EFFECT OF INVESTOR BEHAVIOUR ON STOCK MARKET REACTION IN KENYA

IRENE CHERONO

DOCTOR OF PHILOSOPHY

(Finance)

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AGRICULTURE AND TECHNOLOGY

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Effect of Investor Behaviour on Stock Market Reaction in Kenya

Irene Cherono

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DECLARATION

This thesis report is my original work and has not been presented for a degree in any other university.

Signature……………………….…………………….. Date …………………………...

      Irene Cherono

This thesis report has been submitted for examination with our approval as university supervisors.

Signature……………………….…………………….. Date …………………………...

      Dr. Tabitha Nasieku, PhD

      JKUAT, Kenya

Signature……………………….…………………….. Date …………………………...

      Dr. Tobias Olweny, PhD

      JKUAT, Kenya

DEDICATION

To my mother, Mrs. Nancy Langat and my late dad, Mr. Elisha Langat, thank you for your support.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DEFINITION OF KEY TERMS

Herd Behaviour   occurs when individuals do what everyone else does, even when their private information suggests they should take a different decision (Banerjee, 1992).

Loss Aversion   is the tendency for investors to prefer avoiding losses rather than accruing gains. Kahneman and Tversky (1979) introduced the theory under the assumption that losses have a larger impact on preferences than that of the advantages of gains (Benartzi & Thaler, 1993).

Mental Accounting   is a set of cognitive operations used by individuals and households to organize, evaluate and keep track of financial activities (Thaler, 1999).

Overconfidence   is when investors tend to overestimate the probability of accuracy of their information, their successes and capabilities (De Bondt & Thaler, 1995).

Overreaction   is a market hypothesis stating that investors and traders react disproportionately to new information about a given security causing the security price to change dramatically, so that the price will not fully reflect the security's true value immediately following the event (Soares & Serra, 2005).

Stock Market Reaction is the reversal in the movement of a stock's price which is associated with a downward movement in the price of a stock after a period of upward movement, as investors sell off shares or decrease the volume of buy orders for fear of the stock being overvalued (De Bondt & Thaler, 1985).

Under-reaction is where investors predict the future, they tend to get anchored by salient past events, consequently, they underreact to current news. Positive autocorrelations of returns over relatively short horizons may reflect slow incorporation of news into stock prices. If the news is good, prices keep trending up after the initial positive reaction; if the news is bad, prices keep trending down after the initial negative reaction (Barberis, Shleifer & Vishny, 1998).

ABBREVIATIONS AND ACRONYMS

ABM   Agent-Based Model

ADF   Augmented Dickey Fuller

ADR   American Depositary Receipt

AEX   Amsterdam Exchange Index

AMEX   American Stock Exchange

APT   Arbitrage Pricing Theory

ARCH   Auto Regressive Conditional Heteroscedasticity

ARMA   Auto Regressive Moving Average

BPT   Behavioural Portfolio Theory

BTM   Book to Market

CAPE   Cyclically Adjusted Price Earnings Ratio

CAPM   Capital Asset Pricing Model

CBN   Central Bank of Nigeria

CCK   Chang, Cheng and Khorana model

CDSC   Central Depository & Settlement Corporation

CH   Christie and Huang Model

CMA   Capital Market Authority

CRSP	Center for Research in Security Prices
CSSD	Cross-Sectional Standard deviation.
CZ	Chiang & Zheng (CZ) methods
CSAD	Cross-Sectional Absolute Dispersion
EGARCH	Exponential Generalized Auto Regressive Conditional Heteroscedasticity
EGLS	Efficient Generalized Least Square
EGX	Egyptian Exchange
EMH–	Efficient Market Hypothesis
EUT	Expected Utility Theory
FCSD	Finnish Central Securities Depository
GARCH	Generalized Auto Regressive Conditional Heteroscedasticity
GDP	Gross Domestic Product
GSM	Ghana Stock Market
ICDC	Industrial and Commercial Development Corporation
ICT	Information and Communications Technology
IPO	Initial Public Offering
IQR	Inter-Quartile Range
JSE	Johannesburg Stock Exchange

KQ	Kenya Airways
LM	Lagrange multiplier
LSV	Lakonishok, Shleifer and Vishny
MA	Mental Accounting
MCH	Mispricing – Correction Hypothesis
MIT	Microelectronics Information Technology
M-LPM	Mean-Lower Partial Movement
M -V	Mean Variance
MVT	Mean Variance Portfolio Theory
NSE	Nairobi Securities Exchange
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
PE	Price Earning
PLA	Possession Loss Aversion
PMC	Portfolio-Change Measure
PP	Phillips–Perron
REIT	Real Estate Investment Trust
RTM	Regression to Mean

VAR   Vector Auto Regression

VLA   Valence Loss Aversion

WTA   Willingness to Accept

WTP   Willingness to Purchase

ABSTRACT

Nairobi Securities Exchange has witnessed cases of stock market reactions as a result of extreme price volatility which point to the possibility of underlying inefficiencies which impacts on the shareholder value. Such market reactions are as a result of irrational investor behavior leading to market inefficiencies. The main objective of the study was to determine the effect of investor behavior on stock market reaction in Kenya. Specifically, the study determined the effect of herd behaviour on stock market reaction in Kenya; determined the effect of loss aversion on stock market reaction in Kenya; determined the effect of mental accounting on stock market reaction in Kenya; and determined the effect of overconfidence on stock market in Kenya. Empirical studies on the effect of investor behaviour on stock market reaction are inconclusive especially in the Kenyan setting. The research gap therefore was to determine the effect of investor behavior on stock market reaction in Kenya. The target population was 67 listed companies at the Nairobi Securities Exchange. A sample of 48 listed companies was used in the analysis. Secondary data extracted from NSE historical data on stock prices, volume traded, turnover, number of deals and dividend yield of listed companies for the period 2004 to 2016 was used in the analysis. The study sampled companies that had been listed for at least three years prior to the date of analysis. This was to enable the research to deal with dynamics of time components and to capture investor behaviour variables and stock market reaction in Kenya. This led to unbalanced data and this was a limitation in this research.The study adopted quantitative research design. The descriptive statistics revealed that the variables were normally distributed. The unit root results showed that all the variables were stationary. Pair-wise correlation showed that there was no multicollinearity problem between variables. Panel data regression was adopted. Random Effect Model (EGLS) estimation was effective to explain the objective in this study. The regression coefficients showed that overconfidence and loss aversion variables had a negative statistically significant effect on stock market reaction; herd behavior variable had a positive statistically significant effect on stock market reaction; whereas mental accounting variable had a negative statistically insignificant effect on stock market reaction in Kenya on Random Effect Model EGLS. In conclusion, the null hypothesis was rejected for herd behavior, loss aversion and overconfidence variables because the variables had a significant effect on stock market reactions in Kenya. However, the null hypothesis for mental accounting behavior variable was accepted. This was because mental accounting variable had an insignificant effect on stock market reaction using the EGLS Random Effect Model. Recommendations to CMA are to provide measures to attract more companies to list in NSE to enhance liquidity and efficiency and regulate dominant players to ensure fair competition. Recommendations to NSE are to increase information efficiency by monitoring and improving the trading system, improve the modelling of stock prices and reflect information flow and factor in some behavioural factors and improve on transparency and investor confidence in the stock market. Recommendations to investors were to assess the market sentiments, get information on the fundamental prices of listed stocks, assess the market to identify whether it is bullish, bearish or cattish and look out for bubbles in stock prices.

CHAPTER ONE

INTRODUCTION

1.1 Background

As the economic environment is constantly changing and experiencing periods of economic uncertainty, so do the influences on the decision-making process of investors change (Polasky, Carpenter, Folke & Keeler, 2011). Investors fall prey to psychological traps, triggers and misconceptions that lead them to buying and selling at the wrong time resulting in underperformance in their investments. The psychological phenomena like fear, greed and misconceptions are perpetuated by investor's limited experience and outside influences holding investors at various points of the market cycle. Tversky and Kahneman (1974) explained that investors would overrate recent information, neglecting or attributing less importance to past news, in their prospect revisions, based on their judgment assessments of probabilities. This would lead to excessive optimism over good news and extreme pessimism over bad news. Stock prices would deviate temporarily from their intrinsic values, originating in the medium-long term, leading to a mean-reverting effect.

Stock market overreaction and under-reaction phenomena is inspired by cognitive psychology (Daniel & Hirshleifer, 2015). It is an important challenge to market efficiency and has helped to build the foundations of behavioral finance. Behavioral finance allows for market inefficiency because market participants are subject to common human errors that arise from heuristics and biases (Ramiah, Xu & Moosa, 2015). An investor is considered as rational when he keeps getting new information to update his beliefs and makes choices among available alternatives that are acceptable (Thaler, 2005). Past evidences have proved that human beings are inconstant, irrational and incompetent in their decision making under uncertainty. Individuals are not always rational, and markets are not always efficient.

Efficient Market Hypothesis (EMH) states that stocks are rationally priced such that asset prices fully reflect all available information in the market (Fama, 1970). EMH holds that a stock price accurately reflects full set of available information always such that no one can successfully exploit short-term responses to even extreme price movements. The anomaly of stock price overreaction and under-reaction presents a sufficient challenge to EMH. A common explanation for departures from the EMH is that investors do not always react in proper proportion to new information (Fischer, 2012).

Fama (1998) explained that EMH and stock market anomalies were consistent because overreaction to information was the same as under-reaction, and post-event continuation of pre-event abnormal returns was about as frequent as post-event reversal because long-term return anomalies was sensitive to research methodology used. Fama (1998) followed an earlier dismissal of behavioural finance by Ball (1996) who attacked it on the basis that as an area of study, it was theoretically and methodologically inconsistent. In so doing, Ball (1996), like Fama (1998), limited behavioural finance to a narrow stream of positivist modelling, and event studies, which was abound with anomalies. The critiques demonstrated limited understanding of what behavioural finance was about, as well as narrows the methodological focus through a positivist attack which asserted the core assumptions and research approach of EMH and capital market studies over the anomalous and conflicted evidence of a methodologically weak area that behavioural finance inhabited. Ironically, the objective of behavioural finance was to challenge behavioural assumptions of financial agents (Barberis & Thaler, 2003). Frankfurter (2007) however indicated that the methodology used in behavioural finance studies was no different from those in mainstream modern finance.

Contrary to Fama (1970) on the conventional belief that the markets were rational and efficient, investors' overreacted to both good and bad news. Under-reaction of stock prices to news such as earnings announcements and overreaction of stock prices to a series of good or bad news was based on investor psychological evidence and produced

both under-reaction and overreaction for a wide range of parameter values (Barberis, Shleifer & Vishny, 1998). This caused unjustifiable up and down movements in the stock price and enabled investors to make irrational short-term profits or losses. The prices did not reflect the true value of the stock when the market was inefficient and hence this was followed by a correction in the prices. Persistent overweighting of recent information and underweighting of long-term fundamentals by irrational investor behaviours resulted in overreaction and under-reactions of stock prices. Overreaction and under-reaction in the stock market helped to understand price formation in the stock market. The forces of demand and supply due to investor irrational behavior had direct effect on stock prices, pattern of returns and volume traded (You & Zhang, 2011).

Shefrin and Statman (2011) indicated that investors' decisions were rooted in psychology of aspirations, cognition, emotions, culture and perceptions of fairness. Investors overreacts to performance of companies by selling stocks that have experienced recent losses or buying stocks that had enjoyed recent gains (Farag, 2014). Such overreaction pushed prices beyond their fair or rational market value, only to have rational investors taking the other side of the trades and bringing prices back to the intrinsic values eventually.

Contrarian investment strategies are strategies that loser stocks are purchased and winner stocks were sold to earn superior returns. Soares and Serra (2005) explored the existence of autocorrelation in stock returns by evaluating whether there was a negative autocorrelation in the long run, and positive autocorrelation in the short run and confirmed that the phenomena was caused by investor overreactions and under-reactions.

Saunders (1993) hypothesised that bad weather produced negative feelings and moods of traders and that this had an impact on trade conceived as lower stock prices; on the other hand, good weather had positive effects resulting in higher stock prices. The study analysed weather patterns in New York for the period 1927 to 1989, and found that the

weather had a statistically significant influence, and an economic impact, upon asset prices: defining bad weather through higher levels of cloud cover and good weather as clear days, the author found that there was a significant relationship between stock prices and the level of cloud cover in New York. This suggested that there was a psychological bias that affected trade and/or stock returns. In addition, Lucey (2000) examined Friday close returns on the FTSE world indices from January 1988 to May 2000 for 19 countries, and found that there were significant statistical differences on dates occurring on Friday the 13th of the month, than on any other Friday; in 9 of the 19 countries observed, returns were significantly higher, suggesting the presence of a Friday the 13th effect in stock pricing that was based upon psychological aspects of investor's trading patterns and behaviour.

Behavioral models were developed to explain price momentum and reversal in returns as a continuation followed by reversal in returns to reflect the dynamic interaction between news watchers and momentum traders predicted by the behavioral model (Lin, 2010). Investors are much more sensitive to reductions in financial wealth than to increases, also known as loss aversion. After prior gains, an investor becomes less loss averse because the prior gains cushioned any subsequent loss an investor might incur in future therefore making it more bearable in case he or she incurred loss after incurring gains. Conversely, after a prior loss, an investor becomes more loss averse: after being burned by the initial loss, investors becomes sensitive to additional setbacks and avoided further investments (Barberis, Huang & Santos, 2001). Loss aversion behavior happens when investors become sensitive to decreases in their wealth than increases. This helps explain the tendency of investors to hold on to loss making stocks while selling winning stocks too early (Shefrin & Statman, 2011).

Herding among investors is a popular behavioural finance theory for the excess variability and short-term trends observed in financial markets. Most empirical studies, however, fail to find evidence of herding in spite of testing a variety of theoretical models. One excuse for this failure was the coarse data frequencies employed. Using a

high frequency intraday dataset from the Australian equities market, Henker, Henker and Mitsios (2006) found little evidence for market-wide or industry sector herding. Even in extreme market conditions, participants appeared to discriminate between different securities, as predicted by the rational asset pricing paradigm.

Herd behaviour is regarded as a rational strategy for less sophisticated investors, who imitate the activities of successful investors since the use of their own information and knowledge led to greater cost thus the presence of extreme market movements exacerbated by this behavior (Khan, Hassairi & Viviani, 2011). The cost and time of processing the amount of information generated during those periods was higher than usual, hence led investors to herd. Extreme down-market movements and periods of stress is linked to herd behaviour both directly and indirectly through market volatility to show that the crises significantly increases market volatility. Mobarek, Mollah and Keasey (2014) opined that herd behaviour was more pronounced when market returns, trading volume and return volatility were high. Herd behavior is the most accepted psychological context in the creation of speculative bubbles in the financial markets because of inclination to observe winners mainly when good performance repeated itself.

Noise trading in the stock market is an aspect of herd behavior which follows the fact that investors within a short time horizon manipulates stock prices more than long-term investors. One of the main arguments of behavioral finance is that some properties of asset pricing are most probably regarded as deviations from fundamental values caused by irrational investors called noise traders (Uygur & Taş, 2014). Noise trader theory postulates that sentiment traders have greater impact during high-sentiment periods than during low-sentiment periods, and sentiment traders miscalculated the variance of returns undermining the mean-variance relation. Noise trading existence in the stock markets increasing price volatility and consequently the risk associated with investing in the stock market and the risk premia (De Long, 2005).

De Long, Shleifer, Summers and Waldmann (1990) supported the idea that rational speculators in the presence of positive feedback, investors proceeded to buy today in the hope of selling to noise traders at a higher price the following days, moving the prices even further away from their fundamentals. Individual investors were the culprits of stock market reaction due to noise trading. Irrational investors destabilized markets, by buying when prices were high and selling when the prices were low, whereas rational investors moved the prices closer to their fundamental value, by buying when the prices were low and selling when the prices were high (Blasco, Corredor & Ferreruela, 2012).

Mental accounting describes a tendency of people to place events into different mental accounts based on superficial attributes like dividend paying stocks would be more preferred causing prices to rise above the fundamental values. Mental accounting refers to the implicit method investors use to code and evaluate financial outcomes, transactions, investments and gambles (Benartzi & Thaler, 1995). Investors sometimes disconnects decisions that should in principle be combined. Mental accounting explains why investors are likely to abstain from regarding their reference point for a stock. When a stock is purchased, a new mental account for that stock is opened. The succession score is kept on the account indicating gains or losses relative to purchase price. A normative frame identifies that there is no substantive distinction between returns of stocks.

A combination of mental accounting and risk seeking in the domain of losses led investors to holding onto losing stocks investments and selling winning stocks (Thaler, 1985). Investors made distinctions in their head that did not exist financially. Often, losses incurred were viewed separately from paper losses. This meant that investors sell stocks from their portfolio too soon when they earn a profit and too late when they incur a loss. Turning a paper profit into real profits makes investors happy, but investors' shield away from turning a paper loss into a real loss.

Daniel, Hirshleifer and Subrahmanyam (1998) indicated that investor behavior proposed as an explanation for stock market reaction such as momentum effects in the short horizon and return reversals in the long horizon. Information asymmetry drove price volatility and uninformed investors largely followed the market trend buying when prices rise and selling when the prices fell. Investor behavior explained excess volatility of stock prices based on short run post-earnings announcement drift (Daniel & Hirshleifer, 2015). Barberis, Shleifer and Vishny (1998) explained how investor behavioural biases resulted in overreaction and under-reaction events. Uninformed investors followed any trend that they believed existed in share price behaviour and this trend chasing increased the volatility displayed by the market as these investors were unaware of the fundamental prices of the stock they were trading in and so were unable to stop trading when the intrinsic value was attained.

Investor behavior has strong evidence to cause stock market reaction and explains the causes of market anomalies and is therefore an effective investment strategy by measuring investor irrational behaviors to determine return predictability in the financial markets. Investor behavior causes the ability to predict returns from the under-reactions and overreactions that occurs in the stock market. Short-term price momentum trends after earnings announcements and long-term price reversals after earnings trends explains how investor irrational behaviour drives stock prices away from the fundamental values. Investor behavior variables therefore explains stock market reaction to determine whether profit opportunities exists based on patterns of return predictability. Investors can assess irrational investment behaviors variables to predict abnormal returns (Daniel, Hirshleifer & Subramanyam, 1997).

1.1.1 Investor Behaviour and Stock Market Reaction in Developed Economies

Behavioral finance makes important contributions to the field of investing by focusing on the cognitive and emotional aspects of the investment decision-making process. Although it is tempting to say that people are the same everywhere, the collective set of

7

common experiences that people of the same culture shared influences cognitive and emotional approach to investing (Statman, 2008). People who aspire for the upside are willing to take more risk than people who do not have such aspirations.

Hofstede (2001) explained that in individualistic societies like United States, Australia and Europe, ties among individuals are loose and all are expected to look after themselves and their immediate families only. Group cushion does not exist in individualistic societies. Hsee and Weber (1999) explored whether there is systematic cross-national differences in choice-inferred risk preferences between Americans and Chinese. Findings were explained in terms of a cushion hypothesis, which suggests that people in collectivist societies, such as China, are more likely to receive financial help if they are in need and consequently, they are less loss averse than those in other individualistic society such as the USA. Herding behaviors occurs in Confucian and less sophisticated equity markets in developed economies like China, Japan, Asia and Middle East countries. National culture has an impact on herding behavior because investors from the various countries imitates what and how everyone else is investing (Hofstede, 2001).

Behavioral portfolio theory states that investors divide their money into layers, with some money for downside protection and some money for upside potential (Shefrin & Statman, 2000). Shefrin and Statman (1994) developed an asset pricing model that shows that investors are affected by errors and emotions in their investment decision making process. The tendency of investors to hold losing investments too long and sell winning investments too soon, is a phenomenon known as the disposition effect. An analysis of trading records of all individual investors in the Finnish stock market documents that capital losses reduces the selling propensity of investors. There is, however, no opposite effect identifiable with respect to capital gains. Positive and negative historical returns are somewhat significantly reinforced by the negative association between the selling propensity of investors and capital losses. While these

findings offer no direct support for the disposition effect, the results does suggest that investors are loss averse (Lehenkari & Perttunen, 2004).

Models for herd behavior were developed to understand the group behavior in financial markets among Chinese investors. Chiang, Li and Tan (2010) examined herd behavior of investors in Chinese Stock Market. By applying quantile regression analysis to estimate the herding equation, the author finds supporting evidence of herd behavior in both A-share and B-share investors conditional on the dispersions of returns in the lower quantile region.

The impact of the psychological factors on investors' decision making in the Malaysian stock market shows that overconfidence, conservatism and availability bias has significant impact on the investors' decision making while herd behaviour has no significant impact on the investors' decision making. It was also found that the psychological factors are dependent of individual's gender (Bakar & Yi, 2016). On the relationship between human biases and stock market development in Pakistan, biases included overconfidence, confirmation bias, loss aversion, anchoring bias, framing bias, status quo and myopic loss. Results shows that most biases are significant, however, the results shows a positive relationship with market development, it suggests that despite biases of investors, the market performed well and kept developing, which was contrary to behavioral theories, only one bias of loss aversion had negative relationship with market development but the relationship was insignificant (Khawaja, Bhutto & Naz, 2013). Herd behaviour, overconfidence, availability bias, prospect and market factors all influences the investment decisions of individual investors at the Colombo Stock Exchange (Kengatharan & Kengatharan, 2014).

Overconfidence, conservatism bias and regret had positive significant impact on investors' decision making. However, herd behavior was found to have no impact on investors' decision making (Chin, 2012). Behaviour patterns of individual investors in Ho Chi Minh stock market found that overconfidence, anchoring, herding, loss aversion

and regret aversion had moderate impacts on the investor decision making while market factors had the highest impact among all on the investors' decision making (Thy, 2014). Self-attribution, overconfidence and over-optimism bias behavior in making rational decisions negatively correlated with investors' decision making in the Islamabad Stock Market (Kafayat, 2014). Overconfidence and illusion of control had positive significant impact on investors' decisions at the Islamabad Stock Exchange (Qadri & Shabbir, 2014).

Australian stock market was characterized by a high level of direct stock holdings by individual investors, further enhancing the likelihood of retail investors' influence. Henker and Henker (2010) investigates the Granger causality between investor category trading and stock prices and displayed the relative trading volume of the investor categories. The overreaction hypothesis asserted that stock prices overreacts to unexpected and dramatic news. The behavior of stock prices in New Zealand was examined after a large weekly change in price. The findings suggests that the stock market does overreact, especially in the case of price declines (Bowman & Iverson, 1998).

1.1.2 Investor Behaviour and Stock Market Reaction in Africa

Africa is a collectivistic society where individuals are integrated into strong cohesive in-groups, generally extended families who protect one another in exchange for unquestioning loyalty. Collectivistic societies in Africa provides its members a safety net that is absent in individualistic cultures like America and Europe (Hsee &Weber, 1999). The authors hypothesized that people were more willing to take risk in collectivistic societies than in individualistic societies because they knew that the in-group provided a cushion if they failed.

Hsieh and Hodnett (2011) explained how loser strategy portfolios yielded higher excess market returns with increased holding period in South Africa. Winner strategy portfolios

10

yielded lowered excess market returns with increased holding period. In both cases, there was an apparent regression to the mean. The price reaction of the winner strategy portfolio took prices beyond their fundamental values. The strength of mean reversals was found to be cyclical and fluctuated around the South African business cycle. Study results suggested that contrarian investing could be a haven during the financial market turmoil due to their low correlations with the market during the economic downturn (Hsieh & Hodnett, 2011).

Panicking investors oversold loser shares that had fallen far below their intrinsic value. Investor overreaction on the Johannesburg Stock Exchange shows that there is evidence supporting investor overreaction on the Johannesburg Stock Exchange (Muller, 1999). It suggested that stock market overreacted and that investors paid too much attention to recent dramatic news. If overreaction did occur and prices overshot then there was subsequent revision of stock prices in the opposite direction in South Africa market (Page & Way, 1992).

The impact of overconfidence as a behavioral bias stemmed from the second building block of behavioral finance on cognitive psychology and affected traders' beliefs and thereby their trading behavior in form of excessive trading in the Egyptian Stock Market (Metwally & Darwish, 2015). Market states were found to be strongly affecting the trading activity within the Egyptian Stock Market, especially in an upward trending market. Trading activity was triggered by investors' overconfidence when the Egyptian Stock Market was upward trending. There was also a positive significant impact of market gains on market turnover in subsequent periods. There was no herding present in the Egyptian stock market using daily returns data of the 20 most traded stocks in the Egyptian Exchange in addition to the daily returns of the market index EGX 100 during a period of five years from January 2006 till December 2010 (El-Shiaty & Badawi, 2014).

Shusha and Touny (2016) researched on the attitudinal determinants of herd behavior for individual investors in the Egyptian Exchange. The results indicated that decision accuracy, hasty decision, and investor mood were the main attitudinal determinants that explained why individual investors followed herd behavior, but the effect of these factors differed according to the investor's demographic characteristics.

Strong evidence of overconfidence, loss aversion, framing and the status quo bias existed among Nigerian investors. A weak negative relation between the biases and stock market performance was also established. Babajide and Adetiloye (2012) revealed that investors were not always as rational as they were portrayed to be. Behavioural finance considered how various psychological traits affects how individuals or groups act as investors, analysts and portfolio managers. Investor confidence in Nigerian Stock Exchange was mainly driven by the opinion of fellow investors. This opinion of fellow investors on its own was not based on calculated study of the market but on fears and optimisms of investors about the market. Confidence or loss of confidence of investors in the market was neither influenced by movements of the firms' fundamentals nor the overall macroeconomic environment but investor behavioural biases (Chidi, Agu & Ande, 2013).

Alalade, Okonkwo and Folarin (2014) found strong evidence that behavioural biases exists but are not very dominant in the Nigeria stock market because a weak negative relationship existed between behavioural biases and stock market returns in Nigeria. The authors concludes that being aware of behavioural biases in the Nigerian stock market is a crucial first step in ensuring that investment decisions are properly controlled to avoid any negative impacts on the individual investors and on the stock market; again, the research concluded that behavioural biases was of relevant consideration in portfolio construction to moderate these biases.

The impact of overconfidence bias on the decisions of investors, on evaluation of the relationship between the overconfidence bias, trading volume and volatility indicates the

importance of overconfidence bias in the analysis of characteristics of the Tunisian financial market (Adel & Mariem, 2013).

The asset pricing characteristics and response to annual earnings announcements of the Ghana Stock Market (GSM) were the two main objectives hypothesized that the GSM, as a typical African emerging stock market, was not efficient with respect to annual earnings information released to the market. The assessment of the market response to information was done by measuring abnormal returns over a 17-week event window when the annual earnings information was released (Osei, 2002). The study establishes that the market continues drifting up or down beyond the announcement week, i.e., week zero. This was inconsistent with the efficient market hypothesis (EMH). The conclusion was that the Ghana Stock Market is inefficient with respect to annual earnings information released by the companies listed on the exchange.

1.1.3 Investor Behaviour and Stock Market Reaction in Kenya

Kenya being an African country practices collectivist culture that influences investor investment decisions. Nairobi Securities Exchange has witnessed cases of stock market reaction because of extreme price volatility which point to the possibility of underlying inefficiencies which impacts on the shareholder value. Using analysis of monthly returns on stocks, evidence of overreaction and under-reactions of investors in the Nairobi Securities Exchange was witnessed (Aduda & Muimi, 2011).

In Kenya, there has been incidences of stock market reactions in the Nairobi Securities Exchange caused by investor irrational behavior like herd behavior, loss aversion, overconfidence and mental accounting as evidenced by the 2008 Safaricom IPO for example was overwhelmingly oversubscribed and traded at below the par value of Kshs. 5 for over 5 years after the IPO with the shares going for as low as Kshs. 2.00. The scramble for Safaricom's stock was as a result of investor irrational behavior witnessed anchored by salient past events of the lucrative returns seen in the 2006 KenGen IPO

where the power producer's share price was more than triple after listing the offer at Kshs.11.90 per share. Evidence of existence of behavioural effects on individual investment decision making process existed in the NSE (Mbaluka, 2008).

Werah (2006) suggested that the behaviour of investors at the NSE was to some extent irrational regarding fundamental estimations because of anomalies such as herd behaviour, regret aversion, overconfidence and anchoring. Overconfident investors may sell winners but were less willing to sell losers. This was witnessed in the Mumias Sugar Company share investments at NSE. Kenya's investors bought the Mumias Sugar Company stock at its peak and held it prospecting profitability of the stock returns in future. Individual investors had their investment decisions affected by loss aversion behavior bias. Overreaction and under-reaction of share prices had been witnessed in the Mumias Sugar Company share. It presented a very bitter lesson on how unabated mismanagement could destroy shareholder wealth of Mumias Sugar Company which is currently trading at the lowest price of Kshs. 0.70.

Behavioural factors such as representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion and mental accounting affected the decisions of investors investing at NSE (Waweru, Munyoki & Uliana, 2008). Loss aversion affected investor decisions at NSE, investors were frame dependent and loss averse (Mbaluka, Muthama & Kalunda, 2012). Loss aversion behavior has been witnessed with investors that held shares at Uchumi Supermarkets Limited. The investors after learning in early 2000s when Uchumi Supermarkets Limited started experiencing financial and operational difficulties that were caused by a sub-optimal expansion strategy, poor internal control systems and mismanagement that the share prices were losing value, the investors still held the shares in the hope that the financial performance would improve.

Human psychology played a role in investment choices based on assessment of returns and investor behavior influenced investor decisions at NSE (Kotieno, 2012). Kenya

Airways stock closed 2016 at 19.39% higher than 2015. Herding behaviour was witnessed on the KQ share towards the end of the year 2016 when one big investor purchased its shares worth Kshs.2 million. Herd behaviour was witnessed to cause increase in the KQ share prices because other investors imitated the big investor by buying the share pushing the prices higher for the troubled Kenyan airline.

Aduda and Muimi (2011) tested for investor rationality for companies listed at the Nairobi Stock Exchange and the results were consistent with the notion of overreaction, showing that investors overreacted to both good and bad news. However, the authors did not examine the investor behavior variables to find out how the effect on stock market reaction to assess the abnormal returns at the NSE. Aduda and Muimi (2011) tested overreaction by investors to news and performance of companies listed at the Nairobi Securities Exchange as an anomaly that had been proven in other markets.

Investigations on whether NSE was efficient and in what form of efficiency had been studied in previous research. Kiprono (2014) found evidence of significant abnormal price reaction around the earnings announcement periods suggesting that earnings announcements did contain relevant information. Earnings announcements provided a yardstick that was utilized by the market to assess the wealth and profitability of a firm. If the market was efficient, then any new information released was instantaneously reflected in the share price. Therefore, as earnings were publicly announced, the share price immediately reflected this announcement and therefore denied investors any above-average risk-adjusted profits. However, investor behavior after the announcement of earnings, determined the demand and supply based on purchases and sales of stock and that was determined in this research on its effect on stock market reaction in Kenya.

1.2 Statement of the Problem

The decisions of investors in the stock market play an important role in determining the market trend, which then affects the economy (Wan, Cheng & Yang, 2014). Stock

market reaction occurs when stock prices are driven away from fundamental values, and then the prices gradually revert to the fundamental values. EMH could not address stock market anomalies of market inefficiencies caused by irrational investor behaviors. Stock market anomalies indicated either market inefficiency, profit opportunities or inadequacies in the underlying asset-pricing model. Stock prices are driven away from the fundamental values by the market forces of demand and supply based on investor irrational behavior in their investment decisions. Systematic risk, size effect, liquidity i.e. buy-ask spreads, macroeconomic factors and value effect did not hold up in different sample periods and showed that the measures had lost predictive power to be used as a measure of investment strategy. A model to determine the effect of investor behavior variables on stock market reaction is likely to provide an effective investment strategy to determine returns predictability in the financial markets. Individuals overweighed recent information and underweighted prior data or base rate, causing stock market reaction in violation of the Bayes rules (Debondt & Thaler, 1985). Stock market reaction therefore was caused by investor irrational behavior leading to stock market inefficiencies.

Investors at the NSE equity market lost close to Kshs. 500 billion in 2016 to a market value of Kshs. 1.931 trillion as share prices declined by 25.35% compared to 2015 which was valued at Kshs. 2.42 trillion (The CMA Quarterly Capital Markets Statistical Bulletin – Q2/2016). The demand for stocks had been limited by a continued wait-and-see attitude by investors amid persistent volatility which had had an effect on the stock prices at Nairobi Securities Exchange.

Mbaluka (2008) established the existence of behavioural effects on individual investment decision making process at the NSE. Werah (2006) suggested that the behavior of investors at the NSE was to some extent irrational regarding fundamental estimations because of anomalies such as herd behaviour, regret aversion, overconfidence and anchoring. Aduda and Muimi (2011) confirmed evidence of investor overreaction and under-reaction at the NSE. Previous studies have looked at the impact of investor behaviour biases on investment decisions, investor performance and stock

16

market developments. An investor behavior model was needed to explain the observed pattern of abnormal returns that explained stock market reactions. The research used investor behavioral variables i.e. herd behaviour, loss aversion, mental accounting and overconfidence to determine predictability of abnormal returns in Kenya. Research gap was to develop a model that provides an effective investment strategy to determine return predictability in the financial market using investor behavior biases variables.

1.3 Research Objective

The general objective based on specific objectives are as follows:

1.3.1 General Objective

The general objective was to determine the effect of investor behavior on stock market reaction in Kenya.

1.3.2 Specific Objectives

1. To determine the effect of herd behavior on stock market reaction in Kenya.

2. To determine the effect of loss aversion on stock market reaction in Kenya.

3. To determine the effect of mental accounting on stock market reaction in Kenya.

4. To determine the effect of overconfidence on stock market reaction of in Kenya.

1.4 Research Hypotheses

This study addressed the following pertinent research hypotheses;

H_{01}: Herd behavior has no significant effect on stock market reaction in Kenya.

H_{02}: Loss aversion has no significant effect on stock market reaction in Kenya.

H_{03}: Mental accounting has no significant effect on stock market reaction in Kenya.

H_{04}: Overconfidence has no significant effect on stock market reaction in Kenya.

1.5 Academic Significance of Study

This research is likely to guide Capital Markets Authority on the effect of investor behavior on abnormal returns resulting into stock market reaction. The study will be useful to policy makers and investors in the stock markets to consider behavioral factors on their investment decisions. The study will ensure economic stability could be enhanced by policy makers through putting in policies that enhance effective asset allocation in the capital markets. It will ensure the government and private planners establish ex ante rules to improve choices and efficiency, including disclosure, reporting, advertising and default-option-setting regulations.

It is likely to ensure the government avoids actions that exacerbate investor biases because deviations in stock prices increase volatility in the stock market. CMA will use this study to monitor and regulate by ensuring listed companies offer sufficient information promptly for the investors to reduce investor irrational behaviors. Companies going public can use the findings of this study to understand how investor behavior influence the price of securities and hence can set realistic prices that will attract the investors they target without distorting the market.

The findings of this study is likely to help stockbrokers and fund managers to understand investor behavior and advise the investors appropriately. The Nairobi Securities Exchange and other market players can use these findings as a basis of investor education and minimization of noise trading in the Kenyan market.

1.6 Scope of Study

The study determined the effect of investor behavior on stock market reaction in Kenya. The population for this study comprised of all the 67 listed companies at the NSE for the period of 2004 to 2016. A sample of 48 listed companies was used in this study. The period 2004 to 2016 was sufficient to cover stock market reaction during periods of

market stress, recovery periods of the market and the current price declines experienced at the NSE.

1.7 Limitation of the Study

The process of collecting the secondary data brought challenges of companies that were listed for a short period. The study sampled companies that had been listed for at least three years prior to the date of analysis. This was to enable the research to deal with dynamics of time components and to capture investor behaviour variables and stock market reaction in Kenya. This led to unbalanced data and that was a limitation in this research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discussed literature review on the effect of investor behavior on stock market reactions in Kenya. The conceptual framework and a review of past studies done in this area were included. A critique of empirical review and research gaps were also discussed in this chapter.

2.2 Theoretical Literature

This section explained the theoretical literature from prior researchers regarding the effect of investor behaviour on stock market reaction.

2.2.1 Contrarian Hypothesis

Contrarian investments strategy claims that today's losers are tomorrow's winners and today's winners are tomorrow's losers' and hence the investment strategy based on buying today's losers and selling today's winners should generate superior returns. Alexander (1961) was an earlier proponent of contrarian hypothesis who formulated the filter technique to test the belief widely among market professionals that market prices adjust gradually to new information. The author identified movements in stock prices by x-filter technique i.e. if a security prices go down by a percentage, buy and hold the security until its price moves up by a percentage then you sell at a profit.

Fama and Blume (1966) explained that a stock market reaction was a dependent model where successive price changes were dependent on investor behavior. Samuelson (1967) showed that under general conditions, available information in prices followed a martingale which may or may not have the independence property of a pure random walk. Levy (1967) claimed that a trading rule that buys stocks with current prices that

were substantially higher than their average prices over the past 27 weeks realized significant abnormal returns. Mandelbrot (1971) showed that under general conditions, available information in prices followed a martingale which may or may not have the independence property of a pure random walk.

Jensen and Bennington (1970) analyzed the profitability of Levy's trading rule over a long-period that was, for the most part, outside Levy's original sample period. The authors found that in their sample period Levy's trading rule did not outperform a buy and held strategy and hence attributed Levy's result to a selection bias. Beaver and Landsman (1981) suggested the possibility that 'abnormal' returns observed after certain events like earnings announcements may at least in part reflect more general phenomena associated with being 'winners' and 'losers' in terms of residual returns in the months before the event. Ohlson and Penman (1985) further suggested that the increased volatility of security returns following stock splits might also be linked to overreaction.

De Bondt and Thaler (1985) found results that point to inefficient pricing in financial markets. The research suggested a pattern of under-reaction: over a six-month period, the return on winning stocks exceeded that on losing stocks. De Bondt and Thaler (1987) explained that stock prices also overreact to information, suggesting that contrarian strategies, buying past losers and selling past winners, achieve abnormal returns. The authors interpreted this finding as consistent with Behavioral Hypothesis of investor overreactions based on firm size and differences in risk as measured by CAPM-betas and found systematic price reversals for stocks that experience extreme long-term gains or losses. Past losers significantly outperform past winners. Under-reaction was said to occur if the market price did not move upward far enough following a signal of good news or, downward enough following bad news.

Brown and Harlow (1988) hypothesized that investors could be said to overreact when unexpected favourable or unfavourable announcements induced trading behavior that resulted in price appreciation or depreciation. That was excessive relative to the actual

value implied by the nature of the event. Mutual funds were formed to take advantage of eventual market corrections to stock prices (Brown & Harow, 1988). Chan (1988) proposed a new method to measure the market risk beyond CAPM, allowing time-varying betas. Zarowin (1989) argued that the results of De Bondt and Thaler (1985) (1987) could be contaminated by the Size-Effect and/or the January Effect. Alonso and Rubio (1990) examined the overreaction hypothesis within the Spanish capital market. The hypothesis was clearly accepted even after correcting for size when estimating excess returns. Twelve months after portfolio formation, losers win 24.5% more than winners. There was also a correspondence between excess returns and changes in the earnings pattern of losers and winners' firms.

Zarowin (1990) concluded that stock market overreactions where losers outperformed winners during a period in the subsequent 3-year period was due to size discrepancies between winners and losers since losers tended to be smaller than winners and not investor behavior. Power, Lonie and Lonie (1991) tested for mean-reverting tendencies in the accounting ratios of 'excellent' and 'non-excellent' UK companies and also in the market returns of these companies' shares over the period 1973–1987.

Chopra, Lakonishok, and Ritter (1992) used a multiple regression format incorporating size, prior returns and betas and found that the overreaction effect was economically significant, in that, for portfolios formed based on prior 5-year returns, extreme prior losers outperform extreme prior winners by 5% to 10% per year in the subsequent 5 years. Conrad and Kaul (1993) found evidence from US market that the contrarian strategy was profitable for short-term either weekly, monthly or long-term i.e. 2 to 5 years, or longer intervals, while the momentum strategy was profitable for medium-term i.e. 3 to 12-month).

Da Costa (1994) suggested that differences in risk, as measured by CAPM-betas using the method suggested. The author examined the issue of asymmetry versus symmetry in the overreaction effect and found evidence that the price reversals were asymmetric.

Lakonishok, Shleifer and Vishny (1994) documented that Value Strategies were profitable and linked this result with the Overreaction Hypothesis as well. The authors found that those growth rates were superior for glamour stocks before the formation period, but were inferior 2 to 5 years after that, suggesting that investors mistakenly extrapolated the growth rates of fundamental values such as the sales, Overreacted, and gradually proceeded the Mean Reverting, adjusting their expectations and pushing the prices back to the intrinsic values.

Clare and Thomas (1995) used UK data from 1955 to 1990 drawn from random sample up to 1000 stocks in any one year. The author found that losers outperformed previous winners over a two-year period by statistically significant 1.7% per annum. Clare and Thomas (1995) found that overreaction may in fact be a manifestation of the small firm effect. Campbell and Limmack (1997) found that in the 12 months following portfolio formation 'loser' companies continued to experience negative abnormal returns and 'winner' companies persisted in generating positive abnormal returns, thus appearing to contradict the findings of US studies which support the 'winner-loser' effect. Bernstein (1996) characterized this overreaction and under reaction as RTM. Bodie, Kane and Marcus (1996) brought out the Fads Hypothesis. The authors asserted that overreaction led to positive serial correlation, momentum, over short time horizons. Subsequent correction of the overreaction led to poor performance following good performance and vice versa. The corrections meant that a run of positive returns eventually would tend to be followed by negative returns, leading to negative serial correlation over longer investment horizons.

Barberis, Shleifer and Vishny (1998) presented a model of investor sentiment that displayed under-reaction of stock prices to news such as earnings announcements and overreaction of stock prices to a series of good or bad news. Amir and Ganzachb (1998) examined the hypotheses derived from behavioral decision theory regarding conditions that led to overreaction and conditions that led to under-reaction in analysts' earnings forecasts. The authors argued that three heuristics jointly influenced earnings forecasts:

leniency, representativeness and anchoring and adjustment and presented a model for the concurrent influence of these heuristics on forecast errors, and examined three predictions of this model that there was a tendency towards overreaction in forecast changes and under-reaction in forecast revisions, that there was overreaction to positive forecast modifications and under-reaction to negative forecast modifications, and that these biases increased with the forecast horizon

Daniel, Hirshleifer and Subrahmanyam (1998) proposed a theory of security markets based on investor overconfidence, about the precision of private information and biased self-attribution, which caused changes in investors' confidence as a function of their investment outcomes, which led to market under-reactions and overreactions. The authors indicated that investor behavior had been proposed as an explanation for stock market reactions such as momentum effects in the intermediate (short) horizon and return reversals in the long horizon. Fama (1998) showed anomalies were consistent with market efficiency was split randomly between underreaction and overreaction.

Hong and Stein (1999) modelled a market populated by two groups of bounded rational agents: news watchers and momentum traders which led to under-reaction at short horizons and overreaction at long horizons. Veronesi (1999) presented a dynamic, rational expectations equilibrium model of asset prices in which, among other features, prices overreacted to bad news in good times and underreacted to good news in bad times. Dreman and Lufkin (2000) found that investor behavior had been identified as the major cause of financial bubbles and crashes. The authors found that investor behaviour variables influenced stock market reactions.

Lee and Swaminathan (2000) showed that past trading volume provides an important link between momentum and value strategies and these findings help to reconcile intermediate-horizon under-reaction and long-horizon overreaction effects. Mun, Vasconcellos and Kish (2001) explained that Contrarian/Overreaction Hypothesis implied simultaneously buying (long) previous losers and selling (short) previous

winners to realize excess returns. Cooper, Gutierrez and Hameed (2003) considered the state of the market as a proxy for investor sentiment and for risk aversion, found that the momentum profits only occurred when the market was bullish, which could be in favor of the Overreaction Hypothesis. The rationale was that investors were overconfident about their private information and overreact to it. In up-markets this sentiment, associated with Self-Attribution Bias, generated high levels of overconfidence.

Offerman and Sonnemans (2004) explained that past losers outperformed past winners in stock markets by explaining the recency and hot-hand hypotheses as consistent with this observation. The recency hypothesis states that investors over weighted recent information; they are too optimistic about winners and too pessimistic about losers. Hot-hand hypothesis explained that traders tried to discover trends in the past record of a firm or a team, and thereby overestimated the autocorrelation in the series.

Frank (2004) found that overreaction was said to occur if the market moves upward too far following good news or, moves downward too far after bad news. The author explained that the cause of existence of stock market reactions in the stock market had been linked to investor behaviour. Soares and Serra (2005) explained that serial correlation in returns was contradictory evidence to the EMH and random walk hypothesis, coupled with anecdotal evidence of heuristic practices by investors, challenged the assumption of rational price setting. Overreaction and under-reaction in the stock market facts helped to understand price formation in the stock market.

Blitz, Huij and Martens (2011) proposed the conventional momentum strategies exhibited substantial time-varying exposures to the Fama and French factors. The authors showed that these exposures could be reduced by ranking stocks on residual stock returns instead of total returns. Therefore, residual momentum earns risk-adjusted profits that were about twice as large as those associated with total return momentum; was more consistent over time; and less concentrated in the extremes of the cross-section

of stocks. The results were inconsistent with the notion that the momentum phenomenon could be attributed to a priced risk factor or market microstructure effects.

Daniel and Hirshleifer (2015) theorized that the link between investor behaviour and market volatility had been argued that irrational investors destabilize prices by buying when prices were high and sell when prices were low in contrast to rational investors that led the prices towards their fundamentals by buying low and selling high. Stock market reactions were predictable patterns of return making the stock market inefficient, unprofitable active trading due to mispriced stocks caused by excess price volatility, not to mention excess trading that resulted in investors losing opportunities to earn gains on their investments

The relevance of this theory was to explain the effect of investor behavior on stock market overreactions in the financial markets. The Contrarian Hypothesis helped to assess investor behavior in the simultaneously buying (long) previous losers and selling (short) previous winners to realize excess returns. The hypothesis analyzed that previous losers were undervalued due to investor overreaction possibly instigated by some adverse news and events. Given adequate time, previous losers outperformed the market. Conversely, the overvalued previous extreme winners underperformed the market in subsequent periods.

2.2.2 Under-reaction Hypothesis

Under-reaction hypothesis originated from conservatism bias from an experiment run (Edwards, 1968) where there were two urns, one containing 3 blue balls and 7 red ones, and the other containing 7 blue balls and 3 red ones. A random draw of 12 balls, with replacement, from one of the urns yields 8 reds and 4 blues. In Edwards' experiment, the draw of 8 red and 4 blue balls is not particularly representative of either urn, possibly leading to an overreliance on prior information. Behavioral finance argued that this behavior could be led by Conservatism as suggested in Edwards (1968) where

conservative investors underweighted and slowly processed new information that was gradually incorporated into prices. Several empirical studies challenged the under-reaction argument for explaining the observed momentum effect in returns and proposed alternative hypotheses.

Lo and MacKinlay (1990) argued that a large part of the abnormal returns was attributable to a delayed stock price reaction to common factors rather than to overreaction. Jegadeesh (1991) provided evidence on the relation between short-term return reversals and bid-ask spreads that supported this interpretation. Abarbanell and Bernard (1992) showed that average returns around the quarter earnings announcements were positively significant, following positive earnings surprises in the previous quarter. The authors claimed that this evidence supported the hypothesis of under-reaction. Jegadeesh and Titman (1993) were the first to refer the pattern of under-reaction in returns. The authors found that the momentum premium was higher for high volume stocks both for the winner and the loser portfolios. A strategy of buying high volume winners stocks and selling high volume losers stocks yielded superior returns when compared with the simple price momentum strategy.

Dreman and Berry (1995) explained that Mispricing-Correction Hypothesis was positive and negative earnings surprises affected best high-P/E and worst low-P/E stocks in an asymmetric manner that favoured worst stocks using the Abel Noser data base in New York. Long-term reversion to the mean, in which worst stocks displayed above-market returns while best stocks showed below-market results, regardless of the sign of the surprise, continues for at least 19 quarters following the news. These results were consistent with mispricing or overreaction to events, and a corrective price movement after the surprise was consistent with under-reaction. The author explained the superior returns of contrarian strategies, the idea that the original mis-pricing was followed by corrective price action (Mispricing Correction Hypothesis - MCH).

27

Chan, Jegadeesh and Lakonishok (1996) findings were consistent with under-reaction by investors, since they observed, simultaneously, momentum and a continuation trend in earnings surprises around the announcement dates. Fama (1998) showed anomalies split randomly between under-reactions and overreactions were consistent with market efficiency based on research methodology. Barberis, Shleifer and Vishny (1998) presented a model of investor sentiment that displayed under-reaction of stock prices to news such as earnings announcements and overreaction of stock prices to a series of good or bad news. The author constructed a model in which investors used the prevalence of past trend reversals as an indicator of the likelihood of future reversals. The author argued that investors initially underreacted to new information because of conservatism bias but would eventually overreacted to a series of similar information. This latter effect, the so-called representativeness bias, interacted with conservatism bias to generate the observed temporal patterns in stock returns.

Amir and Ganzachb (1998) examined hypotheses derived from behavioral decision theory regarding conditions that led to overreaction and under-reaction in analysts' earnings forecasts. The authors argued that three heuristics jointly influenced earnings forecasts: leniency, representativeness and anchoring and adjustment. The authors presented a model for the concurrent influence of these heuristics on forecast errors and examine three predictions of this model: that there was a tendency towards overreaction in forecast changes and under-reaction in forecast revisions, that there was overreaction to positive forecast modifications and under-reaction to negative forecast modifications, and that these biases increased with the forecast horizon.

Lee and Swaminathan (2000) examined the relationship between the momentum effect and turnover volume. The volume would proxy for the level of investor interest in a stock. Shane and Brous (2001) provided evidence that analysts and investors corrected under-reaction in response to the next earnings announcement and non-earnings-surprise information available between earnings announcements. The author's evidence also suggested that analysts and investors underreacted to information reflected in analysts'

earnings forecast revisions and that non-earnings-surprise information helps correct this under-reaction as well. Controlling for corrective non-earnings-surprise information significantly increases estimates of the degree to which analysts' forecasting behavior can explain drifts in returns following both earnings announcements and analysts' earnings forecast revisions.

Raedy, Shane and Yang (2006) provided empirical evidence that under-reaction in financial analysts' earnings forecasts increased with the forecast horizon and offered a rational economic explanation for this result. The author's empirical evidence suggested that analysts' earnings forecasts underreact to both types of information, and the under-reaction increased with the forecast horizon. The authors' incentives-based explanation for under-reaction provided an alternative to psychology-based explanations and suggested avenues for further research.

Caylor, Christensen, Johnson and Lopez (2015) investigated whether the trajectory of the current-quarter earnings expectation path defined by the signs of the forecast revision and the earnings surprise provided information about future firm performance, and the extent to which analysts and investors reacted to that information. The results indicated that analysts underreacted more to earnings information revealed by consistent-signal earnings expectation paths than to earnings information communicated by inconsistent-signal expectation paths. The authors found that the current earnings expectation path provided incremental explanatory power for future abnormal returns, even after controlling for the sign and magnitude of the earnings surprise. Overall, the evidence is consistent with under-reaction stemming from analysts' and investors' bias in processing the information in consistent-signal earnings expectation paths.

The relevance of this theory was to explain the effect of investor behavior on stock market under-reactions in the financial markets. Conservative investors underweight and slowly process the new information and was therefore gradually incorporated into stock prices causing under-reaction in the stock market.

2.2.3 Expected Utility Theory

Expected utility theory is a theory about how to make optimal decisions under risk. The theory was developed in 18th-century in Switzerland and became popular after it was formalized in the mid-20th century. Bernoulli (1713) was the first proponent who described the St. Petersburg paradox, involving infinite expected values, prompting two Swiss mathematicians to develop expected utility theory as a solution. The theory described more realistic scenarios where expected values were finite than expected values. Neumann and Morgenstern (1944) claimed that preferences were defined over a domain of lotteries given an essential ingredient of any model trying to understand asset prices or trading behavior was an assumption about investor preferences, or about how investors evaluated risky gambles. The clear majority of models assumed that investors evaluated gambles as per the expected utility framework.

Friedman and Savage (1948) suggested that an important class of reactions of individuals to risk could be rationalized by a rather simple extension of orthodox utility analysis. Individuals frequently must or could choose among alternatives that differ among other things, in the degree of risk to which the individual will be subject. Expected utility theory assumed that the individual maximized his expected return based on the weighted sum of the various possible outcomes, with each weight being equal to the probability that the corresponding outcome would be realized. Furthermore, the theory assumed that the utility of a final state only depended on the final state; how this final state was reached was irrelevant.

Kahneman and Tversky (1979) explained that the theory usually assumed that the individual was risk averse in that per expected utility a prospect was acceptable to an individual if the utility resulting from integrating the prospect with the individual's assets exceeds the utility of those assets, u (w). The concavity of the utility function was not necessary for expected utility theory, but it was generally assumed to describe the preferences of a representative individual and implied that the typical individual was risk

30

averse. Kahneman and Tversky (1982) showed that expected utility theory was often used as a descriptive theory, that was a theory of how people did make decisions or as a predictive theory, that was a theory that, while it might not accurately model the psychological mechanisms of decision-making, correctly predicted people's choices. Expected utility theory made faulty predictions about people's decisions in many real-life choice situations; however, this did not settle whether people should make decisions based on expected utility considerations.

Caplin and Leahy (2001) extended expected utility theory to situations in which agents experienced feelings of anticipation prior to the resolution of uncertainty. The authors showed how those anticipatory feelings could result in time inconsistency. The authors provided an example from portfolio theory to illustrate the potential impact of anticipation on asset prices that could account for persistent gambling provided the rates span the rate of time preference. Hartley and Farrel (2002) investigated the ability of expected utility theory to account for simultaneous gambling and insurance. Contrary to a previous claim that borrowing and lending in perfect capital markets removed the demand for gambles, the authors showed expected utility theory with non-concave utility functions explained gambling. When the rates of interest and time preference were equal, agents seek to gamble unless income falls in a finite set of values. When they differed, there was a range of incomes where gambles were desired. Different borrowing and lending rates could account for persistent gambling provided the rates span the rate of time preference.

Bhattacharya and Garrett (2008) used a theoretical extension of the Friedman and Savage (1948) utility function. The authors predicted that for assets with negative expected returns, such as state lottery games, expected return would be a declining and convex function of skewness. Lottery player's trade-off expected return for skewness.

Buchak (2014) presented a more general theory of decision-making, risk-weighted expected utility (REU) theory, of which expected utility maximization was a special

case. There were decision problems where the preferences that seemed rational to many people couldn't be accommodated within orthodox decision theory in the natural way. In response, a few alternatives to the orthodoxy have been proposed. The author offered an argument against those alternatives and in favor of the orthodoxy. Pettigrew (2015) introduced the orthodox theory of instrumental rationality, Expected Utility (EU) theory, severely restricted the way in which risk-considerations could figure into a rational individual's preferences. The author argued that this was because EU theory neglected an important component of instrumental rationality.

The relevance of expected utility theory was to capture people's attitudes to risky gambles as parsimoniously as possible. Expected utility theory is an essential ingredient of any model trying to understand asset prices or trading behavior as an assumption about investor preferences, or about how investors evaluated risky gambles.

2.2.4 Efficient Market Hypothesis

The traditional classical economists always precluded that the market is efficient hence the Efficient Market Hypothesis, in that the stock prices always reflects full information that is available in the market at the time. Fama (1970) was a proponent of the efficient market hypothesis who defined an efficient market as one where the prices reflect all the information available in the market at the time. However, there has been a growing interest, fathomed by proponents of behavioral finance, in the study of investor behavior in the capital markets and how they affected the stock prices both in the short run and in the long run. Behavioral finance has two building blocks: limit to arbitrage which argued that it could be difficult for rational traders to undo the dislocation caused by less rational traders; and psychology which explained the kinds of deviations from full rationality.

Shiller, Fischer and Friedman (1984) explained a fundamental error in the argument for the efficient markets model. The authors said that it overlooked the fact that the

statistical tests had not shown that returns were not forecastable; they had shown only that returns were not very forecastable. The efficient markets model could be equally consistent with the usual finding in the event-studies literature that announcements had their effect on returns as soon as the information becomes public and had little predictable effect thereafter.

Buffett (1984) argued against EMH, saying that the preponderance of value investors among the world's best money managers rebuts the claim of EMH proponents that luck is the reason some investors appear more successful than others. Malkiel (1999) showed that over the 30 years (to 1996) more than two-thirds of professional portfolio managers have been outperformed by the S&P 500 Index and, more to the point, there was little correlation between those who outperformed in one year and those who outperformed in the next.

Fama (1998) reviewed over twenty studies of behavioural finance, finding that their apparent challenge against the market efficiency hypothesis was, in most cases, embarrassing owing to the predominant focus of the studies on anomalies to the EMH: overreaction and under-reaction to market events, which led to either over- or under-valuation of stocks and assets and suggested that the market was not as efficient as theorized in EMH. Fama (1998) criticized behavioural finance studies that they were not pure event studies, and hence did not engage fully in the precepts of modern finance methodology. Fama's dismissal of behavioural finance attacks it on the basis that, as an area of study, it was theoretically and methodologically inconsistent. In so doing, Fama (1998) explained that market efficiency survived the challenge from the literature on long-term return anomalies. Consistent with the market efficiency hypothesis that the anomalies were chance results, apparent overreaction to information was about as common as under-reaction, and post-event continuation of pre-event abnormal returns was about as frequent as post-event reversal. Most important, consistent with the market efficiency prediction that apparent anomalies could be due to methodology, most long-term return anomalies disappeared with reasonable changes in technique.

Lo (2004) proposed a new framework that reconciled market efficiency with behavioral alternatives by applying the principles of evolution of competition, adaptation and natural selection to financial interactions. The author argued that much of what behaviorists cited as counter examples to economic rationality are loss aversion, overconfidence, overreaction, mental accounting, herding and other behavioral biases were in fact consistent with an evolutionary model of individuals adapting to a changing environment via simple heuristics.

Lo (2005) reviewed the case for and against the Efficient Markets Hypothesis and described a new framework, the Adaptive Markets Hypothesis, in which the traditional models of modern financial economics could co-exist alongside behavioral models in an intellectually consistent manner. Many of the examples that behaviorists cite as violations of rationality that were inconsistent with market efficiency are loss aversion, overconfidence, overreaction, mental accounting, herding and other behavioral biases and were in fact consistent with an evolutionary model of individuals adapting to a changing environment via simple heuristics.

Yen and Lee (2008) summarized from the methodological perspective the empirical findings from 1960s through 1990s bearing on the EMH under the headings supporting empirical findings as documented in 1960s, mixed empirical findings as merged in the late 1970s through 1980s and challenging empirical findings as appeared in 1990s. The authors moved on to sketch the ongoing debate in the 21st century based on empirical evidence available and then presented an overall assessment of the EMH.

Sewell (2011) explained that a market was said to be efficient with respect to an information set if the price 'fully reflects' that information set, i.e. if the price would be unaffected by revealing the information set to all market participants. The efficient market hypothesis (EMH) asserts that financial markets are efficient. On the one hand, the definitional 'fully' was an exacting requirement, suggesting that no real market could ever be efficient, implying that the EMH was almost certainly false. On the other hand,

economics is a social science, and a hypothesis that is asymptotically true puts the EMH in contention for one of the strongest hypotheses in the whole of the social sciences. Strictly speaking the EMH is false, but in spirit is profoundly true. Besides, science concerns seeking the best hypothesis, and until a flawed hypothesis is replaced by a better hypothesis, criticism is of limited value.

Fama (2014) said that the Efficient Market Hypothesis held up well during the 2008 financial crisis and that the markets were a casualty of the recession, not the cause of it. Despite this, the author concedes that poorly informed investors could theoretically lead the market astray and that stock prices could become somewhat irrational thus. There was a difference in performance between experienced and novice traders in a controlled experiment. If the market walks randomly, there should be no difference between these two kinds of traders. However, traders who were more knowledgeable on technical analysis significantly outperform those who were less knowledgeable.

The relevance of the Efficient Market Hypothesis was that it showed the short-comings in the traditional finance of CAPM and APT or Modern Portfolio Theory and the whole of standard finance. It explained how behavioral economists disputed the efficient-market hypothesis both empirically and theoretically and attributed the imperfections in financial markets to a combination of cognitive biases such as overconfidence, overreaction, herd behavior, loss aversion, mental accounting representative bias, information bias, and various other predictable human errors in reasoning and information processing.

2.2.5 Prospect Theory

Tversky and Kahneman (1974) proposed prospect theory by experimenting how investors would overrate recent information by neglecting or attributing less importance to past news, in their prospects revisions, based on their judgment assessments of probabilities. This would lead to excessive optimism over good news and extreme

pessimism over bad news. Stock prices would deviate temporarily from their intrinsic values, originating in the medium-long term, a mean-reverting effect. Kahneman and Tversky (1979) found that under conditions of uncertainty, human decisions depart from those predicted by Standard Finance theory. Due to limited cognitive capacity, investors cannot analyze data optimally. Human cognition has many irrational components even when trying to make rational decisions. The authors discussed prospect theory and the psychological literature on heuristics and biases in judging information provided a sophisticated model of why people make decisions for what seem to be non-rational reasons.

Thaler (1985) developed a new model of consumer behavior using a hybrid of cognitive psychology and microeconomics. The development of the model started with the mental coding of combinations of gains and losses using the prospect theory value function. Then the evaluation of purchases was modeled using the new concept of "transaction utility". The household budgeting process was also incorporated to complete the characterization of mental accounting. Several implications to marketing, particularly in the area of pricing, are developed referred to the way investors frame their financial decisions and evaluated the outcomes of their investments.

Fiegenbaum and Thomas (1988) attempted to explain Bowman's risk return paradox in terms of recent research in behavioral decision theory and prospect theory. The authors emphasized the role of reference, or target, return levels in analyzing risky choices. Tversky and Kahneman (1992) developed a new version of prospect theory that employed cumulative rather than separable decision weighted and extended the theory in several respects.

Levy (1997) emphasized the similarities between prospect theory and expected-utility theory. The author argued that the hypotheses regarding loss aversion and the reflection effect were easily subsumed within the latter, and that evidence of framing effects and nonlinear responses to probabilities were more problematic for the theory. The author

concluded that priorities for future research included the construction of hypotheses on the framing of foreign policy decisions and research designs for testing them; the incorporation of framing, loss aversion, and the reflection effect into theories of collective and interactive decision making; and experimental research that was sensitive to the political and strategic context of foreign policy decision making.

Fennema and Wakker (1997) discussed differences between prospect theory and cumulative prospect theory. It showed that cumulative prospect theory was not merely a formal correction of some theoretical problems in prospect theory, but it also gave different predictions. Some experiments by Lopes (1987) were re-analyzed and are demonstrated to favor cumulative prospect theory over prospect theory. It turned out that the mathematical form of cumulative prospect theory was well suited for modeling the psychological phenomenon of diminishing sensitivity.

Barberis, Huang and Santos (1999) proposed a new framework for pricing assets, derived in part from the traditional consumption-based approach, but which also incorporated two long-standing ideas in psychology: prospect theory, and evidence on how prior outcomes affected risky choice. Consistent with prospect theory, the investor in the model derived utility not only from consumption levels but also from changes in the value of his financial wealth.

Grinblatt and Han (2005) explained the tendency of some investors to hold on to their losing stocks, driven by prospect theory on loss aversion and mental accounting. The authors created a spread between a stock's fundamental value and its equilibrium price, as well as price under-reaction to information. Spread convergence, arising from the random evolution of fundamental values and the updating of reference prices, generated predictable equilibrium prices interpretable as possessing momentum. Empirically, a variable that is a proxy for aggregated unrealized capital gains appeared to be the key variable that generates the profitability of a momentum strategy. Controlling for this variable, past returns have no predictability for the cross-section of returns.

Abdellaoui, Bleichrodt and Paraschive (2006) provided an efficient way to elicit utility midpoints, which were important in axiomatizations of utility. Several definitions of loss aversion have been put forward in the literature. Per most definitions the authors found strong evidence of loss aversion, at both the aggregate and the individual level. The degree of loss aversion varied with the definition used, which underlined the need for a commonly accepted definition of loss aversion.

Barberis (2013) argued that a variety of observed behaviors stem from individuals thinking about risk in the way described by prospect theory. One possible approach to studying this issue was to explain to people, in an appropriate way, that they were acting the way they were because of prospect theory preferences; and to then see if, armed with this information, they changed their behavior.

The relevance of Prospect Theory in this study was that investor behaviour variable loss aversion and mental accountings are biases that simply cannot be tolerated in financial decision making. It instigated the exact opposite of what investors want: increased risk, with lower returns. Investors should take risk to increase gains, not to mitigate losses

2.2.6 Loss Aversion Theory

Kahneman and Tversky (1979) also hypothesized the descriptive model of decision making under risk, prospect theory, which used experimental evidence to argue that people got utility from gains and losses in wealth, rather than from absolute levels. The specific finding known as loss aversion was that people were more sensitive to losses than they were to gains. Since the framework was inter-temporal, the research also made use of more recent evidence on dynamic aspects of loss aversion. This evidence suggested that the degree of loss aversion depended on prior gains and losses: A loss that comes after prior gains was less painful than usual, because it was cushioned by those earlier gains. On the other hand, a loss that came after other losses was more painful

than usual: After being burned by the first loss, people became more sensitive to additional setbacks.

Schoemaker (1982) noted quite early that people's choices were sensitive to how the problem or decision was presented. Translated to the domain of loss aversion, these insights indicated that the magnitude of loss aversion depended on whether people were focused on the negative or the positive. Shefrin and Statman (1985) explained utility representation concept embedded in the disposition effect. The disposition effect was the desire to hold losing investments too long as a risk-seeking behaviour and to sell winning investments too quickly as a risk-avoidance behaviour.

Kahneman, Knetsch and Thaler (1990) explained loss aversion as an explanation for the endowment effect, the fact that people placed a higher value on a good that they owned than on an identical good that they did not own. Loss aversion and the endowment effect led to a violation of the Coase Theorem that the allocation of resources was independent of the assignment of property rights when costless trades were possible. Although the existence of loss aversion was well-accepted, there was still work to be done to develop better accounts of its causes, boundaries and consequences. For example, researchers generally assumed that potential gains needed to be approximately twice as large to offset the potential losses.

Tversky and Kahneman (1991) introduced a loss aversion coefficient the ratio Gains to Losses, G:L (Gains : Losses) that made an even chance to gain G or lose L just acceptable. The authors observed a gain to loss ratio of 2 (2:1) in their experiments, showing that gains on average needed to be twice as large as the losses to make an even chance to gain, G or loss, L acceptable. Losses loomed larger than corresponding gains. In prospect theory, loss aversion referred to the tendency for people to strongly prefer avoiding losses than acquiring gains.

Tversky and Kahneman (1992) explained in the economics and decision theory that loss aversion referred to investor's tendency to strongly prefer avoiding losses to acquiring gains. Thaler, Tversky, Kahneman and Schwartz (1997) showed that if people used a one-year horizon to evaluate investments in the stock market, then the high equity premium was explained by myopic loss aversion. Loss aversion also explained one of the most common investing mistakes: investors evaluating their stock portfolio were most likely to sell stocks that have increased in value or have gone down the least amount. Odean (1998) found that the stocks investors sold outperformed the stocks they didn't sell by 3.4 percent. Even professional money managers were vulnerable to this bias and tended to hold losing stocks twice of winning stocks. Because selling shares that have decreased in value makes the loss tangible and losing sucks, investors tried to postpone the pain for if possible. The result was more losses.

Rozin and Royzman (2001) found that loss aversion had been linked to the negativity bias. The negativity bias described that people paid more attention to negative information than to positive information. Barberis and Huang (2001) explained that loss aversion referred to the difference level of mental penalty people have from a similar size loss or gain. Barberis and Huang (2001) showed that a loss coming after prior gain was proved less painful than usual while a loss arriving after a loss seemed to be more painful than usual. Barberis and Thaler (2003) showed evidence showing that people were more distressed at the prospect of losses than they are pleased by equivalent gains Lehenkari and Perttunen (2004) found that both positive and negative returns in the past could boost the negative relationship between the selling trend and capital losses of investors, suggesting that investors were loss averse.

The relevance of loss aversion theory was that it explained loss aversion bias that simply could not be tolerated in financial decision making. It instigated the exact opposite of what investors want: increased risk, with lower returns. Investors should take risk to increase gains, not to mitigate losses. The loss-aversion theory points to another reason why investors chose to hold their losers and sell their winners: they may believe that

40

today's losers soon outperform today's winners. Investors often make the mistake of chasing market action by investing in stocks or funds which garner the most attention.

2.2.7 Overconfidence Theory

Kahneman and Tversky (1979) proposed overconfidence theory as an anomaly of human judgment that was demonstrated in several experiments by psychologists. The authors explained that there was no problem in judgment and decision making which was more prevalent and more potentially catastrophic than overconfidence bias. Plous (1993) explained that people were overconfident by explaining that the discrepancies between accuracy and confidence were not related to a decision maker's intelligence. Daniel, Hirshleifer and Subrahmanyam (1997) proposed a theory based on investor overconfidence and biased self-attribution to explain several of the securities returns patterns that seemed anomalous from the perspective of efficient markets with rational investors.

Daniel, Hirshleifer and Subrahmanyam (1998) proposed a theory of securities market under-reaction and overreaction based on two well-known psychological biases: investor overconfidence about the precision of private information; and biased self-attribution, which caused asymmetric shifts in investor's confidence as a function of their investment outcomes. The theory also offered several untested implications and implications for corporate finance policy.

Odean (1998) developed a theoretical model which considered whether overconfidence of market participants overestimated their ability to interpret information. Every market participant believed that he or she was better in picking up and interpreting information and that therefore the accuracy of the information received was above average. The model predicted that investors traded excessively. Within this framework, overconfidence caused trading volume and stock price fluctuations to increase and stock price efficiency to decrease. The author argued that overconfident investors

overestimated the accuracy of their own evaluations resulting in an under-estimation of risk and increasing the differences of opinions between traders, thereby resulting in higher trading volume.

Shefrin (2000) explained that overconfidence and anchoring appear to be part of the explanation underlying post-earnings-announcement drift. There were two main implications of investor overconfidence. The first was that investors took bad bets because they failed to realize that they were at an informational disadvantage. The second was that they traded more frequently than was prudent, which led to excessive trading volume. Overconfidence appeared to be a fundamental factor promoting the high volume of trade observed in speculative markets. Without such overconfidence, there was little trading in financial markets. Overconfidence, however generated, appeared to be a fundamental factor promoting the high volume of trade observed in speculative markets.

Barber and Odean (2001) compared trading activity and average returns in brokerage accounts of men and women. The authors found that single men, trades far more actively than women, consistent with the greater overconfidence among men. People tended to overestimate the precision of their beliefs or forecasts, and they tended to overestimate their abilities. Such overconfidence might be responsible for the prevalence of active versus passive investment management itself an anomaly to adherents of the efficient market hypothesis.

Daniel, Hirshleifer and Teoh (2002) reviewed extensive evidence about how psychological biases affect investor behavior and prices. Systematic mispricing caused substantial resource misallocation. The author argued that limited attention and overconfidence caused investor credulity about the strategic incentives of informed market participants. Hoffman (2005) explained the concept of overconfidence that it derived from a large body of cognitive psychological experiments and surveys in which subjects' overestimated both their own predictive abilities and the precision of the

information they had been given. People were poorly calibrated in estimating probabilities events they thought were certain to happen are often far less than 100 percent certain to occur. In short, people thought they were smarter and had better information than they do. For example, they got a tip from a financial advisor or read something on the internet, and then they were ready to act, such as making an investment decision, based on their perceived knowledge advantage.

Biais., Hilton, Mazurier and Pouget (2005) theory on experimental research results suggested that realism produces more positive outcomes in competitive market situations, where perspicacity and accuracy in judgement counted for more than motivation and persistence. Hilton (2006) theorized that miscalibration of judgement could be viewed as distinct from other positive illusions identified by Taylor and Brown (1988). Accordingly, miscalibration needed to be distinguished from other positive illusions in models of how stable tendencies in judgmental biases affected behaviour (Odean, 1998). It is certainly possible that miscalibration would have different effects on behaviour to those caused by positive illusions. The finding that miscalibration led to poor performance did indeed suggested that it paid to have accurate beliefs in a competitive market.

Statman, Thorley and Vorkink (2006) argued that investor overconfidence was a driver of the disposition effect because overconfidence encouraged investors to trade asymmetrically between gains and losses. Daniel and Hirshleifer (2015) discussed the role of overconfidence as an explanation asset prices to displaying patterns of predictability that were difficult to reconcile with rational-expectations-based theories of price formation. The finding indicated anomalies in financial markets were unprofitable active trading and patterns of return predictability that were puzzling from the perspective of traditional purely rational models.

The relevance of the theory was that overconfidence one of the five components of heuristics amongst Gambler's fallacy, Availability bias, Anchoring, and

Representativeness. The effect of investor overconfidence on market reaction at the Nairobi Securities Exchange was one of the objective in this research. Previous studies in this theory indicated that overconfidence caused overreactions and under-reactions in the financial markets.

2.2.8 Herding Theory

Herding is said to be present in a market when investors opt to imitate the trading practices of those they consider to be better informed, rather than acting upon their own beliefs and private information. A very early proponent of herding theory was the classic paper by Grossman and Stiglitz (1976) which showed that uninformed traders in a market context could become informed through the price in such a way that private information was aggregated correctly and efficiently. Two streams of theories identified in literature to investigate the herd behavior, one was investor herd behavior toward a stock and other was market-wide herding. As per herding toward stock, individuals or a group of investors focused only on a subset of securities at the same time by neglecting other securities with identical characteristics.

Friedman (1953) explained the link between investor behavior and market volatility. This showed how irrational investor destabilized prices, that is, how rational investors moved prices towards their fundamental values. Hellwig (1980) explained how volatility was driven by uninformed or liquidity trading. Bikhchandani, Hirshleifer and Welch (1992) explained that an informational cascade appeared when investor made optimal choice by imitating the behavior of preceding investors without relying on their personal information.

Froot, Schaferstein and Stein (1992) considered how investors imitate each other and this drove volatility. The probability of taking wrong action was still present even if all participants as a collective had overwhelming information in favor of right action. Stock prices could be driven by what was known as herd instinct, which was the tendency for

44

people to mimic the action of a larger group. For example, as more and more people bought a stock, pushing the price higher and higher, other people jumped on board as if all the other investors were right or that they knew something not everyone else knew.

Christie and Huang (1995) explained the existence of investor herds was one frequently used explanation for the volatility of stock returns. Lux (1995) formalized herd behavior or mutual mimetic contagion in speculative markets. The author explained both excess volatility and mean reversion with the type of noise trading or infection model.

Caparrelli, D'Arcangelis and Cassuto (2004) explained that in the security market, herding investors based their investment decisions on the masses' decisions of buying or selling stocks. Hey and Morone (2004) analyzed a model of herd behavior in a market context. In the security market, herding investors based their investment decisions on the masses' decisions of buying or selling stocks. In contrast, informed and rational investors usually ignored following the flow of masses, and this made the market efficient. Herd behavior caused a state of inefficient market, which was usually recognized by speculative bubbles. Avramov, Chordia and Goyal (2006) looked into how investors imitated each other and found that herd behaviour drove volatility. The findings suggested that the violation of the efficient market hypothesis due to short-term reversals was not so egregious after all.

Tan, Chiang, Mason and Nelling (2008) explained that herding effect in financial market was identified as tendency of investors' behaviors to follow the others' actions. Practitioners usually considered carefully the existence of herding, because investors relied on collective information more than private information resulted on price deviation of the securities from fundamental value; therefore, many good chances for investment at the present was impacted. Herding impacted on stock price changes influenced the attributes of risk and return models and this impacted on the viewpoints of asset pricing theories.

Chiang and Zheng (2010) explained that herd behaviour in financial markets was of interest to both economists and practitioners. Economists were interested in herding because of the behavioral effect on stock prices. It affected their return and risk characteristics and thus had consequences for asset pricing models. Practitioners instead were interested in herding among investors since it created profitable trading opportunities. Furthermore, due to herding in the market investors needed a larger number of securities that created a lower degree of correlation to reach the same degree of diversification.

The relevance of herding theory was that it explained herd behaviour effect in financial decision making which resulted in price reactions that were not be favourable to the investor. An investment bubble resulted from a rapid escalation in price of an asset over its intrinsic value, which was caused by exuberant market behavior perpetuated through a positive feedback loop.

2.2.9 Mental Accounting Theory

Thaler (1985) developed new theory whose concepts were in three distinct areas: coding gains and losses, evaluating purchases i.e. transaction utility and budgetary rules called mental accounting theory. The author hypothesized that people tried to code outcomes to make themselves as happy as possible i.e. the hedonic editing hypothesis. The hedonic editing hypothesis characterized decision makers as value maximizers who mentally segregated or integrated outcomes depending on which mental representation was more desirable. On mental accounting and mental budgeting, the author suggested that people under-consumed hedonic, luxury goods. The author argued that hedonically pleasurable luxuries were often under-consumed for self-control reasons, which was why they were attractive gifts.

Kahneman and Tversky (1984) discussed the process of mental accounting, in which people organized outcomes of transactions, explained some anomalies of consumer

behavior. In particular, the acceptability of an option depended on whether a negative outcome was evaluated as a cost or as an uncompensated loss. Shefrin and Statman (1985) hypothesized that the underlying mental accounting was that decision makers tended to segregate the different types of gambles faced into separate accounts. The author suggested that if it was painful to sell a stock at a loss, the pain was minimized by selling losers at the same time as per the principles of mental accounting.

Shefrin and Thaler (1988) on behavioural life-cycle theory submitted that people mentally allocated wealth over classifications of current income, current assets, and future income. The propensity to consume was greatest from the current income account, while sums designated as future income were treated more conservatively. In principle, individuals could divide or combined gains and losses completely arbitrarily to maximize their happiness. However, there were limits to the degree to which people could mentally segregate and integrate outcomes.

Thaler and Johnson (1990) explained that as per quasi-hedonic editing hypothesis, risk aversion could be observed after prior losses because subsequent losses were not integrated with the prior outcome. As in the case of prior losses, the one-stage formulation did not create this same sense of being ahead in the mental account, so for the one-stage version, the risk aversion prediction of prospect theory was expected.

Heath and Soll (1996) found that mental budgets caused people to under-consume in categories such as entertainment and apparel. However, over time consumers came to recognize that such expenditures within a reasonable range enhanced their quality of life, in many cases without significantly affecting their ability to fulfill their essential needs. Mental accounting was a specific form of framing in which people segregated certain decisions. For example, an investor took a lot or risk with one investment account but established a very conservative position with another account that was dedicated to her child's education.

47

Statman (1997) argued that mental accounting was consistent with some investors' irrational preference for stocks with high cash dividends; the investors felt free to spend dividend income but did 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. Prelec and Loewenstein (1998) pointed out that when consumers made purchases they often experienced an immediate pain of paying, which weakened the pleasure derived from consumption or even prevent it altogether. The pain of paying, no doubt, had an important role in consumer self-control. Kivetz and Simonson (1999) explained that consumers anticipated in advance their inability to wisely balance resources between hedonic and necessary consumption.

Shefrin and Statman (2000) developed a positive behavioral portfolio theory (BPT) and explored its implications for portfolio construction and security design. The authors presented BPT in a single mental account version (BPT-SA) and a multiple mental account version (BPT-SA). BPT-SA investors integrated their portfolios into a single mental account, while BPT-SA investors segregated their portfolios into several mental accounts. BPT-SA portfolios resembled layered pyramids, where layers were associated with aspirations. The authors explored a two-layer portfolio where the low aspiration layer was designed to avoid poverty while the high aspiration layer was designed for a shot at riches.

Shefrin (2002) explained that the preference for cash dividends was explained by mental accounting and focused on the need for self-control. The investor put capital gains and cash dividends into separate mental accounts. This was one way of keeping control of spending. The investor worried that, once he decided to finance consumption from spending part of his portfolio, he spent his savings too quickly. Hence the saying 'Don't dip into capital' is akin to 'don't kill the goose that lays the golden eggs.' When stock prices fell, dividends served as a silver lining and the reason the investor kept holding the losing stocks.

Massa and Simonov (2004) investigated the way investors reacted to prior gains/losses and used a new and unique dataset with detailed information on investors' various components of wealth, income, demographic characteristics and portfolio holdings identified at the stock level. The authors tested the theory of loss aversion against the alternative provided by standard utility theory and the house-money effect. The authors showed that, on a yearly horizon, investors did not behave as per loss aversion and more in line with standard utility theory or the house money effect. The authors also showed that investors did not suffer from the mental accounting bias. Investors considered wealth in its entirety and risk taking in the financial market was affected by gains/losses in overall wealth, financial wealth and real estate wealth.

The relevance mental accounting theory was that it is a deep-seated bias with many manifestations that caused a variety of problems to investors. The most basic of these problems was the placement of investment assets into discrete "buckets" as per asset type, without regard for potential correlations connecting investments across categories.

2.3 Conceptual Framework

Cooper and Schindler (2011) defined dependent variable as a variable that is measured, predicted, or otherwise monitored and is expected to be affected by manipulation of an independent variable. Independent variable is also defined as a variable that is manipulated by the researcher, and the manipulation causes an effect on the dependent variable. Figure 2.1 showed the conceptual framework of the study and depicted the interrelationship between the study variables. The dependent variable in the study was the Stock Market Reaction. The independent variable was investor behaviour variables. Investor behaviour variables were represented by four constructs which include: Herd Behaviour, Loss Aversion, Mental Accounting and Overconfidence.

Herd Behavior • Return dispersion	
Loss Aversion • Utility of gains / losses	

Stock Market Reaction • Abnormal returns

Mental Accounting • Price-dividend ratio	
Overconfidence • Trading volume	
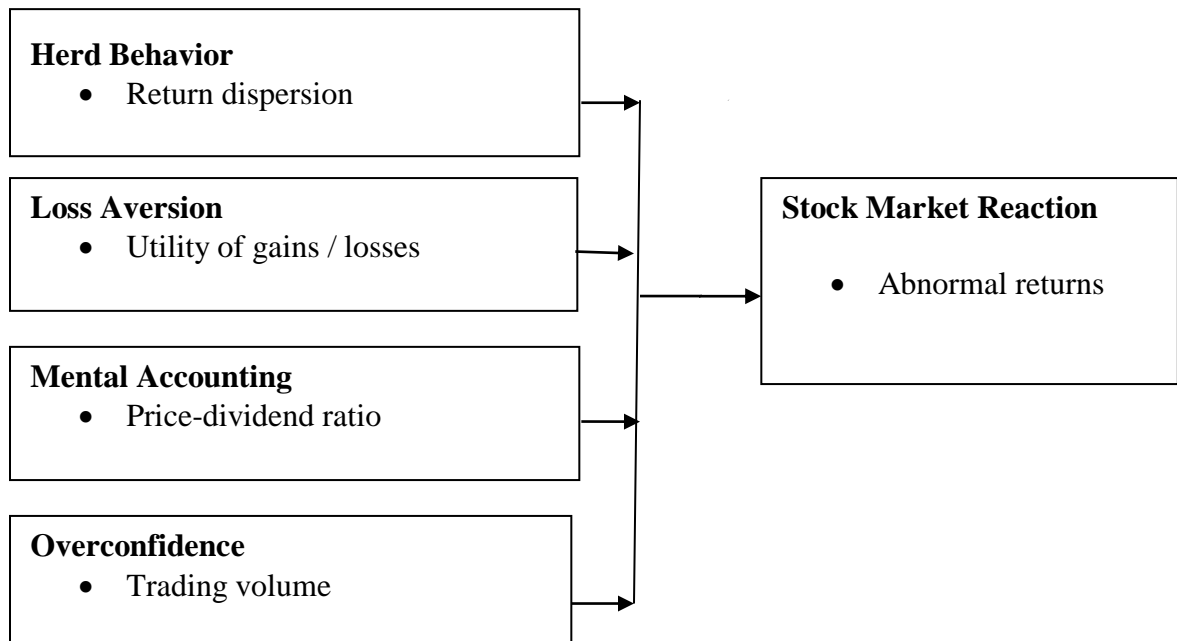
Independent Variables   **Dependent Variable**

Figure 2.1: Conceptual Framework

Independent variables were operationalised as follows: Herd Behavior variable was measured using return dispersion (Thirika & Olweny, 2015); Loss Aversion variable was measured using utility of gains/losses (Barberis & Huang, 2001); Mental Accounting variable was measured using price dividend ratio (Barberis & Huang, 2001); and Overconfidence variable was measured using trading volume (Adel & Mariem, 2013). The dependent variable, stock market reaction variable was measured using abnormal returns based on DeBondt and Thaler (1985); Jegadeesh and Titman (1993). The objective of the research determined the effect of investor behavior on stock market reactions in Kenya.

2.4 Empirical Literature

This section reviews literature from prior scholars regarding the effect of investor behaviour variables: herd behavior, loss aversion, mental accounting and overconfidence on stock market reaction, the dependent variable

2.4.2 Herd Behavior and Stock Market Reaction

Lux (1995) objective was to formalize herd behavior or mutual mimetic contagion in speculative markets. The research design used was quantitative research design. The independent variable was herding. The dependent variable was speed of change in trading volume. The population was the stock market. The sample was listed companies. The findings indicated that the emergence of a bubble was explained as a self-organizing process of infection among traders leading to equilibrium prices which deviated from fundamental values. It was further postulated that the speculators readiness followed the crowd depending on one basic economic variable. Lux (1995) showed the speed of change in trading volume indicated the emergence of a bubble explained by the emergence a self-organizing process of infection among traders caused stock prices to deviate from fundamental values.

Serra and Lobão (2002) used the measure of herding developed by Lakonishok et al. (1992) methodology. The main objective of study was to assess if Portuguese mutual funds exhibited herding and to what extent. The context was Portuguese. The population of study was 260 investment funds in Portugal managed by 18 different companies. The sample was 32 equity mutual funds based in Portugal, between 1998 and 2000. The independent variables were the number of funds bought or sold, the proportion of funds trading stock and a proxy for the expected proportion of buyers under the null of independently trading by funds. The dependent variables were market capitalization, portfolio holdings, frequency in portfolio rebalancing, market stock returns and market volatility. The study adopted quantitative research design. The research found strong

evidence of herding behavior for Portuguese mutual funds. The findings suggested that the level of herding is 4 to 5 times stronger than the herding found for institutional investors in mature markets. The herding effect affected purchases and sales of stocks. There was a stronger tendency to herd among medium-cap funds rather than very large or very small funds, and among funds with less stocks in the Portuguese market.

Hachicha (2010) objective was to examine the herding behavior at Toronto stock exchange based on the cross-sectional dispersion of trading volume. The study used the security market line with trading volume to show that valuable information about price dynamics was gleaned from trading volume. The author used Hwang and Salmon (2004) to analyze data using state space model with cross-sectional dispersion of trading volume. The population of study was investors at Toronto Stock Exchange. The sample was investors at the Toronto Stock Exchange. The independent variable was herd behavior. The dependent variable was trading volume of security, market return, trading volume and volatility. Data was from the main index of Toronto Stock Exchange which is S&P/TSX60 which included monthly prices and volumes. The research design was quantitative and the model used was regression analysis. The author employed an innovative new methodology inspired from the approach of Hwang and Salmon (2004) and based on the cross-sectional dispersion of trading volume to examine the herding behavior on Toronto Stock Exchange. The findings showed that the herd phenomenon consisted of three essential components: stationary herding which signaled the existence of the phenomenon whatever the market conditions, intentional herding relative to the anticipations of the investors concerning the totality of assets, and the third component highlighted that the current herding depended on the previous one which was the feedback herding.

Fu (2010) explored herding behavior and investors' asymmetric reactions to good news and bad news in China equity market. The objective was to test the turnover effect on herding. Data covered from Jan 2004 to June 2009 period that includes the 2008 financial crisis. The independent variables were dispersion and turnover. The dependent

variable was herding. Quantitative research design was used in this study. CSAD and CSSD model was used to analyze the data. The findings showed that even though there did not exist herd behavior in China equity market. The authors demonstrated the existence of asymmetric reaction that investors' tendency toward herd behaviour was significantly higher during market downstream. This study partly supported the turnover effect that low turnover stocks significantly converged to market return than high turnover stocks during extreme market conditions. The author indicated that low turnover stocks showed a significant tendency to herd market return during extreme downward situation. Low turnover stocks tended to herd than high turnover stock and investors tended to herd in downward market. The turnover effect on herding was partly supported; low turnover stocks showed a significant tendency to herd market during extreme downward situation. Fu and Taipei (2010) found out that low turnover had high tendency to herd market return. The author indicated that turnover rate influence herding. Low turnover lacked sufficient information which led to more tendencies to herd market return.

Blasco, Corredor and Ferreruela (2012) tested the link between investor herd behaviour and market volatility, arguing that irrational investor behaviours destabilize prices. The main objective of study was to analyze the relationship between herding and volatility during market stress days. The population of study was Ibex-35 Index. The sample was Ibex-35, 15-minute price data from 1st January 1997 to 31st December 2003, total of 1750 trading days. The independent variables were number of stocks transaction in the period under study, the percentage variation in returns year by year, number of trades. The dependent variables were the volume traded and stock price volatility. The research design used was quantitative research design. The study adopted Patterson and Sharma (2006) herding intensity measure which was measured using regression analysis. The authors showed that herding behavior in stock markets was tightly linked to market stress and volatility, both directly and indirectly through the variation of the latter during market stress periods. The results showed evidence of the asymmetric effect of herding

on volatility during extreme market movements, something that was in line with the different psychological implications of extreme up and down-market movements.

Lindhe (2012) used CZ, CH, CCK and Hwang and Salmon (2001) methodology which used CSSD to analyze data. The objective was to determine the investment behavior among market participants in four Nordic countries more specifically about their propensity to exhibit herd behavior. The author adopted quantitative research design. The sample was 31 to 108 industries. The model used was regression analysis. Data was collected from Thomson Reuters Data stream and included Denmark, Finland, Norway and Sweden sample data of 2001 to 2012 to investigate market-wide herd behavior. The author studied of investment behavior among market participants in four Nordic countries i.e. Denmark, Finland, Norway and Sweden used regression model more specifically regarding their propensity to exhibit herd behavior used Cross-Sectional Absolute Deviation as a measure of dispersion. The approach of Chiang and Zheng (2010) was applied to detect market-wide herding during the period 2001-2012. Significant evidence of local market-wide herding was found in Finland during both up and down going market days. The author found evidence of local market-wide herding was found in Denmark, Norway or Sweden.

Spyrou (2013) used Lakonishok, Shleifer and Vishny (1992) methodology to determine how herd behavior was measured in empirical studies. The objective was to provide a review of theory and empirical evidence on herding behavior in financial markets. The population and sample of study was analyst recommendations and institutional investors. The dependent variable was herding. The independent variable was measures of herding. The research methodology used was review and discussion of literature in Greece context. The research classified empirical methodologies into two main categories: studies that relied on micro data or proprietary data and investigated whether specific investor types herd, and studies that relied on aggregate price and market activity data and investigated herding toward the market consensus. The research presented two of the most commonly used measures of the former first (Lakonishok, Shleifer & Vishny,

1992); (Sias, 2004) and then proceeded with a discussion of two of the most commonly used measures the latter (Christie & Huang, 1995) and (Chang Cheng & Khorana, 2000). The findings were more than two decades of empirical and theoretical research that provided a significant insight on investor herding behavior.

Messis and Zepranis (2014) used Hwang and Salmon (2004) to analyse investor daily, weekly and monthly data of securities traded at the Athen Stock Exchange. Hwang and Salmon (2004) also used state space models check on the Cross-Sectional variability of factor sensitivities. The objective of study was to investigate the existence of herding in the Athens Stock Exchange over the 1995-2010 periods and examine its effects on market volatility and to analyze investor daily, weekly and monthly data of securities traded at the Athen Stock Exchange. The population of study was investors at Athens Stock Exchange. The sample was investors at Athens Stock Exchange over the period 1995-2010. The independent variables were market return, the systematic risk, price volatility beta and size of the selected stocks. The dependent variable was the excess return of asset. Quantitative research design was used. The methodology used panel data regression model to examine herding over portfolios formed on beta and size of the selected stocks. The detection of herding was done using the state space model of Hwang and Salmon (2004). Four volatility measures were employed. The findings depicted the presence of herding over two different periods of time. Large differences were observed among the portfolios regarding the herding periods. The results confirmed a linear effect of herding on all volatility measures considered. Stocks exhibiting higher levels of herding or adverse herding presented higher volatility, and from this point of view, herding was regarded as an additional risk factor in the market.

Thirikwa and Olweny (2015) objective was to investigate the determinants of herding at the Nairobi securities exchange. The context was Kenya. The research design used was quantitative research design. The target population was companies listed at the NSE. The independent variables were domestic market returns, market capitalization, book to market value and external market returns. The dependent variable was market wide

herding measured using CSAD. The methodology adopted was quantitative research design i.e. longitudinal survey design i.e. panel data regression analysis was used to analyze data. The authors focused on the way deviations on the returns on individual stocks is influenced by the market performance (returns), market capitalization of the firms, the book-to-market value of the firms and the external market performance. The study used daily time series data for the period between 2008 and June 2015. The empirical analysis was an Ordinal Least Square (OLS) regression analysis. The main findings of the research were as follows: The stock returns were fat tailed (leptokurtic) and not normally distributed. The results showed evidence of herding in the NSE around market performance, market capitalization and book-to-market value. The result showed that the magnitude of the impact of the market performance on the deviation on individual stock returns, measured by β_3, is relatively high at 9.475 and significant at 1%. Deviations in the stock returns was also impacted by the market capitalization and the Book-to-market value, though both relatively low, at =0.670 and = -0.242 at 1% significant level relatively.

Vieira and Pereira (2015) studied herding behavior in a small European market, by analyzing the stocks that constituted the Portuguese stock PSI-20 index, for the period between 2003 and 2011 using quantitative research design. The objective of study was to analyze the relationship between herd behavior and investor sentiment, an area that has been little explored. The independent variables were intraday order sequences, generally considered to offer the ideal frequency series of statistic values for up runs, (buyer) series of statistic values for down runs (seller) series of statistic values for runs with no price changes (zero). The dependent variable was sentiment. Regression model was used to analyze data using the methodology proposed by Patterson and Sharma (2006) to analyze the Portuguese sample. The results showed that herding intensity was negative and statistically significant, which concluded that investors mimicked each other in a systematic way. These different findings had an important empirical

implication, since it suggested that different herding measures led to different conclusions about the existence of investor herd behavior.

Lee and Lee (2015) used the Agent-Based Modelling computational methodology that allowed an analyst to create, analyze and experiment with artificial worlds composed of agents that interact within a specific environment. The research design used was quantitative research design. The objective was to show that irrational agents explain excess volatility in the stock market. The population of study was the agents who are fundamentalists and chartist in South Korean Stock Market. The research design used was quantitative research design. Correlation analysis was used to analyze the data. The findings showed that when the agents had different expectations on the tipping point, the collapse of the price did not emerge automatically and price fluctuations were often small and even some seemingly flat intervals appear. Their findings confirmed that bubble and burst of prices were more likely to emerge when heterogeneous expectations about prices were combined with herding behavior among agents, so that agents in the same group shared the similar expectations about the price changes.

2.4.3 Loss Aversion and Stock Market Reaction

Bell and Lattin (2000) used reference dependence choice model to review the theory of reference-dependent choice in USA. The theory of reference-dependent riskless choice is presented in Tversky and Kahneman (1991). In other words; the utility of alternative j evaluated from reference point r was captured by the reference function R(x). The sample and population of study was refrigerated orange juice and subsequently extend this analysis to 11 additional product categories. The independent variable was indicator of feature advertising activity, the difference between the reference price and the observed price when the observed price is below the reference point, the difference between the reference price and the observed price when the observed price is above the reference point. The dependent variable was expected utility structure. Quantitative research design was used in this study. Descriptive Statistics based on reference -

dependent choice model on scanner panel data from the refrigerated orange juice category. Estimated loss aversion using a sticker shock model of brand choice in which the reference prices are brand-specific. The findings strongly suggested that loss aversion was in fact a universal phenomenon, at least in the context of frequently purchased grocery products.

Barberis, Huang and Santos (2001) objective was to study asset prices in an economy where investors derived direct utility not only from consumption but also from fluctuations in the value of their financial wealth. Investors were loss averse over those fluctuations, and the degree of loss aversion depended on their prior investment performance. The dependent variables were loss aversion and mental accounting. Independent variables were utility of gain or loss ratio and price-dividend ratio of returns. Quantitative research design was used. Panel data regression analysis was used. Findings indicated that the loss aversion and mental accounting framework could help explain the high mean, excess volatility and predictability of stock returns, as well as their low correlation with consumption growth. The design of the model was influenced by prospect theory and by experimental evidence on how prior outcomes affected risky choice.

Barberis and Huang (2001) objective was to study equilibrium firm-level stock returns in two economies: one in which investors were loss averse over the fluctuations of their stock portfolio, and another in which they were loss averse over the fluctuations of individual stocks that they own. The independent variable was utility of gains and losses stock and price-dividend ratio. The dependent variable was Stock Returns for individual and portfolio stocks. Quantitative research design and the model specification was panel data regression model was used. The findings were that the typical individual stock return has a high mean and excess volatility, and there was a large value premium in the cross section which could to some extent, be captured by a commonly used multifactor model.

Bond and Satchell (2006) objective was to use conditional volatility models to capture predictable variation in the second moment of returns. However, with recent theoretical literature emphasizing the loss-averse nature of agents, the author considered models that captured time variation in the second lower partial moment. Utility-based evaluation was carried out on several approaches to model the conditional second-order lower partial moment. Data from three emerging market countries were used in this evaluation. The three countries, Singapore, Malaysia, and Taiwan, were chosen primarily because of the availability of a suitably long data series. The dependent variable was monthly returns and the independent variable was expected utility of gains and losses. The Kuala Lumpur Composite Index was used to represent a risky asset class in Malaysia. Monthly returns were available over the period February 1986 to July 1999. Returns were calculated from the value of the index at the end of each month and this was the same for all series. The one-month deposit rate was chosen as the cash alternative. For Singapore, the Singapore All Share Index was used along with the interbank one-month rate to represent the return on cash. The data on these series cover the period from May 1986 to July 1999. Finally, the Taiwan Stock Exchange Price Index was chosen for Taiwan; a 30-day money market rate is used as well. The data extend from February 1986 to July 1999. All data were taken from the Data stream data service. Quantitative research design was used. Conditional Semi-Variance Models and Portfolio Weights in a Two-Asset Mean-Semi-Variance Framework models were used. The findings showed that when agents were loss averse, there were utility gains to be made from using models that explicitly captured this feature. These results linked the theoretical discussion on loss aversion to empirical modeling.

Jarrow and Zhao (2006) objective was to review and extend downside loss portfolio theory and consider a single-period economy in which agents invest in period 0. The authors used regression model analysis. The context was the USA. The independent variable was investor's aversion toward downside losses and standard risk-averse utility function. The dependent variable was expected utility. Quantitative research design was

used. Panel data regression analysis was used in the analysis. The author reviewed and extended downside loss portfolio theory and considered a single-period economy in which agents invested in period 0 and the investment outcomes were realized in period using regression model analysis in USA. This was due to the increasing use of derivatives in managing equity portfolios and the increased use of quantitative techniques for bond portfolio management. The author employed the lower partial moment as a risk measure for downside loss aversion and compared mean-variance (M-V) and mean-lower partial moment (M-LPM) optimal portfolios under non-normal asset return distributions. The findings indicated that when asset returns were nearly normally distributed, there was little difference between the optimal M-V and M-LPM portfolios. When asset returns were not normal with large left tails, the author documented significant differences in M-V and M-LPM optimal portfolios. This observation was consistent with industry usage of M-V theory for equity portfolios but not for fixed-income portfolios.

Gächter, Johnson and Herrmann (2007) objective was to find out if loss aversion occurred in riskless and risky choices. The authors conducted an endowment effect experiment and randomly selected 660 customers in total at a large German car manufacturer who participated in the lottery choice task which arguably measures loss aversion in risky choices. The population of study was 660 customers in total at a large German car manufacturer. The sample was 360 subjects randomly selected customers of a car manufacturer. The independent variable was endowment effect - willingness-to- to-accept (WTA) and the willingness to purchase (WTP) from the same individual. The dependent variable was value of trade. All participants were German speaking and lived in Austria, Germany and Switzerland. Quantitative research design was adopted. Correlation analysis was used. All subjects participated in a simple lottery choice task which arguably measured loss aversion in risky choices. The research found that substantial heterogeneity in both measures of loss aversion. Loss aversion in the riskless choice task and loss aversion in the risky choice task were highly significantly and

strongly positively correlated. The research found that in both choice tasks loss aversion increases in age, income, and wealth, and decreases in education.

Brenner, Rottenstreich, Sood and Bilgin (2007) objective was to consider two types of loss aversion defined by two interpretations of loss i.e. in terms of valence or in terms of possession. The authors contrasted the overall tendency to stay or trade in choices among goods versus choices among fads in USA, Florida. The population of study was 121 undergraduates at the University of Chicago completing a survey in exchange for $1. The independent variable was endowment effect - possession gain i.e. receiving an item and possession loss i.e. giving up an item. The dependent variable was Valence loss / gain. The authors adopted quantitative research design. Quantitative research design was used. Experimental results showed endowment effect reversals consistent with Possession Loss Aversion.

Seo, Goldfarb and Barrett (2010) examined the role of pleasant or unpleasant feelings and decision frames of gains or losses in risk taking in a 20-day stock investment simulation in which 101 participants rated their current feelings while making investment decisions. The context was the UK, New England. The sample population was 118 private stock investors. The dependent variable was risk taking. The independent variable is gain or loss ratio. Quantitative research design was used. Panel regression model analysis was adopted. As predicted, affect attenuated the relationships between decision frames and risk taking. After experiencing losses, individuals made riskier choices, in keeping with the framing effect. However, this tendency decreased and/or disappeared when loss was simultaneously experienced with either pleasant or unpleasant feelings. Similarly, individuals' tendency to avoid risk after experiencing gains disappeared or even reversed when they simultaneously experienced pleasant feelings.

Harinck, Beest, Dijk and Zeeland (2012) used measurement induced focus to get the difference between comparing gains to losses and losses to gains. The context was

Netherlands. The population of study was 41 Participants. The sample was 34 remaining participants were 19 women and 15 men. The dependent variable was the amount of money. The independent variable was gain/loss ratios. Quantitative research design was used and the model used was regression analysis. The research drew attention to the fact that even the measurement of loss aversion itself may affect its magnitude by inducing a focus on either losses or gains. In three studies, the research provided empirical evidence for such a measurement-induced focus. The author used coin toss gambles in which there was a 50/50 chance to win or to lose to assess gain/loss ratios as a measure of loss aversion. Participants either filled out the loss side or the gain side of this gain/loss ratio. The studies consistently showed that using within - and between - subject designs and anticipated and real coin-toss gambles the strength of loss aversion depended on the measurement format i.e. fill-in-the-loss versus fill-in-the-gain; filling in the loss side increased loss aversion.

Easley and Yang (2015) objective was to study the wealth and pricing implications of loss aversion in the presence of arbitrageurs with Epstein-Zin preferences. Dependent variable was loss aversion. Independent variables were price impacts, investor's decisions, saving behavior and market selection. Quantitative research design was used. Result showed that if loss aversion was the only difference in investors' preferences, then for empirically relevant parameter values, loss-averse investors was driven out of the market and did not affect long run prices. The selection process was slow in terms of wealth shares; but it was effective in terms of price impacts, because of endogenous withdrawal by loss-averse investors from the stock market. Overall, the market selection mechanism was efficient.

2.4.4 Mental Accounting and Stock Market Reaction

Litzenberger and Ramaswamy (1982) objective was to examine controversy concerning the effect of dividend yields on common stock returns and if the positive association between common stock returns and dividend yields reported in a number of empirical

studies can be attributed entirely to information effects. The research design used was quantitative research design. Pooled Time Series and Cross Section Test model were employed. Dependent variable was dividend yield. Independent variable was stock returns. The results indicated that there was a positive and non-linear relationship between common stock returns and expected dividend yield. The prediction rule for expected dividends was based solely on information that would have been available to the investor ex-ante. These results couldn't therefore be attributed to the favorable or unfavorable information that would be presented in a proxy for expected dividend yield that anticipated the occurrence of a dividend.

Keim (1985) examined the empirical relation between stock returns and long-run dividend yields. The research design used was quantitative research design. The data were from the monthly files of New York Stock Exchange (NYSE) stocks maintained by the Center for Research in Security Prices (CRSP) at the University of Chicago. The context was USA. Time series of portfolio returns for the period January 1931 to December 1978 was used. Dependent variable was dividend yield portfolio. Independent variable was average return, average dividend yields and average market value of equity. The findings showed that much of the phenomenon was due to a nonlinear relation between dividend yields and returns in January. Regression coefficients on dividend yields, which some models predicted should be non-zero due to differential taxation of dividends and capital gains, exhibited a significant January seasonal, even when controlling for size. This finding was significant since there were no provisions in the after-tax asset pricing models that predict the tax differential was more important in January than in other months.

Thaler and Johnson (1990) objective was to find out whether risk-taking was affected by prior gains and losses. The context was USA. The target population was investors. The dependent variables were reaction to losses or gains. The independent variables were prospect theory, hedonic editing, gain and loss ratio. An experimental design was adopted to bring out quantitative research design which was adopted. Panel regression

analysis was used to analyze data. The findings were while normative theory implored decision makers to only considered incremental outcomes, real decision makers were influenced by prior outcomes. The findings considered how prior outcomes were combined with the potential payoffs offered by current choices and proposed an editing rule to describe how decision makers framed such problems. The authors also presented data from real money experiments supporting a house money effect increased risk seeking in the presence of a prior gain and break-even effects in the presence of prior losses, outcomes which offered chances to break even were especially attractive.

Heath, Chatterjee and France (1995) designed an experiment with the objective to test the robustness of mental accounting of multiple events in USA. Two methods had been used to test the mental accounting of multiple events. Thaler's (1985) original approach asked subjects to evaluate the relative happiness of two fictitious consumers facing financially equivalent situations. One faces a single event i.e. integrated version while the other faces two events i.e. segregated version. The independent variable was multiple gain or loss ratio. The dependent variable was change in value of stock. The research found out that mental accounting principles for multiple events were replicated and then extended to pricing situations that were designed to moderate these principles if reference dependence was proportional i.e., if consumers evaluate events in terms of proportional deviations from reference states rather than raw deviations. Prices were stated with or without popular percentage-based pricing frames such as 33% off. Mental accounting principles generally prevailed in the absence of percentage-based frames. However, percentage-based frames altered two principles and increased tendencies toward the others. The findings demonstrated that mental accounting principles, price perception and reference dependence were sensitive to the ways in which deviations from reference states were framed.

Barberis and Huang (2001) objective was to study equilibrium firm-level stock returns in two economies: one in which investors were loss averse over the fluctuations of their stock portfolio, and another in which they were loss averse over the fluctuations of

individual stocks that they own. The dependent variable was Stock Returns for individual and portfolio stocks. The independent variable was utility of gains and losses stock price dividend ratio. The authors used quantitative research design and the model specification was panel data. The findings were that the typical individual stock return had a high mean and excess volatility, and there was a large value premium in the cross section which could, to some extent, be captured by a commonly used multifactor model.

Lim (2004) objective was to establish how psychological and reputational considerations affect the behavior of individual investors and security analysts by examining investors' preference for framing their gains and losses using trading records of individual investors at a large discount brokerage firm. The finding indicated that investors tended to bundle sales of losers on the same day and separated sales of winners over different days. The result was consistent with the principles of mental accounting (Thaler, 1985), according to which individuals attained higher utility by integrating losses and segregating gains.

Lim (2006) objective was to test whether investors' trading decisions were influenced by their preferences for framing gains and losses. The author used hedonic editing hypothesis (Thaler, 1985) to show the data set of individual investor trades used in the study is from a large U.S. discount brokerage house contained the daily trading records of 158,034 accounts (78,000 households) from January 1991 to November 1996. The file had more than 3 million records of trades in common stocks, bonds, mutual funds, American Depositary Receipts (ADRs), and so forth. The independent variables were gain or loss ratio. The dependent variable was number of stocks sold. The research used quantitative research design and developed testable hypotheses on investor trading behavior from the hedonic editing hypothesis (Thaler, 1985) and provided evidence that investors' stock selling decisions were consistent with the implications of prospect theory and mental accounting. The author found that the degree of trade clustering was related to investors' stock preferences and portfolio returns.

65

Kumar and Lim (2008) objective was to examine whether the framing mode, narrow versus broad, influenced the stock investment decision of individual investors. The authors used Odean (1998) Proportion Gain Realized : Proportion of Loss Realized (PGR : PRL) methodology to measure disposition effect on primary data for the study consisting of a six-year (1991-1996) panel of all executed trades and monthly portfolio positions of a group of individual investors at a major U.S. discount brokerage house. For a sub set of households, demographic information such as age, income, occupation, marital status, gender, etc. were also available. There were 77,995 households in the database, of which 62,387 have traded in stocks. From this group, the author chose 41,039 investors who had executed a minimum of five trades during the six-year sample period. The study adopted quantitative research design and used the panel data regression model and descriptive statistics adopting Odean (1998) PGR-PLR methodology for analysis. This study examined whether the framing mode, narrow versus broad, influenced the stock investment decisions of individual investors. The research also found that the degree of trade clustering was related to investors' stock preferences and portfolio returns. Collectively, the evidence indicated that the choice of decision frames was likely to be an important determinant of investment decisions.

Park (2010) objective was to explain why the dividend-price ratio showed strong predictive power during one period, while it exhibited weak or no predictive power at other times. The research used international data. Dependent variable was price-dividend ratio. Independent variable is stock returns. Quantitative research design and the model specification was panel data regression model was used. The model used was time series. The results demonstrated that the dividend–price ratio generally had a predictive power for stock returns when both are I (0). However, the results also showed that the dividend–price ratio lost its predictive power when it became I (1) and were robust across countries.

De Cesari and Huang-Meier (2015) objective was to investigate how private information in stock prices impacted quarterly dividend changes. Quantitative research design was

used. Panel data regression model was used. Dependent variable was dividend changes. Independent variables were stock price informativeness and stock returns. The findings indicated that the positive relationship between past returns and current dividend changed strengthened when returns conveyed more private information. This finding was robust to the use of several price informativeness measures and the inclusion of managerial private information and stock overvaluation measures. Managers seemed to learn new information from stock prices that they used when deciding on their dividend policy. This study highlighted private information in stock prices as an important determinant of dividend policy and contributed to the literature on the real effects of financial markets.

Frydman, Hartzmark and Solomon (2015) objective was to find out why investors evaluate their portfolio decisions over time. The population of study was individual investors trading on their own accounts. The sample of study was individual investors from January 1990 to June 2010, though data from as early as 1980 was utilized to construct the price history. The independent variables were realized gains and loses i.e. disposition effect using the difference in the proportion of gains realized (PGR) and the proportion of losses realized (PLR). The dependent variable was Prospect theory utility. The research design adopted was quantitative research design. The model used was Barberis and Xiong (2012) model which adopted correlation analysis. The findings indicated that when trading the new position, investors exhibited a disposition effect based on the amount invested in the original position that was no longer in the portfolio

2.4.5 Overconfidence and Stock Market Reaction

Daniel, Hirshleifer and Subrahmanyam (1998) explained that overconfidence implied negative long-lag autocorrelations, excess volatility, and, when managerial actions were correlated with stock mispricing, public-event-based return predictability. The context was the US investors. The independent variables were investor overconfidence and variations in confidence arising from biased self-attribution. The dependent variables

were stock market overreactions and under-reactions. The study adopted quantitative research design and correlations analysis. The authors showed that overconfidence implied negative long-lag autocorrelations, excess volatility, and, when managerial actions were correlated with stock mispricing, public-event-based return predictability. Biased self-attribution added positive short-lag autocorrelations or short-term momentum, short-run earnings drift but negative correlation between future returns and long-term past stock market and accounting performance.

Daniel and Titman (1999) objective was to find out whether overconfidence affected stock prices. The research used regression analysis to observe a relationship between stock returns and both Book to Market value and momentum. The authors begun the analysis by examining the performance of 125 portfolios sorted on size, Book to Market value and momentum in the USA. The independent variables were aggregate income fund return, growth fund return; return on the CRSP value-weighted index of all U.S. common stocks, risk-free return over the month. The dependent variable was CAPM-like regressions, Sharpe ratio maximization and Excess return. The study adopted quantitative research design and panel data model regression analysis. Their analysis suggested that investor overconfidence generated momentum in stock returns and that that momentum effect was likely to be strongest in those stocks whose valuations required the interpretation of ambiguous information.

Barber and Odean (2001) used quantitative research design to measure common stock investments of 37,664 households at the New York Stock Exchange in USA in 1998 for which the authors identified the gender of the person who opened the household's first brokerage account. This sample was compiled from two data sets. The author's primary data set was information from a large discount brokerage firm on the investments of 78,000 households for the six years ending in December 1996. Using account data for over 35,000 households from a large discount brokerage, the authors analyzed the common stock investments of men and women from February 1991 through January 1997. The independent variables were portfolio risk, turnover, effect of trading on return

performance and gender. The dependent variables were cross sectional analysis of turnover and performance. The study adopted quantitative research design. The study used regression analysis. The authors documented that men trade 45 percent more than women. Trading reduced men's net returns by 2.65 percentage points a year as opposed to 1.72 percentage points for women.

Daniel, Hirshleifer and Subrahmanyam (2001) objective was to offer a model in which asset prices reflected both covariance risk and misperceptions of firms' prospects, and in which arbitrageur's traded against mispricing. The context was the US. The target population was listed companies. The dependent variable was expected returns. The independent variables were volume, volatility, fundamental/price ratios, and mean returns. Quantitative research design was adopted. The findings indicated that with many securities, mispricing of idiosyncratic value components diminished but systematic mispricing did not. The theory offered untested empirical implications about, and was consistent with several empirical findings. These included the ability of fundamental/price ratios and market value to forecast returns, and the domination of beta by those variables in some studies.

Scott, Stumpp and Xu (2003) objective was to establish overconfidence bias with valuation theory and could bias stock prices in systematic ways uncovering evidence of bias required use of different techniques for stocks with different growth rates. The study compared US context with UK, Japan, Germany and France. Dependent variable was growth category. Independent variables were PE ratios, stock growth rate and stock returns. The results found consistent investor overconfidence behavior across different countries and trading environments.

Biais, Hilton, Mazurier and Pouget (2005) conducted univariate analysis using miscalibration and observation methodology. The objective of study was to measure the degree of overconfidence in judgement in the form of miscalibration, i.e. the tendency to overestimate the precision of one's information and self-monitoring i.e. a form of

69

attentiveness to social cues of 245 participants and observed their behavior in an experimental financial market under asymmetric information. Twenty-six cohorts of students from Toulouse University and the London Business School participated in the experimental trading game in France and United Kingdom respectively. For 245 participants, the authors measured miscalibration using a scale adapted from Russo and Schoemaker (1992), and self-monitoring using the scale developed by Snyder and Gangestad (1986), and collected data about behaviour and performance in the experimental market. The independent variables were measured the degree of overconfidence in judgement i.e. in the form of miscalibration, i.e. the tendency to overestimate the precision of one's information and self-monitoring i.e. a form of attentiveness to social cues of 245 participants and observe their behaviour in an experimental financial market under asymmetric information. The dependent variables were average trading profits and earnings. The study adopted quantitative research design. The study used regression analysis. Miscalibrated traders, underestimating the conditional uncertainty about the asset value, were expected to be especially vulnerable to the winner's curse. High self-monitors were expected to behave strategically and achieve superior results. The empirical results showed that miscalibration reduced and self-monitoring enhanced trading performance. The effect of the psychological variables was strong for men but non-existent for women.

Statman, Thorley and Vorkink (2006) objective was to find out whether investors were overconfident about their valuation and trading skills explained high observed trading volume. With biased self-attribution, the level of investor overconfidence and thus trading volume varied with past returns. The dependent variable was trading volume. Independent variable was market return. Quantitative research design was used. Panel data regression model was used. The database consisted of monthly observations on all NYSE/AMEX common stocks, excluding closed-end funds, REITs, and ADRs, from August 1962 to December 2002, the span of the daily CRSP files. The author found that share turnover was positively related to lag returns for many months. The relationship

held for both market-wide and individual security turnover, which was interpreted as evidence of investor overconfidence and the disposition effect, respectively. Security volume was more responsive to market return shocks than to security return shocks, and both relationships were more pronounced in small-cap stocks and in earlier periods where individual investors held a greater proportion of share

Ko and Huang (2007) objective was to develop a model in which overconfidence caused investors to over-invest in information acquisition when this information improved market efficiency by driving prices closer to true values and study the impact of overconfidence on mispricing and information acquisition, comparing the net effect on prices. Quantitative research design was used. The dependent variable was information investment. Independent variable was overconfidence level. The model used was regression analysis based on Grossman and Stiglitz (1976) except that it added information acquisition and overconfident investors. The findings indicated that overconfidence generally improved market pricing provided the level of overconfidence was not too high.

Glaser and Weber (2007) objective was to test this hypothesis by correlating individual overconfidence scores with several measures of trading volume of individual investors. The target population was approximately 3,000 online broker investors were asked to answer an internet questionnaire which was designed to measure various facets of overconfidence i.e. miscalibration, volatility estimates, better than average effect. The sample population was 215 individual investors who answered the questionnaire. The dependent variable was volume of trade. The independent variable was overconfidence measured using miscalibration, volatility estimates and better than average effect. Quantitative research design was adopted. The authors found that investors who thought that they were above average in terms of investment skills or past performance but who did not have above average performance in the past traded more. Measures of miscalibration were, contrary to theory, unrelated to measures of trading volume. This result was striking as theoretical models that incorporated overconfident investors

71

mainly motivated this assumption by the calibration literature and modeled overconfidence as underestimation of the variance of signals. About other recent findings, the author concluded that the usual way of motivating and modeling overconfidence which was mainly based on the calibration literature must be treated with caution. Moreover, the authors' way of empirically evaluating behavioral finance models, the correlation of economic and psychological variables and the combination of psychometric measures of judgment biases, such as overconfidence scores, and field data seemed to be a promising way to better understand which psychological phenomena drove economic behavior.

Zaiane and Abaoub (2009) objective was to study the impact of the phenomenon of overconfidence on the trading volume and its role in the formation of the excess volume on the Tunisian stock market. The database consisted of monthly observations of Tunisian common stocks from January 2000 to December 2006. The dependent variable was trading volume. The independent variables were the monthly stock market return, the monthly volume i.e. shares traded and the monthly temporal volatility of market return based on daily market returns within the month, correcting for realized autocorrelation, as specified in French, Schwert and Stambaugh (1987). Based on the work of Statman, Thorley and Vorkink (2006) and by using VAR models and impulse response functions, the results indicated a little evidence of the overconfidence hypothesis when volume i.e. shares traded was used as proxy of trading volume.

Grinblatt and Keloharju (2009) objective was to study and document the behavioral attributes that influenced trading volume. The authors used panel data to combine information from several data sets: FCSD data. The study used panel data regression analysis on data set to record the portfolios and trading records from January 1, 1995 through November 29, 2002 of all household investors domiciled in Finland. The daily electronic records the author used were exact duplicates of the official certificates of ownership and trades, and hence were very reliable. The author studied trading data from July 1, 1997 on for those individuals who held stocks at some point between

January 1, 1995 and June 30, 1997. The independent variables were value of stock portfolio, number of stock portfolio, number of stock trades, portfolio turnover, number of speeding tickets, self-confidence and ability score. The dependent variable was trading volume based on the function of gender, birth measuring time i.e. year. The study adopted quantitative research design and regression analysis. The author analyzed the role that two psychological attributes-sensation seeking and overconfidence-played in the tendency of investors to trade stocks. Equity trading data from Finland were combined with data from investor tax filings, driving records and mandatory psychological profiles. The authors used these data, obtained from a large population to construct measures of overconfidence and sensation seeking tendencies. Controlling for a host of variables, including wealth, income, age, number of stocks owned, marital status and occupation, the authors found those overconfident investors and those investors most prone to sensation seeking traded more frequently.

Huisman, Sar and Zwinkels (2010) used Parkinson (1980) as an alternative measure of investors expected volatility for AEX INDEX with an implied volatility estimate from data obtained from a repeated biweekly survey that it had unique access to. The context was Netherlands. The population of study was private investors. The sample of respondents consisted of private investors being a client of the Dutch ABN Amro bank, one of the biggest Dutch banks in Netherland. The independent variable was trading frequency. The dependent variable was investors expected volatility. The authors adopted quantitative research design. The authors adopted autocorrelation and correlation analysis model. The results indicated that the expected volatilities resulting from the Pearson-Tukey measure were even lower than those from the Parkinson (1980) measure. Results confirmed that surveyed retail investors exhibited a significant overconfidence bias.

Yeoh and Wood (2011) recruited participants for a financial trading competition from students at the University of Essex in the United Kingdom who responded to poster and e-mail advertisements. The objective of the study was to find out why trading volume

increases with confidence, with overconfident traders, the number of transactions increases with confidence, the average size of transactions increased with confidence, and if trading volume increased with confidence, whether or not investment performance increases investment performance did not increase with confidence, men were more overconfident than women, men expected higher returns than women, and whether men traded more than women. A total of 260 participants signed up for the competition, with the final sample reduced to 146 once students who failed to meet the requirement of logging on at least once every two weeks during the eight weeks of the competition. The independent variables were number of transactions, average size of transactions, investment performance and high perceived competence. The dependent variable was trading volume. The authors adopted quantitative research design based on an experimental design and analyzed data using panel data regression model specification. The findings were that overconfident participants undertook smaller but more frequent trades.

Durand, Newby, Tant and Trepongkaruna (2013) objective was to systematically profile investors' personality traits to examine if, and how, those traits were associated with phenomena observed in financial markets. Dependent variable was overconfidence. Independent variable was overreaction in an experimental foreign exchange market. Findings indicated that personality traits were associated with overconfidence and overreaction in financial markets.

Adel and Mariem (2013) objective was to study the impact of overconfidence bias on the decisions of investors, specifically to evaluate the relationship between the bias, trading volume and volatility. Context was Tunis. The empirical study on a sample of 27 companies listed on the stock exchange in Tunis, observed over the period, which ran from 2002 until 2010. The dependent variable was investor overconfidence. Independent variables were trading volume, market return, volatility and turnover. The results achieved through the application of tests and VAR modeling ARMA-EGARCH

74

indicated the importance of confidence bias in the analysis of characteristics of the Tunisian financial market.

Jlassi, Naoui and Mansour (2013) objective was to examine the effect of overconfidence behaviour on dynamic market volatility in global financial markets. Using daily data from 27 countries spanning over 2000-2012. Quantitative research design was used. Dependent variable was the market return at time. Independent variable was the mean of conditional on past information, the residual of the mean at time, the conditional volatility at time, the volatility effect on conditional volatility. The model was GARCH effect or the persistence in conditional volatility irrespective of any event happening in the market. The findings indicated that overconfidence was more pronounced for the advanced markets relatively to the emerging ones. With the exception of some Asian and Latin American markets overconfidence was presented in both up and down markets. Evidence suggested that overconfidence was the main incentive that triggered and prolonged the global financial crisis in the US market and in other continents. Finding showed that overconfidence still existed even during the recession period, but at different levels.

Boussaidi (2013) objective was to test the causality between the trading volume and the conditional return volatility in the absence of public information. The context was Tunis. Quantitative research design was used. Dependent variable was trading volume. Independent variable was return volatility. VAR model was used to analyze the data. The data were daily prices, daily number of shares traded, number of shares outstanding at the end of the day, and public information announcement dates from March 13, 2008 to March 16, 2009 for 30 firms listed on the Tunis Stock Exchange. The model was causality test model. The results indicated that the overconfidence hypothesis was confirmed only for one third of the firms composing the sample. The sum of the lagged coefficients associated to turnover was positive and significant.

Tariq and Ullah (2013) objective was to investigated investor overconfidence in Pakistan stock market. The context was Pakistan. The population was 26 stocks representing all sectors of Karachi Stock Exchange (KSE) from 2003-2010. The dependent variable was market turnover. Independent variable was weighted return of cross section of securities at time. Quantitative research design was used and VAR model was adopted. Results indicated that return volatility had significant impact on returns but it hadn't gotten any significant impact on turnover and previous days' returns had significant positive impact on today's turnover.

Metwally and Darwish (2015) objective was to investigate the relation between past market return and current market turnover in volume and value, discovering whether the Egyptian market and its investors were prone to the overconfidence bias and testing the variations in the turnover in volume and value resulting from different market status. The context was Egypt. The population of study was investors at the Egyptian Stock market during the period from 2002 till 2012. The sample was the whole period was divided into four sub periods; two tranquil upward trending (2005-2005) and (2005-2008) and two volatile and down ward trending (financial crisis 2008-2010) and the (Egyptian Revolution Period 2010-2012). The dependent variable was turnover and the independent variable was return. Quantitative research design was used and VAR model was adopted. Results indicated that the influence of past market return to the market turnover in volume only existed in the first lag, since the second lag of market return was not significant. The positive impact of the lagged market returns on the market turnover fitted the overconfidence hypothesis, although the effect was not as strong as expected. The results were presented using the five lags selection criteria of the VAR model. It was found that Schwartz Criteria was supporting the result at lag 2, while the other four criteria were all significant at lag.

2.4.5 Stock Market Reaction

DeBondt and Thaler (1985) objective was to investigate whether investor behavior affected stock prices. The independent variable was excess adjusted residual returns between the winner and loser portfolios. The dependent variable was cumulative abnormal returns. The study used quantitative research design. Panel data regression model was adopted. The findings indicated that based on CRSP monthly return data; there was consistency with overreaction hypothesis that shed new light on the January returns earned by prior winners and losers.

Jegadeesh and Titman (1993) documented that strategies that bought stocks had performed well in the past and sold stocks that had performed poorly in the past generate significant positive returns over 3- to 12-month holding periods. The objective of study was to determine relative strength portfolios based on J-month lagged returns and held for K-months. The independent variable was cross-sectional dispersion of expected returns for winner and loser stocks. The dependent variable adopted stock market reactions (overreactions and under-reactions). The study used quantitative research design. Panel data regression model was adopted. The authors found that the profitability of these strategies are not due to their systematic risk or to delayed stock price reactions to common factors. However, part of the abnormal returns generated in the first year after portfolio formation dissipated in the following two years. A similar pattern of returns around the earnings announcements of past winners and losers was also documented.

2.5 Critique of the Empirical Literature

An analysis of empirical literature showed that most authors adopted quantitative research design in the studies reviewed except Syprou (2013) and adopted literature review of various empirical and theoretical reviews of herd behaviour. The other reviews compared significantly with the current study that adopted quantitative research design.

The other difference was that most studies used experimental research method to measure variables for overconfidence, loss aversion and mental accounting. Panel data regression model was being adopted in this research. This compared significantly with most of the studies in this review for example Seo, Goldfarb and Barrett (2010); Harinck, Beest, Dijk and Zeeland (2012); Gächter, Johnson and Herrmann (2007); Brenner, Rottenstreich, Sood and Bilgin (2007); Heath, Chatterjee and France (1995); Frydman, Hartzmark and Solomon (2015); and Thaler and Johnson (1990). Vector Autoregressive model was adopted by Adel and Mariem (2013); Tariq and Ullah (2013); Zaiane and Aboub (2009); Metwally and Darwish (2015); Statman *et al* (2006).

The population of study however contrasted significantly in Seo, Goldfarb and Barrett (2010); Harinck, Beest, Dijk and Zeeland (2012); Gächter, Johnson and Herrmann (2007); Brenner, Rottenstreich, Sood and Bilgin (2007); Heath, Chatterjee and France (1995); Frydman, Hartzmark and Solomon (2015); and Thaler and Johnson (1990). The population and data in previous studies differed significantly with the use of investors instead of equity stocks of listed companies in the bourse to assess the investor behaviour variables in different contexts of various financial markets as was adopted in this study. The population and data contrasted significantly in most studies on some of the reviews on loss aversion and mental accounting that used investors on experimental tests conducted. The population in this study was historical data of returns, volume traded, and number of deals and dividend yield of listed companies at the NSE.

The independent and dependent variables contrasted significantly for most studies on herding, loss aversion mental accounting and overconfidence, because the population of study was investors. The variables were to determine the effect of investor psychology variables of herding, loss aversion, mental accounting and overconfidence on stock market reaction in Kenya. The variables in most of the reviews differed significantly as most studies conducted experiments in order to collect data on the investor behavior biases. Barberis and Huang (2001), Adel and Mariem (2013) and Thirika and Olweny (2015) studies used the measurable variables that were adopted in this study

This study contrasted significantly with the present study where objective was to determine the effect of investor behaviour on stock market reactions of listed companies in Kenya using regression analysis. The objective of studies and population sample differed significantly in the previous studies with the current study where the main objective was to determine the effect of investor behavior on stock market reactions in Kenya.

Some of the studies whose objectives differed significantly were as follows. Blasco, Corredor and Ferreruela (2012) objective of study was to analyze between volatility and herding during market stress. Lee and Lee (2015) objective was to explain the mechanisms of how bubbles and crashes emerges in asset markets with heterogeneous agents which differed significantly with current study. Gächter, Johnson and Herrmann (2007) objective also differed significantly to draw attention to the fact that measurement of loss aversion itself may affect its magnitude by inducing a focus on either loss or gain. Kumar and Lim (2008) objective was to examine whether the framing mode influences the stock investment decisions of individual investors contrasted with the current study. Lim (2006) objective tested whether investor's trading decisions were influenced by their preference for framing gains and losses. Yeoh and Wood (2011) objective was to determine the effect of overconfidence on trading behavior. Biais, Hilton, Mazurier and Pouget (2005) used calibration and observation measure for the degree of overconfidence in judgement in the form of miscalibration.

Blasco *et al.* (2012) implemented Patterson and Sharma (2006) model specification measure based on intraday data and both realized volatility measures and conditional volatility models have been used. Lee and Lee (2015) data also differed with the use of agents who were fundamentalists and chartists. The sample was 2,500 agents. The authors used the Agent-Based Modelling computational methodology that allowed an analyst to create, analyze and experiment with artificial worlds composed of agents that interacted within a specific environment. Gächter *et al* (2007) measured individual-level loss aversion in riskless choices in an endowment effect experiment by eliciting both

WTA and WTP from each of our 360 subjects i.e. randomly selected customers of a car manufacturer.

2.6 Research Gap

Investor behavior showed that investors were generally not rational and did not make choices in line with what standard probability theory predicted (Akerloff & Shiller, 2015). People who communicated regularly thought alike and had similar judgments when reacting to information. The social influence had an enormous power on individual investment decision-making process. When people were faced with the finding of a large group of people who arrived at the decision different from theirs, they changed and followed the decisions of the large group, herd behaviour. Systematic risk, size effect, liquidity i.e. buy-ask spreads also caused stock market reaction but did not hold up in different sample periods and had lost predictive power to be used as an investment strategy (Jegadeesh & Titman, 1993).

Investor behavior variables provided a predictive power to measure abnormal returns in the financial markets because of the laws of supply and demand of stocks that were determined by investor psychology i.e. beliefs, attitudes and behavior of investors towards a particular stock in the stock market. The weekend effect, January effect, the dividend yield effect, small-firm effect, PE effect, the effect of end months, the value effect, the momentum effect, the phenomenon data snooping and turn-of-the-year effect indicated weak evidence that stock market returns were predictable using variables such as dividend yields, interest rates or inflation (Schwert, 2003).

The anomalies indicated either market inefficiency i.e. profit opportunities or inadequacies in the underlying asset-pricing model. The anomalies were as a result of behavioral variables to create new asset-pricing theories that combined economic equilibrium concepts with psychological concepts to create an improved asset-pricing model (Schwert, 2003). The PE ratio anomaly referred to the observation that stocks

with extremely low PE ratios earn larger risk adjusted returns than the high PE stocks (Debondt & Thaler, 1985). The equity of companies with very high PE was thought to be overvalued before predictably falling in price. Fundamental analysis had been inconsistent in gauging investor investment decisions and therefore did not give an accurate measure of returns predictability.

The core behavioural factor and the most robust finding in the psychology of judgment needed to understand anomalies was overconfidence. People could exaggerate their talents and underestimate the possibility of bad results over which they had no control. The blend of overconfidence and optimism caused people to overestimate their awareness underestimate their risks and overstress their ability to control their events which led to excessive trading volume and speculative bubbles. Return predictability depended on investor allocation preferences on investment decisions. Companies with low PE ratios were thought to be temporarily undervalued because investors became excessively pessimistic after a series of bad earnings report or other bad news. These anomalies were regarded as evidence of market inefficiency, giving birth to behavioral finance, which challenged the fundamental assumptions of the theory of efficiency (Debondt & Thaler, 1987).

Shiller (2015) documented the behavioural factors that lead to investment bubbles and argues that future stock prices were to some extent predictable using Cyclically Adjusted Price-Earnings ratio (CAPE). Irrational exuberance was unsustainable investor enthusiasm that drove asset prices up to levels that weren't supported by fundamentals. The author demonstrated that markets couldn't be explained historically by the movement of company earnings or dividends. Bubble theory explained that the prices of assets could temporarily rise far above their true values and that these bubbles were easily identifiable.

Akerlof and Shiller (2015) argued that if there was profit to be made in the markets, sellers will systematically exploit investor psychological weaknesses and their ignorance

through manipulation and deception. Rather than being essentially benign and always creating the greater good, markets were inherently filled with tricks and traps and would phish investors as phools. Investors were faced with uncertainty of not knowing what causes stock prices to go up or down because they have no objective way of knowing (Shiller, Fischer & Friedman, 1984). Since investors lacked a clear sense of objective evidence regarding prices of stocks, their opinions on investments are always derived by their behavior in investment decision making. In a rational world, prices change only when news arrives. However, it had been hard to explain changes in prices and volumes traded at the stock market using only observable news (Cutler, Poterba & Summers, 1989).

Equity pricing involved the weighing of long-term benefits i.e. the right to a share in the future net cash flow due to equity and costs i.e. the riskiness of the future cash flows, so it seemed reasonable to speculate that the emotions and feelings of how investors influence their pricing of equities (Fowler, 2014). Loewenstein (2000) described behavioural finance as emotions and feelings experienced at the time of deciding often propelled by behaviour indirections that were different from those dictated by weighing of the long-term costs and benefits of disparate actions.

Henker and Henker (2010) concluded that retail investors were not responsible for stock mispricing. Since retail investors did not affect prices in this carefully selected environment, Henker and Henker (2010) inferred that their trading was unlikely to influence stock market prices. Their conclusion had important implications for theories, particularly behavioral finance theories that were dependent on the influence of retail investor trading in stock markets.

Barberis, Shleifer and Vishny (1998) based their study on representativeness and conservatism investor biases to explain that earnings were trending and at times mean reverting. Daniel, Hirshleifer and Subrahmayam (1998) built on overconfidence bias about the validity of what investors treat as private information. The findings assumed

82

that prices were driven by a single representative agent and then posit a small number of cognitive biases that this representative agent might have. They then investigated the extent to which theses biases were sufficient to simultaneously deliver both short-horizon continuation and long-horizon reversals. Hong and Stein (1999) modelled two bounded rational agents: the news watchers who make forecasts based on what they considered private information but did not condition properly on past prices and the momentum traders who conditioned on past prices. Barber and Odean (2000) indicated that investors were reluctant to sell stocks that had declined in value compared to stocks that have appreciated.

Calderon-Rossell Model explained that macroeconomic factors were determinants of stock market growth (Calderon-Rossell, 1991). Tobin Qs theory measured the market value of a company's assets divided by the replacement cost of the company's assets (Hayashi, 1982); (Yoshikawa, 1980). Fama and French (1988) explained permanent and temporary components of stock prices by hypothesizing the slow mean-reverting component of stock prices tends to induce negative autocorrelation in returns. Brock (1982) model; Lucas (1978) neoclassical growth model of asset-price determinants of aggregate savings and investments provided a theory for movements of asset returns and aggregate production over time. DeBondt and Thaler (1985) found that stocks whose price had risen very dramatically tended to have negative abnormal returns in subsequent years.

Shiller, Fischer, and Friedman (1984) argued that mass psychology might be the dominant cause of movements in the price of the aggregate stock market. Daniel *et al*. (1998) based their study on two well-known psychological biases: investor overconfidence about the precision of private information; and biased self-attribution, which causes asymmetric shifts in investors' confidence as a function of their investment outcomes. The authors showed that overconfidence implies negative long-lag autocorrelations, excess volatility, and, when managerial actions are correlated with stock mispricing, public-event-based return predictability. Biased self-attribution added

positive short-lag autocorrelations i.e. momentum, short-run earnings i.e. drift, but negative correlation between future returns and long-term past stock market and accounting performance.

Consistent with moderated confidence, Frank (2004) showed that price and investors' value estimates in a bucket under-reacted more as the reliability of information increases. De Bondt and Thaler (1985) found systematic price reversals for stocks that experienced extreme long term gains or losses. Past losers significantly outperform past winners. Stock market under-reactions and overreactions aid in predicting returns of listed stocks (Han, Hwang & Ryu, 2015). The existence of overreaction in the marketplace, if it were to be proven, would be important to both investment decision making and theory, and in more acute cases could explain the major cause of financial bubbles and panics (Dreman & Lufkin, 2000).

Popescu (2008) opined that investor behaviour dwells on the fact that people fall into psychological traps including overconfidence, anchoring and adjustment, improper framing, irrational commitment escalation and the confirmation trap. Correlation between accounting performance with future price changes i.e. post-earning announcement drift. There was a tendency for stocks' cumulative abnormal returns to drift in the direction of an earnings surprise for several weeks following an earnings announcement. Stock prices reacted positively to earnings news but require several quarters to fully reflect the information in earnings, whether post earnings announcement drifts extend to aggregate data. The connection between stock returns and aggregate earnings surprises. Test for post announcement drift in market returns. Post earnings announcement drift in market returns and how the market reacted to firm and aggregate earnings should help them refine models of price behavior.

Kaminsky and Schmukler (1999) analyzed what type of news moved the markets in those days of market jitters. The authors found that movements were triggered by local and neighbouring-country news, with news about agreements with international

84

organizations and credit rating agencies having the most weight. However, some of those large changes couldn't be explained by any apparent substantial news, but seemed to be driven by herd instincts of the market itself. The evidence suggested that investors over-reacted to bad news

CSAD captured any possible non-linear relation between stock price dispersions and the market returns. Decrease in the level of return dispersion showed possibility of market-wide herding in a market. Non-linear relationship between dispersion and market returns showed the presence of herding in a market measured the level of dispersion using CSAD based on conditional version of CAPM. Low dispersion meant high tendency among investors to herd. Herd behavior in the market was consistent with a non-linear relationship between dispersions (CSAD) and the corresponding equally weighted market return (Lindhe, 2012). Return dispersion variable was suggested by CCK (2000) and used the cross-sectional absolute deviation of returns (CSAD) as a measure of return dispersion. Chang et al. (2000) modified and extended the work by Christie and Huang (2005); though making the same assumption that the level of dispersion would increase during periods of market stress, they concluded that the herd behaviour in the market would imply a decrease in dispersion but also a non-linear relationship between dispersion and market returns. Lindhe (2012) also modified the method of measuring dispersion to cross-sectional absolute deviation, CSAD, based on the conditional version of the capital asset pricing model.

Studies done on stock market overreactions and under-reactions had only looked at overconfidence and self-attribution and herding biases. To be able to give a meaningful conclusion on the effect of investor behaviour and stock market reaction, the research suggests the following areas for research: Effect of investor herd behavior on stock market reactions in Kenya; effect of investor loss aversion on stock market reactions in Kenya; effect of investor mental accounting on stock market reactions in Kenya; and effect of investor overconfidence on stock market reactions in Kenya.

2.7 Summary of the Literature

The reviewed theories were then critiqued for relevance to specific variables. The chapter also explored the conceptualization of the independent and the dependent variables by analyzing the relationships between the two set of variables. In addition, an empirical review was conducted where past studies both local and global were reviewed in line with the following criteria, title, scope, methodology resulting into a critique. From these critiques the research gap was identified as the effect of investor behavior on stock market reaction in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, research methodology assisted in achieving the research objectives. The objective of this research work was to establish the effect of investor behavior on stock market reaction in Kenya. This involved deciding the research philosophy, research design structure, choosing the specific methods and developing a sampling strategy. It involved describing the analysis carried out. This chapter covered research philosophy, research design, target population, data collection instrument, data collection procedures, pilot test and data processing analysis.

3.2 Research Philosophy

Positivist approach was the research philosophy adopted because quantitative tools and techniques emphasized measuring and counting. The positivist approach involves causal relationships, highly structured methodology, scientific principles, large samples, quantification and incremental contribution to theory. Positivist philosophy was used because the data was highly structured large samples, measurement, and quantitative data. According to Travers (2001) positivism focused purely on facts, gathered through direct observation of people behavior and experience and measured empirically using quantitative methods. Such quantitative methods included surveys and experiments as well as statistical analysis. This study adopted positivistic approach in the use of quantitative tools and techniques that emphasized measuring and counting to establish possible relationships that existed among the independent and dependent variables which in this study were investor behavior and stock market reactions respectively (Saunders, Lewis, & Thornhill, 2009).

Fama (1998) limited behavioural finance to a narrow stream of positivist modelling, and event studies, which was abound with anomalies. The critique was seen as demonstrating a limited understanding of what behavioural finance is, as well as narrowing the methodological focus through a positivist attack which asserted the core assumptions and research approach of EMH and capital market studies over the anomalous and conflicted evidence of a methodologically weak area that behavioural finance inhabits.

The choice of a research philosophy determined the research design. Two philosophical traditions that guided social science research were positivism and social construction. Positivism is a philosophy that seeks real facts of social phenomena that are objective, neutral and predictable with little regard for the subjectivity of individuals. Phenomenological approach did not begin from an established theory. The research developed ideas through induction and was a participant observer, and tried to understand what was happening and investigated small samples in depth over time. The study adopted the ontology of objectivism portraying the position that social entities existed in reality to social actors concerned with their existence (Saunders. Lewis & Thornhill, 2007)

3.3 Research Design

The study used quantitative research design. Quantitative researchers employed measurement, experiment and statistical analysis to answer their research questions, and qualitative researchers preferred observations, interviews, and content analysis (Long, 2014). The study used unbalanced panel data regression analysis to measure, describe and analyze the effect of investor behavior on stock market reaction in Kenya for the period 2004-2016. The logic of selection of this period was to collect most recent data.

Panel data regression model was adopted because it took care of heterogeneity associated with listed companies at the Nairobi Securities Exchange by allowing for

individual specific variables. Also, by combining time series of cross sectional observations, panel data gave more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency. This research design was selected for the study because the data collected for the study variables was used to analyze historical stock prices, volume traded, turnover and number of deals which required quantitative analysis.

 Quantitative research design was suitable because of time constraints that secondary data provided the only possibility of undertaking cross-sectional and time series analysis. Quantitative research design therefore was useful in the study because cross-sectional and time series data analysis was required (Brooks, 2014). De Bondt and Thaler (1985) investigated whether investor behavior had an effect on stock market reaction using quantitative research design hence the suitability of the design in this study.

3.4 Target Population

Population refers to an entire group of individuals, events or objects having common characteristics that conform to a given specification (Miles, Huberman & Saldana, 2014). The target population for this study comprised 67 listed companies in Kenya trading in equity stocks in the period 2004 to 2016 at the NSE. All the 67 listed companies were used as the population for this study in order to determine how the investor behavior had an effect of stock market reactions in Kenya. The study used daily historical stock data from NSE comprising of 67 listed companies in Kenya trading in equity stocks in the period 2004 to 2016. This was aimed at a covering a comprehensive length of time to give accurate results as the period covers periods of social, political and economic changes in Kenya. The period 2004 to 2016 was sufficient to cover stock market reaction during periods of market stress, recovery periods of the market and the current price declines experienced at the NSE.

3.5 Data Collection Instrument

The study employed secondary data that was extracted from historical data from NSE over the 13-year period, 2004 to 2016. Secondary data collection instrument specified in Appendix II was used.

3.6 Data Collection Procedures

The study used secondary data. Secondary data gathered from the historical price data, volumes traded, turnover and number of deals for meaningful analysis and interpretation. This study determined the effect of investor behavior on stock market reactions in Kenya. A schedule was drawn in Appendix II to provide direction on the data relevant to the study to keep the study focused on the objectives.

From the conceptual framework, the study had four independent variables and one dependent variable. The dependent variable was the Stock Market Reactions and investor behavior variables were explanatory variables. NSE historical data on stock returns for the 13-year period 2004 to 2016 for all the listed companies was analyzed. The total population was 67 listed companies however a sample frame for this study was 48 listed companies in Kenya from 2004 to 2016 because these were the companies that had traded for more than 3 years during this period of study. Sampling frame involved identifying samples from which to infer about the population.

Historical data for all listed companies on NSE for the period of 2004 to 2016 was used. The period 2004 to 2016 was used because this was the most recent period when the Kenyan stock market went through technological changes in their operations as well as the economy of the country improved substantially during this period due to social and political changes that explained the stock market reactions and investor behavior in Kenya. Stocks were selected that had sufficient return observations during the formation period.

3.7 Pilot Study

Secondary data was used for data analysis as indicated in Chapter three based on appendix II. The pilot study was conducted to ensure that the instrument captured all the necessary information to determine the required NSE historical data, the instrument was discussed with the experts prior to data collection and the necessary review done.

3.8 Data Processing and Analysis

Secondary data was collected from historical data at NSE for the period 2004 to 2016. This approach was guided by econometric theory that advocated for panel data analysis to achieve better regression results (Baltagi, Bratberg & Holmås, 2005). One of the main advantages of panel data was that it enabled the researcher to control against unobserved heterogeneity and provided the researcher with both cross-sectional and time-series dimensions; which reduced the likelihood of bias in the parameter estimators. Historical data on stock prices, volume traded, number of deals and price dividend ratio was analysed in excel and used to compute the formulas relevant for the study variables in the sample selected listed companies across time.

Descriptive statistics included measures of central tendency, dispersion and skewedness were used to summarize and profile stock market reaction, herd behaviour, loss aversion, mental accounting and overconfidence variables for the study. Panel regression model was used in the analysis. E Views version 9 software was used in the analysis to determine the effect of investor behaviour on stock market reaction. Presentation of study results was done by use of tables, graphs and box plots.

3.9 Measurement of Study Variables

The study adopted stock market reaction as the measure for dependent variable. Herd behavior, loss aversion, mental accounting and overconfidence constituted investor

behavior which were the independent variables for the study. This section provided details of how each of the study variables was measured and operationalized.

3.9.1 Stock Market Reactions

Stock market reaction was measured using abnormal returns. Excess return AR_{it} were computed as the difference between the stock return and the market portfolio return to get market adjusted return. Abnormal return was measured as follows:

Abnormal return = Observed return – Expected return

$$AR_{i,t} = R_{i,t} - R_{m,t} \qquad \text{Where:} \qquad\qquad (3.1)$$

R_{it} = Actual return observed for all the 48 listed stocks in the 13 year period

R_{mt} = the equal-weighted return of the entire 20 share index.

t = the 13 year-period, i = the 48 sampled listed companies at NSE

Market return constant R_{mt} was subtracted from $R_{it.}$ There was no risk adjustment except for movements of the market as a whole and the adjustment wass identical for all stocks (De Bondt & Thaler, 1985).

3.9.2 Herd Behavior

Herd behavior was measured using return dispersions based on Cross Sectional Absolute Deviations (CSAD) method (Thirika & Olweny, 2015). CSAD was expressed as

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{N}|r_{it} - r_{mt}|$$

$$(3.2)$$

CSAD is the measure of dispersion where:
 N is the number of companies in the sample,

92

r_{it} = the observed stock return on firm i for 13-year t,

and r_{mt} = the cross-sectional average return on year t.

i = the 48 companies sampled

t = the 13 year period from 2004 to 2016

This meant that the dispersions would decrease or at least increase at a less-than-proportional rate with the market return. Herd behaviour existed when there was a small difference between the returns of individual stock and the market index.

3.9.3 Loss Aversion

Utility of gains or losses of prior returns was used to measure loss aversion variable (Barberis & Huang, 2001). The gain or loss on stock i between time t and $t + 1$ was measured as follows:

$$X_{i,t+1} = S_{i,t}R_{i,t+1} - S_{i,t}R_{f,t} \tag{3.3}$$

Where:

$X_{i,t+1}$ = the measures the gain or loss on stock i between time t and time t_1, a positive value indicating a gain and a negative value, a loss.

$S_{i,t}$ = the reference state of the value of the investor's holdings of stock i at time t

R_{it+1} = the future expected return (one-year lead)

$R_{f,t}$ = the risk free rate (Treasury bill rate)

In words, the gain was the value of stock i at time $t + 1$ minus its value at time t multiplied by the risk-free rate. Expected return led by one month minus equals to market return minus risk free rate.

3.9.4 Mental Accounting

Mental Accounting was measured using price-dividend ratio. Price-dividend ratio is financial ratio that indicates how much a company pays out in dividends each year relative to its share price. The formula was as follows:

$$\frac{P_0}{D_1} = K \tag{3.4}$$

Where:

P_0 = the price of stock

D_0 = the dividend paid that year and K is the price dividend ratio.

A stock with a high price-dividend ratio i.e. a growth stock was often one that has done well in the past, accumulating prior gains for the investor, who then views it as less risky and requires a lower average return. A stock with a low price-dividend ratio was a value stock had often had dismal prior performance, burning the investor, who now views it as riskier, and required a higher average return. The mental accounting variable was first calculated by forming five portfolios. The portfolios formation was based on the price-divided ratio annually. These portfolios were rebalanced each year to form new portfolios. Barberis and Huang (2001) subtracted the average returns of the portfolio of the companies that had the highest price-divided ratio from the average returns of the companies that had the lowest price-divided ratio. This resulted in a portfolio referred to as difference portfolio. The intention of creating this portfolio was to assess whether mental accounts formed on the basis of the price-divided ratio have any explanatory power on the market reaction. It was to assess whether the companies that pay lower divided are able to beat the high paying divided companies. The formula was as follows:

SMR = Portfolio A – Portfolio B (3.5)

Where: Portfolios A were companies with low price-dividend ratio

Portfolios B were companies with high price-dividend ratio

Stocks with low price-dividend ratios i.e. dividend yield had higher average returns than stocks with high price-dividend ratios. Multifactor models that had been shown to use the value premium in actual data and matches empirical features of aggregate asset return (Barberis & Huang, 2001). In equilibrium, aggregate stock returns had a high mean, excess volatility, and were moderately predictable in the time series, while the risk-free rate was constant and low.

3.9.5 Overconfidence

Overconfidence was measured using trading volume values divided by the number of deals to ascertain turnover rate. Turnover rate was used as a measure of volume of transactions and number of deals (Adel & Mariem, 2013). Excessive trading of shares on confidence contributed to excessive volatility (Adel & Mariem, 2013). Overconfidence was measured by turnover as follows:

$$\text{Turnover Rate} = \frac{n_{it}}{N_{it}} \qquad (3.6)$$

Where:

n_{it} = the number of shares traded of stock i (volume traded per year);

N_{it} = the number of exchanges of stock i (number of deals per year); t was time 13-year period; and i was the 48 sampled listed company at the NSE.

Table 3.1: Summary of Measuring Variables

Dependent variable	Measure	Proxy	Data
Stock Market Reaction	(Abnormal Returns)	$AR_{i,t} = R_{i,t} - R_{m,t}$	Past returns

Independent Variables	Measure	Proxy	Data
Herd Behaviour	Return dispersion	$CSAD_t = \frac{1}{N} \sum_{i=1}^{N} |r_{it} - r_{mt}|$	Past returns
Loss Aversion	Utility of gains/ losses	Prior gains and losses $$X_{i,t+1} = S_{i,t} R_{i,t+1} - S_{i,t} R_{f,t}$$	Returns
Mental Accounting	Price-dividend ratio	Value premium (Portfolios A are companies with low price-dividend ratio) **less** (Portfolios B are companies with high price–dividend ratio)	Past returns
Overconfidence	Trading volume & Number of deals	Turnover rate $= \dfrac{n_{it}}{N_{it}}$	Trading volume and number of deals

De Bondt and Thaler (1985); Adel and Mariem (2013); Barberis and Huang (2001); Thirika and Olweny (2015).

3.10 Panel Regression Model Estimations

The three techniques used to specify and estimate panel regression models are Pooled Regression Model, Fixed Effect Model, and Random Effects Model. The simplest of the three models is pooled regression model, also known as the constant coefficients model with reference to both the intercept and slope. However, Pooled Regression model is the most restrictive as it disregards the space and time dimensions of pooled data. It is best suited in situations where there are neither significant cross-sectional or temporal effects and involves pooling all the data and running an ordinary least square (OLS) regression model. The major problem with this model is that it does not distinguish between the various cross sections involved in the study; i.e. by pooling all the firms, we deny the heterogeneity or individuality that may exist among them (Gujarati, 2003). The basic model panel regression model was presented as follows:

$$Y_{it} = a_{it} + bX_{it} + \mu_{it} + v_{it} \tag{3.7}$$

Where;

Y_{it} = Dependent variable

i = company

t = time

a = constant

b = coefficient

X = independent variables

μ = unobservable effect

v = error term

Fixed effect model estimation involved designing the regression model that allowed for the intercept to vary across space i.e. individual firms with the slope coefficients remaining constant; hence the term fixed effects. By so doing, the model captured the differences in individual characteristics of the entities being studied such as management style or philosophy hence improving the reliability of the regression results (Gujarati, 2003). This was achieved by employing the mean differencing or differential intercept dummies technique; hence the term least-squares dummy variable (LSDV) model. Under this study, the fixed effect model with time invariant intercept term was designed as follows:

$$Y_{it} = \alpha_{it} + \beta X_{it} + \mu_{it} + v_{it} \tag{3.8}$$

Y_{it} = the dependent Variable,

X_{it} = the vector of independent variables,

β_{it} = the coefficient of the independent variables,

μ = unobservable effect

v = error term

i = firm; and t = time.

Where μ_{it} sums up or summarised all the variables that affect y_{it}, the dependent variable cross-sectional, N, e.g. companies or country but did not vary over time was estimated using dummy variables which was termed the least squares dummy variables (LSDV) approach as follows:

$$Y_{it} = \beta x_{it} + \mu_1 D_i + \mu_2 D2_i + \mu3D3_i.........\mu_N DN_i + v_{it} \qquad (3.9)$$

Another way of specifying the fixed effect model involved designing the regression model that allowed for the intercept to vary across both space i.e. individual firms and time with the slope coefficients remaining constant. By so doing, the model captured not only the cross-sectional characteristics such as differences in management style or philosophy but also time-induced differences such as technological changes, regulatory and/or tax policy changes, and external effects such as wars or other conflicts. Under this study, the fixed effect model with time variant intercept term was designed as follows:

$$y_{it} = \alpha + \beta x_{it} + \lambda \sigma_t + v_{it} \qquad (3.10)$$

Least Squares Dummy Variables model was estimated as follows:

$$y_{it} = \beta x_{it} + \lambda_1 D1_i + \lambda_2 D2_i + ...+ \lambda_T DT_t + v_{it} \qquad (3.11)$$

Random effects model also called error components model proposed different intercept terms for each entity and again these intercepts were constant over time, with relationships between the dependent and independent variables assumed to be homogeneous both cross-sectional, N and temporally, T. Differences in random effects model, the intercepts for each cross-sectional unit were assumed to arise from a common intercept α plus a random variable e_i as follows:

$$y_{it} = \alpha + \beta x_{it} + w_{it} \ ; \ w_{it} = e_{it} + v_{it} \qquad (3.12)$$

Random effect model was also conceptually not difficult to allow for time variations than to allow for cross-sectional variation, therefore time period specific error was included as follows:

100

$$y_{it} = \alpha + \beta x_{it} + w_{it} \ ; \ w_{it} = \varepsilon_{it} + v_{it} \tag{3.13}$$

If number of time series data, T is large, and number of cross sectional units was small, there was likely to be little difference in the values of the parameters estimated by Fixed Effect Model and Random Effect Model, hence the choice here was Fixed Effect Model based on computational convenience. When number of time series data, T was small and number of cross sectional units was large the estimates obtained by two methods can differ significantly. Random Effect Model equals $\beta_{1i=}\beta+\varepsilon_i$ where ε_i was the cross sectional random component whereas in Fixed Effect Model was treated β_{1i} as fixed and not Random. In Fixed Effect Model, β_{1i} was conditional on the observed cross-sectional units in the sample were regarded as random drawings, then Random Effect Model was appropriate, for in the case of statistical inference was unconditional. If the individual error component ε_i and one or more regressors were correlated, then the Random Effect Model estimators were biased, whereas those obtained from Fixed Effect were unbiased. If N is larger than T was small, and if the assumptions underlying Random Effect Model hold, then Random Effect Model estimators were more efficient than Fixed Effect Model.

3.11 Statistical Model

The panel data regression model adopted was the Random Effect model because of panels in which T, i.e. the number of time series observations, was very small and N i.e. the number of groups were large and of the same order of magnitude. Panel data regression models was used to pool data observations on a cross-section of the sampled 48 listed companies under study over a period of thirteen years. The study used panel regression models to analyze secondary data as the secondary data collected exhibited both time series and cross-sectional dimensions. Stock market reactions variable was modelled with herd behaviour, loss aversion, mental accounting and overconfidence. The study determined the effect investor behavior on stock market reactions in Kenya, panel regression equation was specified as follows:

101

$$SMR_{it} = \alpha_{it} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \mu_{it} \qquad (3.14)$$

Where:

SMR_{it} was Stock Market Reaction as measured by Abnormal Returns to determine stock market reaction;

X = the investor behavior variables i.e. X_1 = Herding Behavior, X_2 = Loss Aversion Behavior, X_3 = Mental Accounting Behavior and X_4 = Overconfidence Behavior.

α_i = the intercept term

μ_{it} = the error term i.e. the time-varying disturbance term is serially uncorrelated with mean zero and constant variance.

i = sampled 48 companies listed at the NSE,

t = time was 13 years from 2004 to 2016 to determine the effects of investor behavior on stock market reaction in Kenya.

3.12 Model Specification Tests

The following model specification tests were conducted.

3.12.1 Unit Root Test / Stationarity Test

To avoid change of the estimates over time due to non-stationarity, unit root tests were applied to investigate or detect non-stationarity in all the study variables. Failure to consider its presence can in turn leads to spurious estimates (Brooks, 2014).

3.12.2 Hausman Specification Test

Hausman test was conducted to determine which model provides superior results between the random effects and fixed effects models by sequentially estimating both models (starting with FEM) against the alternative hypothesis that the random effect model is appropriate at 5% confidence level. The Hausman test provided a chi-square value and a corresponding *p*-value which formed the basis of accepting or rejecting the null as appropriate. However, fixed effects model is said to impose testable restrictions on the parameters of the reduced form model as indicated by Chamberlain (1984) suggesting that one should check the validity of these restrictions before adopting the fixed effects model. On the other hand, Mundlak (1978) argued that the random effects model makes assumptions of exogeneity of all the regressors with the random individual effects. Due to such arguments, this study bases its decision, the null hypothesis that the differences in coefficients are not systematic by considering the resulting p-value. Therefore, on conducting the test, if the P-value exceeds 5% significance level, it shall imply that the individual level effects are best modelled using the random effects method. Upon specifying the random effects model, the results shall be ready for discussion (Hausman, 1978).

3.12.3 Heteroscedasticity test

This heteroscedasticity specification was motivated by the observation that in many financial time series, the magnitude of residuals appeared to be related to the magnitude of recent residuals. ARCH does not invalidate standard LS (least square) inference. However, ignoring ARCH effects may result in loss of efficiency. The test was meant to assess whether the variance is evolving or it is constant. If the variance was constant the coefficients of the lagged variance as the explanatory variables should not be statistically significant (Brooks, 2014).

3.12.4 Autocorrelation test

In the autocorrelation test, the residuals are regressed on dependent variables plus a lagged value of the residuals. It is always expected that the variables used are statistically insignificant. This would show that there is no serial correlation in the residuals (Brooks, 2014).

3.12.5 Correlation Test

Multicollinearity is considered to exist when there is perfect linear relationship between the study variables. The variance inflation factors are used to determine if any pair of independent variables are highly collinear and the size and magnitude of the pairs of variables determined by the correlation matrix. This bias arises when one or more pairs of independent variables are perfectly correlated to each other. Brook (2014) asserts that multicollinearity is the problem that occurs when the explanatory variables are very highly correlated with each other. If there is no multicollinearity, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents results and discussion in line with the research design in chapter three. Descriptive statistics analysis was conducted to test normality of the raw data. Pair-wise Correlation Test was conducted to test for correlation between variables on raw data. The chapter also presents regression diagnostic checks and panel data specification tests by testing for stationarity using unit root test. Other tests conducted are heteroscedasticity and autocorrelation tests. The chapter discusses the findings of the panel data regression results to show the relationship between the dependent variable and the independent variables using random effect model (EGLS) which was assessed to be more efficient than the other estimators in appendices v, v, vii and viii.

4.2 Pilot Study

The study used secondary data collected by means of pre-designed instrument specified under appendix II. The instrument was designed by the help of experts in finance who included lecturers in the Finance field and research officers at NSE and CMA. To ensure that the instrument captured all the necessary information to determine the required NSE historical data, the instrument was discussed with the experts prior to data collection and the necessary review done. Having agreed on the adequacy of the instrument, no further piloting was conducted on the instrument prior to data collection.

4.3 Descriptive Statistics

This section contains the descriptive statistics of all the variables included in the analysis. Descriptive statistics is concerned with the development of some important statistical measures or indices that are used to summarize research data such as measures

of central tendency or statistical averages, measures of dispersion, measures of asymmetry (skewness), measures of relationship and other measures from the raw data (Kothari, 2004). Table 4.1 presented the summaries of the descriptive statistics of all the variables employed in this thesis. Herd behavior, loss aversion, mental accounting and overconfidence employed were the independent variables and stock market reaction was the dependent variable used to measure by abnormal returns.

The data used in this study consists of yearly observations for historical data at Nairobi Securities Exchange from January 2004 to December 2016. Historical data for stock prices, volume, number of deals and dividend yield obtained from the NSE for the period 2004 to 2016 for a population of sixty-seven (67) listed companies. A sample of forty-eight (48) listed companies was generated based on whether the company had traded at the NSE for 3 consecutive years or more, a minimum of three periods leading to unbalanced data in the data analysis.

Companies like Tourism Promotion Services, Olympia Capital Holdings and Firestone Limited were delisted in 2005. An IPO for the newly listed companies was Scan Group Limited, TPS Serena and Equity Bank Limited in 2006. Access Kenya Limited IPO was listed in 2007. Centum Limited and Co-operative Bank Kenya Limited IPOs were listed in 2008. Unilever Tea and ICDC were delisted in 2008 and 2009 respectively.

Safaricom Limited IPO was listed in 2010. Liberty limited IPO was first listed in 2012. WPP Scan Group IPO was listed in 2015. Deacons and Nairobi Business Ventures were listed at the NSE in 2016. The Nairobi Securities Exchange announced the mandatory delisting of Hutchings Biemer Limited for failure to adhere to regulatory requirements in 2008. The companies were then suspended from trading on the Exchange and the subsequent approval of the delisting by the Capital Markets Authority. This resulted in unbalanced data because of the varying time series length, T, between cross-section units. The research uses listed companies that had traded for at least a minimum period of 3 years consecutively and that is how the research arrived at sample of 48 listed

companies, i.e. cross-section, instead of all the 67 anticipated listed companies within the period of study 2004 to 2016.

As shown on Table 4.1, all 5 variables were utilized in this study namely stock market reaction which represented the dependent variable and herd behavior, loss aversion, mental accounting and overconfidence were the independent variables. Table 4.1 above presents some elementary tests of descriptive statistics and normality.

Table 4.1: Descriptive Statistics

Statistic	Stock Market Reaction	Herd Behavior	Loss Aversion	Mental Accounting	Overconfidence
Mean	0.239702	7.446287	-3.800852	1.272511	7.452842
Median	0.065097	6.516924	-0.569992	1.123137	7.693004
Maximum	14.26990	27.08965	100.1068	7.149395	12.36708
Minimum	-11.21669	1.163112	-127.9985	-2.224323	3.239210
Std. Dev.	3.129849	3.800949	31.49633	2.295504	1.607020
Skewness	0.515245	0.516511	-0.598714	0.868656	-0.271120
Kurtosis	3.214191	2.956592	2.645861	4.258907	2.924450
Jarque-Bera	122.9135	372.6978	83.02647	106.8974	10.42366
Probability	0.000000	0.000000	0.000000	0.000000	0.005452
Sum	113.6922	3580.272	-1828.210	565.7903	3545.744
Sum Sq. Dev.	4702.059	6934.662	476169.1	2529.282	1239.606
Observations	529	529	529	529	529

4.3.1 Analysis of Descriptive Statistics

Table 4.1, the mean for stock market reaction was 0.239702. The maximum of stock market reaction level stood at 14.2699 and the minimum was -11.21669 while the standard deviation was recorded at 3.129849. The interpretation was that the variable

data had a normal distribution. This indicated the stability of the variable and that the classical assumptions were supported. The conclusion was that stock market reaction variable had no significant deviation from the expected mean.
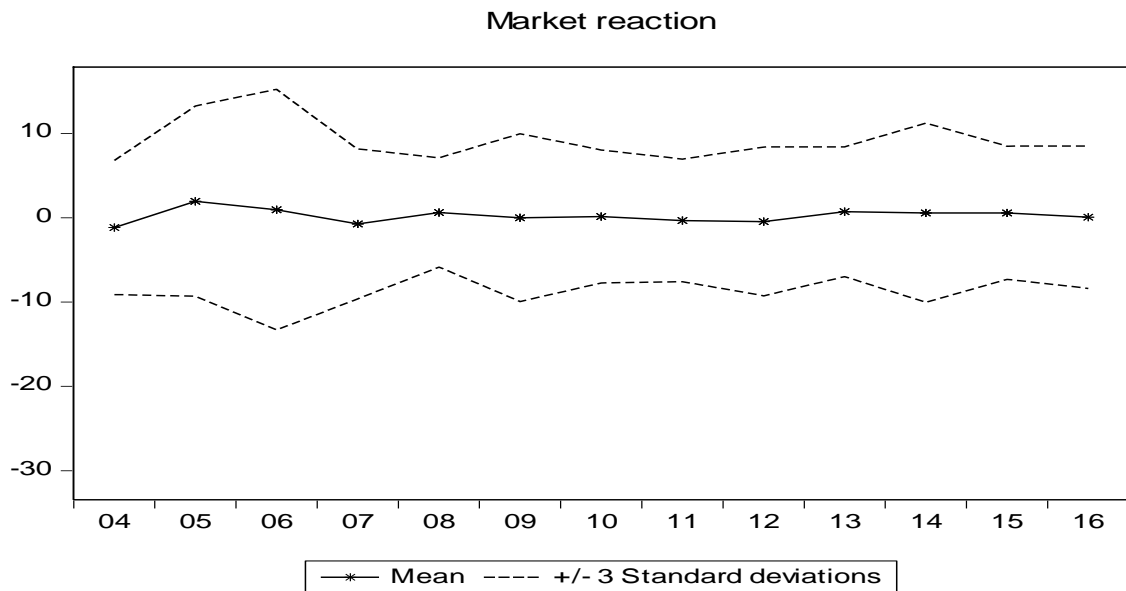
Market reaction

Figure 4.1: Analysis of Descriptive Statistics - Stock Market Reaction

Table 4.1, the mean for herd behaviour was 7.446287. The maximum of herd behaviour level stood at 27.08965 and the minimum was 1.163112 while the standard deviation was recorded at 3.800949. The interpretation was that the variable data had a normal distribution. This indicated the stability of the variable and that the classical assumptions were supported. The conclusion was that herd behaviour variable had no significant deviations from the expected mean.
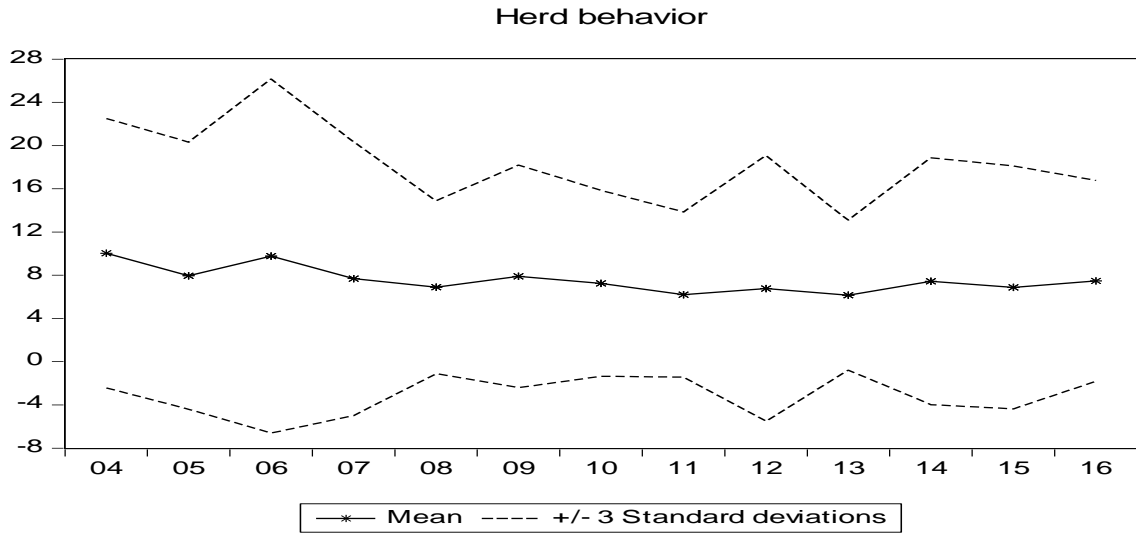
Figure 4.2: Analysis of Descriptive Statistics - Herd Behaviour

Table 4.1 shows that the mean for loss aversion variable was 3.800852. The maximum of loss aversion variable level stood at 100.1068 and the minimum was -11.21669, while the standard deviation was recorded at 31.49633. The interpretation was that the variable data had a normal distribution. This indicated the stability of the variable and that the classical assumptions were supported. The conclusion was that loss aversion variable had no significant deviations from the expected mean.
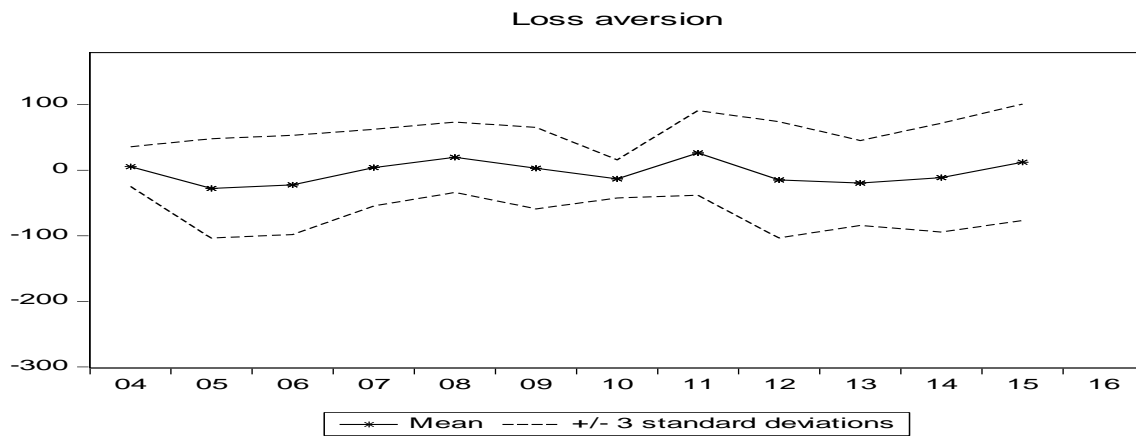
Figure 4.3: Analysis of Descriptive Statistics - Loss Aversion

Table 4.1 shows that the mean for mental accounting variable was 1.272511. The maximum of mental accounting variable level stood at 14.26990 and the minimum was -127.9985, while the standard deviation was recorded at 2.295504. The interpretation was that the variable data had a normal distribution. This indicated the stability of the variable and that the classical assumptions were supported. The conclusion was that mental accounting variable had no significant deviations from the expected mean.
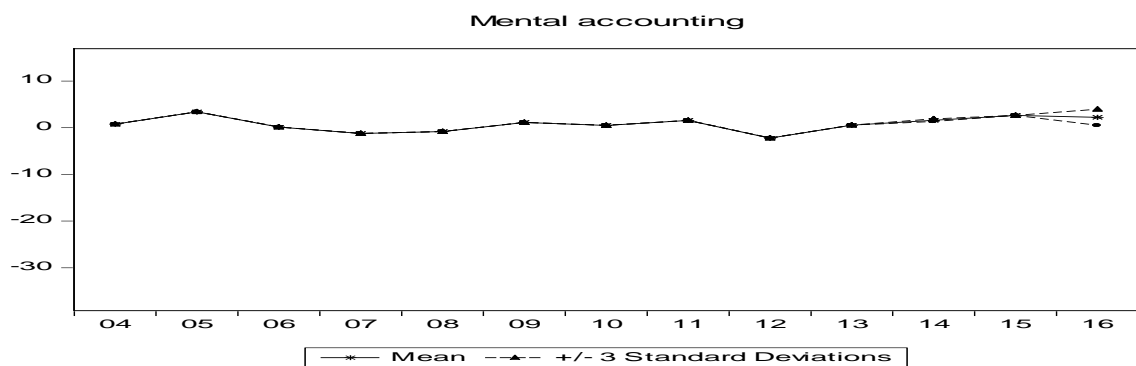
Figure 4.4: Analysis of Descriptive Statistics - Mental Accounting

Table 4.1 shows that the mean for overconfidence variable was 7.452842. The maximum of overconfidence variable level stood at 14.26990 and the minimum was -127.9985, while the standard deviation was recorded at 1.607020. The interpretation was that overconfidence variable data had a normal distribution.
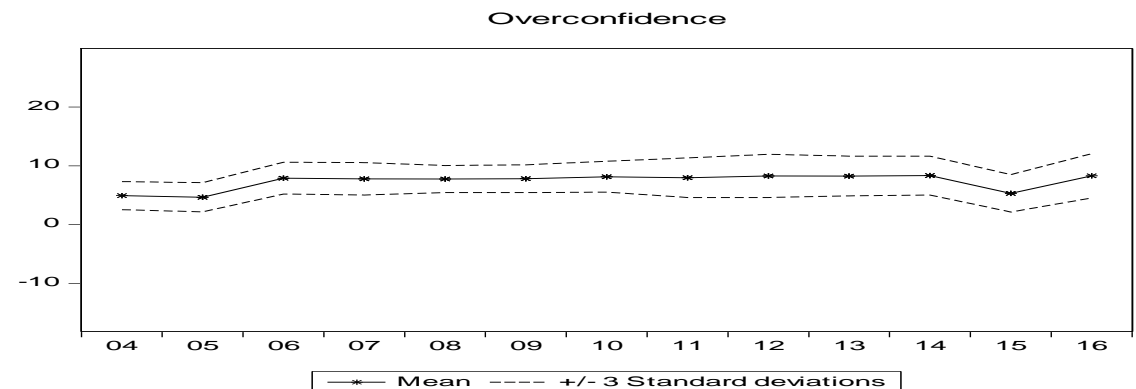
Figure 4.5: Analysis of Descriptive Statistics – Overconfidence

110

As evidence in this section, overconfidence variable data had a normal distribution. The interpretation was that the overconfidence variable could be used in further analysis. This indicated the stability of the variable and that the classical assumptions were supported. The conclusion was that overconfidence variable had no significant deviation from the expected mean. The plot of the mean against time was shown in figure 4.5.

4.3.2 Analysis of Normal Distribution

Inferential statistics are meant to infer whether there was underlying relationship between the respective variables for purposes of sequential analysis. The variables were subjected to normality to check whether the data provided was normally distributed or not. To know the decision to take the rule is that if the p-value is greater than 0.05, H_0 was not rejected and H_1 was rejected if the p-value was less than 0.05, H_0 was rejected and H_1 was accepted.

In this study, the standardized moments of skewness and kurtosis were employed. This was further augmented by the Jarque–Bera test which was a derivative of skewness and kurtosis estimates. From Table 4.1, the skewness value of 0.515245 was computed for the dependent variable, stock market reaction. The skewness values were also shown among the independent variables, herd behavior, loss aversion, mental accounting and overconfidence at 0.516511, -0.598714, 0.868656 and -0.271120 respectively.

The recorded figures for kurtosis from stock market reaction, herd behavior, loss aversion, mental accounting and overconfidence are 3.214191, 2.956592, 2.645861, 4.258907 and 2.924450 respectively. In conclusion, the probability values obtained from the Jarque-Bera test statistic results suggested that all the variables passed the normality test at five percent level of significance. In view of this, the research rejected the null hypothesis that the data for this analysis was not normally distributed.

4.4 Model Specification Tests

To determine the suitability of the panel data for statistical analysis, various tests were conducted. The tests aimed at establishing whether the panel data fulfilled the cardinal requirements of classical linear regression analysis and included correlation test, unit root test, multicollinearity test, heteroscedasticity test and autocorrelation test. This section presented results of various diagnostic tests carried out on the data together with the relevant remedial treatment undertaken to ensure suitability of the data.

4.4.1 Correlation Test

Pair-wise correlation was used to examine the level of collinearity present between explanatory variables used in the study. For insights into the association between the dependent variable and independent variables focus was on the correlation analysis which was conducted to see the existence of multicollinearity. To determine whether an association exists between the variables employed in the study, a pairwise correlation analysis was conducted to see the severity of the relationship. The resulting value in the correlation analysis showed whether the change in the dependent variable was caused by a change in the independent variable (Cohen, Cohen, West & Aiken, 2002).

Table 4.2 above shows the pair-wise correlation matrix of both dependent and independent variables. The correlation in this case was conducted to pre-test potential multicollinearity during further analysis. Brook (2002) asserts that multicollinearity was the problem that occurred when the explanatory variables were very highly correlated with each other. If there was no multicollinearity, then adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change.

Table 4.2: Pair-wise Correlation Test

Correlation t-statistic Probability	Stock Market Reactions	Overconfidence	Loss Aversion	Herd Behavior	Mental Accounting
Stock Market Reactions	1.000000				
t-statistic	-----				
p-value	-----				
Overconfidence	-0.017560	1.000000			
t-statistic	-0.384373	-----			
p-value	0.70090*	-----			
Loss Aversion	-0.819759	-0.048185	1.000000		
t-statistic	-31.32710	-1.055810	-----		
p-value	0.0000**	0.2916	-----		
Herd Behaviour	0.192988	-0.136180	-0.211064	1.000000	
t-statistic	4.304664	-3.008480	-4.725832	-----	
p-value	0.0000**	0.0028**	0.0000**	-----	
Mental Accounting	0.135785	-0.227992	-0.153565	0.149644	1.000000
t-statistic	2.999580	-5.124824	-3.401271	3.312422	-----
p-value	0.0028**	0.0000**	0.0007**	0.0010	-----

Included observations: 1479
Sample period: 2004 – 2016
* indicated insignificant at 5%.
** indicated significant at 5%.

The result for pair-wise correlation shows that there was no multicollinearity problem since the highest correlation between the independent variables was -0.227992 between mental accounting and overconfidence behavior. The low correlation between the independent variables was a good sign and was an early indicator of orthogonality. This means that one could fit a regression model without challenges of dealing with collinearity problem. It was now a standard procedure to conduct a correlation analysis

before conducting a regression analysis. Thus, all the independent variables were retained for further analysis.

4.3.2 Unit Root Test

Panel unit root test was applied on all variables used in the analysis to determine whether the panel data was stationary. The results from the unit root test for all the cross-sections in the variables: stock market reaction, herd behavior, mental accounting, loss aversion, overconfidence in Table 4.3 below showed that all the 48 cross sections were stationary. The first part of each section for each variable presented the common unit root tests developed by Levin, Lin and Chu (2002) and the one developed by Breitung (2001) t-statistic. The test showed that considered simultaneously all the cross-sections were stationary for all the variables. In other words, they did not have the unit root problem since the null hypothesis of unit root was rejected as depicted by the significant p-value of 0.0000.

The second section presented three other tests of stationarity in panel data setting. These were Im, Pesaran and Shin (2003), ADF - Fisher Chi-square Maddala and Wu (1999), PP - Fisher Chi-square (Choi, 2001). These tests assumed that there was a unit root process on individual cross sections. As depicted by the p-values which were very statistically significant, the null hypothesis of non-stationarity was rejected.

The interpretation was that all the variables were found to be stationary in the two cases of test. In conclusion, the test of stationarity was important because it helped to identify the order of integration of a variable and avoid spurious regression. In this case, all the variables were found to be integrated of order zero (0).

Table 4.3: Unit Root Test

Series: Stock Market Reactions	Method	Statistic	Prob.	Interpretation
	Null: Unit root (assumes common unit root process)			
	Levin, Lin & Chu t*	-23.7412	0.0000*	Stationary
	Breitung t-stat	-3.52203	0.0002*	Stationary
	Null: Unit root (assumes individual unit root process)			
	Im, Pesaran and Shin W-stat	-6.62687	0.0000*	Stationary
	ADF - Fisher Chi-square	265.142	0.0000*	Stationary
	PP - Fisher Chi-square	353.634	0.0000*	Stationary
Series: Herd Behaviour	**Method**	**Statistic**	**Prob.**	**Interpretation**
	Null: Unit root (assumes common unit root process)			
	Levin, Lin & Chu t*	-19.9873	0.0000*	Stationary
	Breitung t-stat	-3.39570	0.0003	Stationary
	Null: Unit root (assumes individual unit root process)			
	Im, Pesaran and Shin W-stat	-5.23248	0.0000*	Stationary
	ADF - Fisher Chi-square	234.818	0.0000*	Stationary
	PP - Fisher Chi-square	368.667	0.0000*	Stationary
Series: Loss Aversion	**Method**	**Statistic**	**Prob.**	**Interpretation**
	Null: Unit root (assumes common unit root process)			
	Levin, Lin & Chu t*	-17.4761	0.0000*	Stationary
	Breitung t-stat	-1.63466	0.0511*	Stationary
	Null: Unit root (assumes individual unit root process)			
	Im, Pesaran and Shin W-stat	-11.9884	0.0000*	Stationary
	ADF - Fisher Chi-square	306.118	0.0000*	Stationary
	PP - Fisher Chi-square	321.852	0.0000*	Stationary
Series: Mental Accounting	**Method**	**Statistic**	**Prob.**	**Interpretation**
	Null: Unit root (assumes common unit root process)			
	Levin, Lin & Chu t*	-24.3174	0.0000*	Stationary
	Breitung t-stat	-5.96499	0.0000*	Stationary
	Null: Unit root (assumes individual unit root process)			
	Im, Pesaran and Shin W-stat	-5.31146	0.0000*	Stationary
	ADF - Fisher Chi-square	210.551	0.0000*	Stationary
	PP - Fisher Chi-square	241.109	0.0000*	Stationary
Series: Overconfidence	**Method**	**Statistic**	**Prob.**	**Interpretation**
	Null: Unit root (assumes common unit root process)			
	Levin, Lin & Chu t*	-13.3815	0.0000*	Stationary
	Breitung t-stat	-1.69881	0.0447*	Stationary
	Null: Unit root (assumes individual unit root process)			
	Im, Pesaran and Shin W-stat	-2.57013	0.0051*	Stationary
	ADF - Fisher Chi-square	147.715	0.0002*	Stationary
	PP - Fisher Chi-square	204.879	0.0000*	Stationary

*5% significance level

4.3.3. Heteroscedasticity Test

Heteroscedasticity tests meant that previous error terms influenced other error terms and hence violating the statistical assumption that the error terms had a constant variance. However, Homoscedasticity suggests that the dependent variable has an equal level of variability for each of the values of the independent variables (Garson, 2012). A test for homoscedasticity was made to test for variance in residuals in the regression model used. If there existed equal variance of the error terms, there was a normal distribution. Lack of an equal level of variability for each value of the independent variables was known as heteroscedasticity, The Breusch–Pagan test developed by Breusch and Pagan (1979) was used to test for homogeneity in the linear regression model.

The result in Table 4.4 indicated the test statistics on heteroscedasticity. The F-statistic was found to be 1.846046 and the p-value was found to be 0.1593 which was more than the critical value of 0.05. The chi-square test on the other hand was also statistically insignificant (Obs*R-squared 3.68546; Prob.0.1584). This implied that there was no heteroscedasticity in the model. The test was meant to assess whether the variance was evolving, or it was constant. If the variance was constant the coefficients of the lagged variance as the explanatory variables should not be statistically significant. From the table it was evident that there was no heteroscedasticity since the F-statistic and the chi-square was statistically insignificant.

Table 4.4: Heteroscedasticity Test

Heteroskedasticity Test:			
F-statistic	1.846046	Prob. F(2,382)	0.1593
Obs*R-squared	3.685467	Prob. Chi-Square(2)	0.1584

4.3.4 Autocorrelation Test

The result in Table 4.5 below indicated the test for serial correlation. The F-statistic was found to be F-statistic 0.011425, Prob.0.9149 and the chi-square was found to be (Observed * R-squared 0.01156; Prob. 0.9143). Table 4.5 below presented the results on (Lagrange multiplier (LM) – Test) autocorrelation test. The dependent variable was the residuals. The residuals were regressed on dependent variables plus a lagged value of the residuals. The decision was made based on F-statistic and the chi-square which in this case was statistically insignificant. The conclusion was that there was no serial correlation in the model.

Table 4.5: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.011425	Prob. F (1,475)	0.9149
Obs*R-squared	0.011569	Prob. Chi-Square (1)	0.9143

4.3.5 Residual Unit Root Test

The results from the unit root test for all the residuals from the regression model. Table 4.6 below showed that the model was stationary since the residuals did not have a unit root problem. The first part of the table presented the common unit root tests developed by Levin, Lin and Chu (2002) and the one developed by Breitung t-statistic.

The test showed that considered simultaneously all the cross-sections were stationary for all the residuals. In other words, they did not have the unit root problem since the null hypothesis of unit root was rejected as depicted by the significant p-value of 0.0000. The lower section presented yet another three tests of stationarity in panel data setting. These

were Im, Pesaran and Shin (2003), ADF - Fisher Chi-square Maddala and Wu (1999), PP - Fisher Chi-square (Choi, 2001).

Table 4.6: Residual Unit Root Test

Panel unit root test: Summary: Series: Residuals				
Method	**Statistic**	**Prob.****	**sections**	**Obs**
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-25.8253	0.0000	45	412
Breitung t-stat	-3.5E-12	0.5000	45	367
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.79206	0.0000	44	410
ADF - Fisher Chi-square	209.619	0.0000	44	410
PP - Fisher Chi-square	358.862	0.0000	44	424

5% significance level

These tests assumed there was a unit root process on individual cross sections. As depicted by the p-values which were very statistically significant, the null hypothesis of non-stationarity was rejected. The interpretation was that all the residuals for each cross-section were stationary in the two cases of test. In conclusion, the test of stationarity was important because it helped to identify the order of integration of a variable and avoided spurious regression. In this case, the residuals were found to be significant at the 5% level rated of order zero (0) except the Breitung t-stat which showed that the results were insignificant.

4.3.6 Residuals Box Plot

A boxplot, also known as a box and whisker diagram, summarizes the distribution of a set of data by displaying the centering and spread of the data using a few primary elements (McGill, Tukey and Larsen, 1978).

Boxplots for Residuals

Residual values
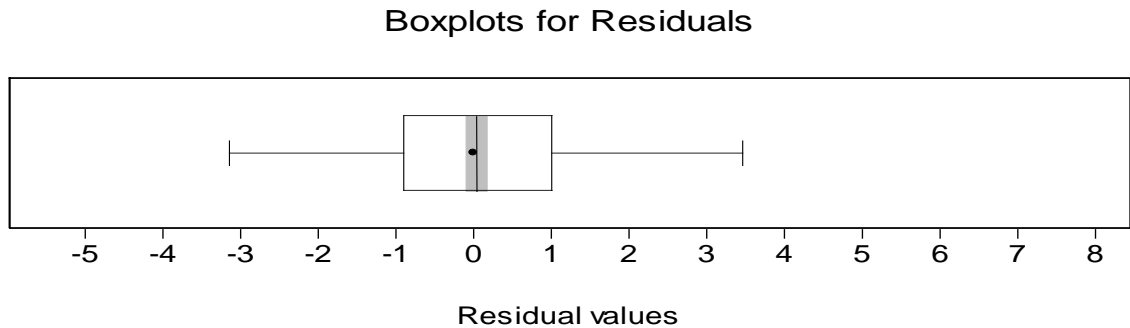
Figure 4.6: Boxplot for Residuals

Figure 4.1 above showed the plots of the residuals for the random effect regression. The box portion of a boxplot represented the first and third quartiles, that is, the middle 50 percent of the data. These two quartiles were collectively termed the hinges, and the difference between them represented the interquartile range (IQR). The median was depicted using a line through the center of the box, while the mean was drawn using a symbol in this case the dot. Both the name and the values of the residuals were presented. It was observed that the residuals were close to the value of zero. The interpretation was that there were no outliers in the residuals and the model was well-identified. This meant that the model was stable.

4.3.7 Hausman Test

To establish the estimation effects between fixed and random and to provide superior results for the study, Hausman test was carried out for the specified panel regression model. The test was conducted against the null hypothesis that random effect model was the preferred model. The test results rejected the null if the chi-square statistic was significant at 5% significance level; otherwise, the null was accepted.

Table 4.7 above presented the results on the Hausman test that was used to test the existence of a difference between a fixed effect and random effect model. Hausman (1978) originally proposed a test statistic for endogeneity based upon a direct

comparison of coefficient values. Table 4.5 above presented the results on Hausman test. The test started by estimating the random effect model. The test also estimated the fixed effect model. The last step entailed the subtraction of the random effect estimated from the fixed effect estimates. If the difference was statistically significant, then the fixed Effect model was adopted. On the other hand, if there was no difference, literature suggested the adoption of the random effect model which assumed that the unobservable effect was not correlated with the explanatory variables. Table 4.7, the chi-square value of 6.989864 was statistically insignificant and showed that there was no difference in the two models.

Table 4.7: Hausman Test

Correlated Random Effects - Hausman Test:

Test random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Random effect		6.989864	4	0.1364
Variable	Fixed	Random	Var(Diff.)	Prob.
Herd Behaviour	0.022466	0.027536	0.000134	0.6615
Loss Aversion	-0.080152	-0.081713	0.000001	0.0288
Mental Accounting	-0.011816	-0.016385	0.000035	0.4387
Overconfidence	-0.124507	-0.131279	0.001103	0.8384

5% significance level

4.5 Panel EGLS Random Effect-Model

Under the random effect model, the unobservable time effect was assumed to be uncorrelated with the explanatory variables and that the component had time element. In using the random effect, the estimator was the EGLS (Efficient Generalized Least Square). The EGLS was assumed to be a consistent estimator under random effect than OLS. In Table 4.8, Wansbeek and Kapteyn estimator of component variances was employed to gain efficiency in the standard errors. The results in Table 4.8 indicates that the overall model is a goodness of fit statistics. Since the value of F-statistic was found to be 238.6804 and the p-value was found to be 0.000 which was less than the critical value of 0.05. The value of the adjusted R square was 0.664505. This value clearly suggested that after adjusting for the degrees of freedom, there was significant effect investor behaviour on stock market reaction.

This indicates that all independent variables considered caused a variation of 66.4505 % on stock market reaction. The Durbin-Watson statistic value of 1.906137 was very close to 2 and indicated the absence of serial correlation in the model.

Regression results in Appendices V, VI, VII and VIII were generated for comparison with the results of the adopted Random Effect Model, EGLS, Wansbeek and Kapteyn estimator (Table 4.8). Random Effect Model, EGLS, Wansbeek and Kapteyn estimator was selected to explain the objectives of this study.

Table 4.8: Panel EGLS Random Effect-Model

Dependent Variable: Market reactions; Method: Panel EGLS (Random effects); Periods included: 13; Cross-sections included: 48; panel (unbalanced); Wansbeek and Kapteyn estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Herding Behavior	0.027536	0.012743	2.160938	0.0312
Loss Aversion	-0.081713	0.001536	-53.20532	0.0000
Mental Accounting	-0.016385	0.021249	-0.771065	0.4411
Overconfidence	-0.131279	0.030146	-4.354716	0.0000
C	0.728627	0.260801	2.793803	0.0054

Test Statistics				
R-squared	0.667301	Mean dependent variable	0.257156	
Adjusted R-squared	0.664505	S.D. dependent variable	3.171833	
S.E. of regression	1.837187	Sum squared residuals	1606.622	
F-statistic	238.6804	Durbin-Watson stat	1.906137	
Prob(F-statistic)	0.000000			

5% significance level

4.5.1 Effect of Herd Behaviour on Stock Market Reaction in Kenya

The regression results in Table 4.8 above, the coefficient of herd behavior was found to be 0.027536. This value shows that holding other variables in the model constant, an increase the herding behavior by one unit caused stock market reaction to increase by a value of 0.027536 units. The positive effect shows that there was a positive relationship between herd behavior and stock market reaction. The coefficient was also found to be statistically significant with a t-statistic value of 2.160938. The p-value is found to be 0.0312. The interpretation is that in Kenya, herd behavior had a positive significant

effect on stock market reaction in the long-run horizon. The findings indicates that herd behavior had a positive significant effect on stock market reaction in Kenya.

Thirika and Olweny (2015) results were consistent with the findings in this study because the results indicated a positive significant relationship between the deviation in earning of a security and the squared market returns evidence that herding existed in the NSE. There was a positive significant result between absolute market returns and CSAD at the NSE which was consistent with the findings in this research that showed that CSAD had a positive significant effect on abnormal returns. Vieira and Pereira (2015) results were consistent with the findings in this study because results showed positive statistically significant coefficients. All the coefficients were significantly positive, indicating that stock return dispersions increased during periods of large price changes.

Fu (2010) results were consistent with the results in this study because it showed that all regressions show that difference between $\beta 1$ and $\beta 2$ was significantly positive based on the t value. Since the values of dependent variables were small, the coefficient value and the differences were also small but still significantly different. Herd behavior was more likely to happen during downward market. Linde (2012) results were inconsistent because the coefficient showed a negative and statistically significant value of coefficient in Finnish market which was inconsistent with the results in this study. However, Linde (2012) results on Sweden, Denmark and Norway were inconsistent because the coefficient was insignificant. This indicated that there was no evidence of herding in Sweden, Denmark and Norway therefore inconsistent with the findings in this research.

4.5.2 Effect of Loss Aversion on Stock Market Reaction in Kenya

The regression results in Table 4.8 above, the long run coefficient of loss aversion variable was found to be -0.081713. This value showed that holding other variables in the model constant, an increase in the investor loss aversion by one unit caused the stock

market reaction to decrease by a value of 0.081713 percent. The negative effect showed that there was an inverse relationship between loss aversion variable and stock market reaction variable. The coefficient was also found to be statistically significant with a t-statistic value of -53.20532. The p-value was found to be 0.0000. Loss aversion behavior variable had a negative statistically significant effect on stock market reaction.

The findings therefore indicates that there was a negative significant effect of investor loss aversion variable on stock market reaction in Kenya. Seo, Goldfarb and Barrett (2010) results were inconsistent with the results in this study as it showed that the degree of gain was significantly and positively related to pleasant feeling, whereas the degree of loss was consistent with the results in this study because the results were negatively significantly related to pleasant feeling. The degree of loss was positively and significantly related to unpleasant feeling whereas the degree of gain was significantly and negatively related to unpleasant feeling. Genesove and Mayer (2001) were inconsistent because loss aversion had positive effect on stock market reaction when considered to enter the model linearly and consistent when loss aversion had negative when it was raised to the second power. Gächter, Johnson and Herrmann (2007) were inconsistent with this study because the results showed that loss aversion in the riskless choice task and loss aversion in the risky choice task were highly significantly and strongly positively correlated.

Easley and Yang (2015) were inconsistent with results in this study because the findings showed that if loss-averse investors and arbitrageurs only differed in the way of deriving loss aversion utility, then loss-averse investors vanish and had no significant effect in the long run asset prices for an empirically relevant range of parameters. De Bondt and Thaler (1985) were consistent with the findings in this study because results indicated that long-term prior losing stocks on average outperform long term prior winning stocks. Barberis, Huang and Santos (2001) was consistent with the results in this study because the authors developed a framework helped to explain the high mean, excess volatility,

and predictability of stock returns, as well as their low correlation with consumption growth.

4.5.3 Effect of Mental Accounting on Stock Market Reaction in Kenya

The regression results in Table 4.8 above, the long run coefficient of mental accounting variable was found to be -0.016385. This value shows that holding other variables in the model constant, an increase in the mental accounting variable by one unit caused stock market reaction to decrease by a value of 0.016385 per cent. The negative effect shows that there was an inverse relationship between mental accounting and stock market reaction variable. The coefficient was statistically insignificant with a t-statistic value of -0.771065. The p-value was found to be 0.4411. The interpretation was that mental accounting behavior variable had a negative statistically insignificant effect on stock market reaction in the long-run. This implied that increase in mental accounting behavior variable would not cause an effect on stock market reaction in Kenya.

Barberis and Huang (2001) findings were inconsistent because the authors found that the portfolio formed to mimic the effect of mental accounting had a positive significant effect on stock market reaction. The interpretation was that the firm that paid less dividend could subsequently beat those that paid high divided to attract investors.

Keim (1985) results were inconsistent with the findings in this study because dividend yield and stock returns showed coefficient was positive and significant in both January (t = 5.60) and non-January months (t = 3.30), although the sub-period results indicated substantial variation in the magnitude of the coefficients through time.

Litzeberger and Ramaswamy (1980) results were inconsistent with the findings in this study because the results the indicated positive significant coefficients in both ex-months and non-ex-months. Park (2010) results were also inconsistent and found that dividend-price ratio had significant predictive power for future stock returns.

Desari and Huang-Meir (2015) results were inconsistent with the results in this study because findings indicated that abnormal revisions in the value of a stock were more strongly positively (negatively) associated with future increases (decreases) in dividends when the market valuation of the stock contains more private information that managers could exploit.

Lim (2004) results were inconsistent with the principles of mental accounting (Thaler, 1985) according to which individuals attain higher utility by integrating losses and segregating gains which was positive and significant (½ = 0:193, p-value= 0:000), which was inconsistent with the findings in this study. Lim (2006) results suggested that mental accounting was likely to play a significant role in investors' trading decisions.

Frydman, Hartzmark and Solomon (2015) findings were inconsistent with this study because results showed that selling an asset and buying another one in quick succession was a way of extending the original investing episode and maintaining the initial mental account.

4.5.4 Effect of Overconfidence on Stock Market Reaction in Kenya

The regression results in Table 4.8 above the coefficient of overconfidence variable was found to be -0.131279. This value shows that holding other variables in the model constant, an increase in the investor overconfidence variable by one percent caused a decrease stock market reaction by a value of 0.131279 per cent. The negative effect shows that there was an inverse relationship between overconfidence variable and stock market reaction variable. The coefficient was statistically significant with a t-statistic value of -4.354716. The p-value was found to be 0.0000. This result therefore reveals that the null hypothesis of overconfidence variable had significant effect and was rejected. The interpretation was that in the Kenya market, overconfidence variable had a statistically significant effect on stock market reaction in Kenya. This implied that

126

increase in investor overconfidence behavior variable would cause a decrease in stock market reaction.

The findings for investor overconfidence variable had a negative and significant effect on stock market reaction. The findings in this study were inconsistent with Adel and Mariem (2013) who tested that excessive trading of shares on investor confidence contributed to excessive volatility and found that β coefficient had a positive significant level of trading volume market performance in the Tunisia stock exchange. Yeoh and Wood (2011) results were consistent with this study because the findings showed the coefficients for overconfidence and average transaction variables both indicated a negative significant relationship with portfolio performance. These findings were also inconsistent those of Metwally and Darwish (2015) where overconfidence had a positive and statistically significant effect on stock market reaction.

Tariq and Ullah (2013) were also inconsistent because they found a positive significant effect for investor overconfidence on stock market reaction. Zaiane and Aboub (2009) result was inconsistent with the findings in this study because results showed a positive and significant contemporaneous association between volume and volatility. Boussadi (2013) results were inconsistent with the findings in this study because results indicated that the sum of the lagged coefficients associated to turnover was positive and significant effect. Statman et al (2006) result was inconsistent with results in this study because findings showed positive and highly significant association between market turnover and lagged market returns.

4.6 Summary

The study determined the effect of investor behavior on stock market reaction in Kenya. The findings were arrived at after multidimensional analysis of data. The data was first subjected to descriptive statistics to establish normality test that was essential for convergence of the parameters to their true values. All the variables were found to have

normality. The measures of central tendency employed, skewness and kurtosis revealed that the distribution of the variables was normal. Normality in statistical analysis was important for the parameters in the model or in a system to collapse very first to their true value.

The variables were further subjected to other pre-estimation econometric analytical tools. One of these tools was the unit root test, which was employed to assess the stationarity of the variables. The study found that all the five variables were stationary at level as presented by the panel unit roots tests table in this chapter. Stationarity was important to identify the integration order of variables. When stationarity was ignored it led to spurious regression in the analysis and gave the wrong inference. The study employed Pair-wise correlation analysis to test for multicollinearity among the independent variables. The correlation revealed there was no potential multicollinearity. The study went further to conduct the regression analysis.

Table 4.9: List of the hypotheses accepted or rejected based on the significance of results

Hypothesis	Sign	Significance	Decision
H_{01}: Herd behavior has no significant effect on stock market reaction in Kenya.	+ve	Significant	H_0 Rejected
H_{02}: Loss aversion has no significant effect on stock market reaction in Kenya.	-ve	Significant	H_0 Rejected
H_{03}: Mental accounting has no significant effect on stock market reaction in Kenya.	-ve	Insignificant	H_0 Accepted
H_{04}: Overconfidence has no significant effect on stock market reaction in Kenya.	-ve	Significant	H_0 Rejected

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents summary of findings, conclusion, contribution to existing literature, recommendations and areas suggested for further research. The general objective of the study was to determine the effect of investor behavior on stock market reaction in Kenya. The summary of findings conclusions and recommendations were aligned with the specific objectives. The chapter also suggested areas for further research.

5.2 Summary of Finding

The research determined the effect of investor behavior on stock market reaction in Kenya. It explained investor behavior biases and their resulting effect on stock prices at NSE. Investor behaviour variables determined the effect on stock market reaction in Kenya. Herd behaviour, loss aversion, mental accounting and overconfidence were the investor behavior variables used to measure and explain investor irrational behavior in investment decision-making among investors that caused abnormal returns hence stock market reaction leading to stock market inefficiency at the Kenyan bourse, NSE. The study determined the effect of investor behavior on stock market reactions in Kenya. This involved determining the effect investor behavior variables i.e. herd behaviour, loss aversion, mental accounting and overconfidence on abnormal returns i.e. stock market reaction in Kenya. The summary and discussion followed the study objectives and hypothesis formulated in chapter one.

5.2.1 Effect of Herd Behaviour and Stock Market Reaction in Kenya

The study sought to determine the effect of herd behavior on stock market reaction in Kenya. This was achieved by analyzing herd behavior variable using Cross Sectional Absolute Deviations (CSAD) method, a measure of dispersion of returns and stock market reaction as a dependent variable measured using abnormal returns as indicated in chapter three. The findings indicated that herd behavior had a positive statistically significant effect on stock market reaction in Kenya. This implied that the positive significant effect of herd behavior on stock market reaction in Kenya.

5.2.2 Effect of Loss Aversion and Stock Market Reaction in Kenya

The study sought to determine the effect of loss aversion on stock market reaction in Kenya. This was achieved by analyzing loss aversion variable using utility of gains or losses of prior returns and stock market reaction as a dependent variable measured using abnormal returns as indicated in chapter three. The findings indicated that loss aversion had negative statistically significant effect on stock market reaction in Kenya. This implied that the negative significant effect of loss aversion on stock market reaction in Kenya.

5.2.3 Effect of Mental Accounting and Stock Market Reaction in Kenya

The study sought to determine the effect of mental accounting on stock market reaction in Kenya. This was achieved by analyzing mental accounting variable measured using price-dividend ratio analysis and stock market reaction as a dependent variable measured using abnormal returns as indicated in chapter three. The findings indicated that mental accounting variable had a negative statistically insignificant effect on stock market reaction in Kenya. This implied mental accounting had a negative insignificant effect on stock market reaction in Kenya.

5.2.4 Effect of Overconfidence and Stock Market Reaction in Kenya

The study sought to determine the effect of overconfidence on stock market reaction in Kenya. This was achieved by analyzing overconfidence variable measured using trading volume and number of deals to ascertain turnover rate and stock market reaction as a dependent variable measured using abnormal returns as indicated in chapter three. The findings indicated that overconfidence variable had a negative statistically significant effect on stock market reaction in Kenya. This implied that overconfidence had a negative significant effect on stock market reaction in Kenya.

5.3 Conclusion

The study concluded that in Kenya's stock market, herd behavior variable had a positive significant effect on stock market reaction. This showed that herd behavior variable explained stock market reaction in Kenya. The conclusion was that herd behavior was a vital variable and investors should assess its effect on stock prices i.e. stock market reaction in their investment decision-making. The null hypothesis was rejected because herd behavior variable had a significant effect on stock market reaction in Kenya.

The study concluded that the loss aversion variable had a negative statistically significant effect on stock market reaction. This variable was significant and revealed the dynamics of the effect of loss aversion variable on stock market reaction. This showed that investors should be concerned about the losses or gains utility measure in their investment decisions in Kenya which could result in abnormal returns. The null hypothesis was rejected because loss aversion had a significant effect on stock market reaction in Kenya.

The study concluded that the mental accounting behavior has a negative insignificant effect on stock market reaction in Kenya. This showed that investors should be less concerned about the dividend yield analysis for listed companies at NSE and that they should make investment decisions on stocks without basing on divided yield data. The

null hypothesis was accepted because mental accounting behavior had no significant effect on stock market reaction in Kenya.

The study concluded that overconfidence behavior had a negative significant effect on stock market reaction in Kenya. Overconfidence behavior therefore caused stock market reaction in Kenya. The null hypothesis was rejected because overconfidence variable had a negative significant effect on stock market reaction in Kenya.

5.4 Contribution to existing literature

The study contributes to existing literature of behavioural finance in financial markets. The study draws attention to the measures of investor behaviour variables: herd behaviour, loss aversion, mental accounting and overconfidence and its effect on stock market reaction in Kenya. The results in this study shows that investor behaviour variables i.e. herd behaviour, loss aversion, and overconfidence had a significant effect on stock market reaction i.e. results in abnormal returns of listed stocks in Kenya. However, mental accounting had an insignificant effect on stock market reaction in Kenya.

The study shows how herd behavior variable's effect on stock prices moving from its fundamental values causing abnormal returns hence stock market reaction resulting from to variations in returns. The results of study contribute to literature on how investors and stock brokers should asses herd behavior variable at NSE to determine effect on stock market reaction in Kenya. Herd behaviour variable had positive significant effect on stocks returns at the NSE. The literature indicated that investors should know the estimates of intrinsic values of stocks in order to make informed investment decisions.

The study also contributes to literature on how loss aversion variable caused an effect on stock market reaction in Kenya. It showed how investors could exploit bubbles and avoid the risk of incurring losses in their stock investments. Loss aversion caused stock prices moving from their fundamental values leading to abnormal returns hence stock

132

market reaction resulting in variations of returns. In this research, it was revealed that loss aversion had significant effect on stock market reaction. It was noted that the loss aversion variable had a negative significant effect on stock market reaction which meant that it led to abnormal returns in the stock market. Since the influence of loss aversion was supported by all the results from RE model had a negative significant effect. Investors and stock brokers should assess the effect of loss aversion variable when making investment decisions to ascertain whether how prices of listed stock moved away from its fundamental values.

The study contributes to literature on how mental accounting variable measure causes an insignificant effect on stock market reaction in Kenya. Mental accounting variable did not cause abnormal returns. There was no stock market reaction resulting from to variations in returns while analyzing the measure of mental accounting variable. Mental accounting variable did not lead to stock prices moving from its fundamental values. In this research, it was revealed that mental accounting variable had an insignificant effect on stock market reaction. It was noted that the mental accounting did not cause abnormal returns at NSE.

The study contributes to literature on how overconfidence variable causes a significant effect on the stock market reaction at NSE. Overconfidence variable caused stock prices to move away from its fundamental values resulting in abnormal returns hence stock market reaction because of variations in returns. In this research, it was revealed that overconfidence variable had a negative significant effect on stock market reaction. It was noted that overconfidence variable could cause abnormal returns at NSE. Investors and stock brokers should assess the effect of overconfidence variable when making investment decisions to ascertain whether the prices of equities had moved away from the fundamental values

5.5 Recommendations

One of the most efficient and cost effective ways of achieving such Kenya's vision 2030 is through the Nairobi Securities Exchange equity funding and the capital markets. For the capital markets to achieve this, the following recommendations should be taken in to consideration. Capital Markets Authority should consider relaxing listing requirements, increase public awareness and safeguard a more transparent stock market. This will attract more companies to list in the bourse, therefore, enhancing more liquidity and more efficiency in the Kenyan stock market since the number of players shall increase. CMA should ensure fair competition in the market by regulating dominant players in the market who skewed the market in their favour.

NSE trading system should be under continuous monitoring and improvement to increase information efficiency and allocation efficiency in the market. This means increasing awareness of investor opportunities in the NSE. Increased information efficiency and allocation efficiency increases confidence of investors to participate in the market. It also increases the liquidity in the market indirectly since the number of participants increases.

CMA and the NSE should work to improve the modelling of stock prices so as to reflect the information flow and factor in some behavioural factors that are significant in influencing returns in the Kenyan market. This will have an effect of increasing transparency and confidence in the market hence attracting more investors and more capital flows into the capital markets. The study recommends that CMA should advice investors on irrational behavior variables that could drive securities prices away from fundamental values in the stock market. The regulator should ensure that the trading activities are disclosed to market players to ensure that investors will make informed decisions when deciding on the investment strategies investing. CMA and the NSE should improve the modelling of stock prices to be able to reflect the information flow and factor in some behavioral factors that are significant in influencing returns in the

stock market. This will have an effect of increasing transparency and confidence in the market hence reducing herd behavior among investors.

Investors should strive to get information about intrinsic values of listed stocks at the NSE. Investors should take into consideration the market sentiments as they consider investing in the Nairobi securities exchange. More care should be taken when to consider the behaviour in the market whether there is a bullish, bearish or cattish sentiment in the market even as investors consider the market risks. Investors should be on the lookout for bubbles that exist in stock markets because bubbles imply deviations of stock prices from intrinsic values. A positive bubble in a security exists when its price is higher than its intrinsic value, whereas a negative bubble exists when its price is lower than its intrinsic value.

5.6 Suggestion for Further research

Most studies done on the securities market were inconclusive especially how behavioural factors influenced returns in the developing market. To give a meaningful conclusion about behavioural factors and the developing market, the research suggested the following areas for research. Investor behaviour of the NSE around the other East African countries securities market returns could be studied to see if instead of the NSE herding around developed markets it was herding on the performance of the neighbouring countries. The magnitude of investor behaviour at the NSE as the market efficiency improves should be studied. The relationship between Nairobi securities exchange efficiency and economic growth can also be studied.

The study mapped previously studied variable of pricing error into the observable measures of mispricing and price overreaction. Prices react to investor behavior in our model because Kenyan investors herd, practiced mental accounting, were loss averse and overconfident. This research discussed only four (4) behavioural variables with explanation power on stock market reaction in Kenya. This was evident from the pooled,

135

fixed effect and random effect models that showed that the model explained approximately 66% on the variation of the stock market reaction. It is therefore in this context that the future researchers are encouraged to consider other irrational investor behavior variables caused stock market reaction to increase the predictive capability of the model. Other investor behavioural variables should be studied to determine the effect on Stock market reaction in Kenya.

Event study should be used to analyze the change in expected and actual earnings of listed companies. Neuroeconomics research on brain activity of economics and behavioral psychology to study how the brain affects financial decisions should also be the next area of further research. The investor's guide to spotting the signs of a stock market crash should be studied. Other areas of research are the effects of social economic and political changes in a country on investor behavior and how macro-economic factors affect stock pricing models at the Nairobi Securities Exchange.

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APPENDICES

Appendix I: Companies Listed in the Nairobi Securities Exchange in the period 2004 to 2016

1. A.Baumann CO Ltd
2. Atlas Development and Support Services
3. Athi River Mining
4. B.O.C Kenya Ltd
5. Bamburi Cement Ltd
6. Barclays Bank Ltd
7. Britam Holdings Ltd
8. Britam Holdings Ltd
9. Car and General (K) Ltd
10. Carbacid Investments Ltd
11. Centum Investment Co Ltd
12. CFC Stanbic Holdings Ltd
13. CIC Insurance Group Ltd
14. CMC Holdings Ltd
15. Co-operative Bank of Kenya Limited
16. Crown Berger Ltd
17. Diamond Trust Bank Kenya Ltd
18. E.A. Cables Ltd
19. E.A. Portland Cement Ltd
20. Eaagads Ltd
21. East African Breweries Ltd
22. Equity Group Holdings Ltd
23. Eveready East Africa Ltd
24. Express Ltd
25. Flame Tree Group Holdings
26. HF Group Holdings
27. Home Africa Limited
28. Hutchings Biemer Ltd
29. I&M Holdings Ltd
30. Jubilee Holdings Ltd
31. Kakuzi Ltd

32. Kapchorua Tea Co. Ltd

33. KenGen Ltd

34. KenolKobil Ltd

35. Kenya Airways Ltd

36. KCB Group Ltd

37. Kenya Orchards Ltd

38. Kenya Power & Lighting Co Ltd

39. Kenya Re-Insurance Corporation Ltd

40. Kurwitu Ventures

41. Liberty Kenya Holdings Ltd

42. Limuru Tea Co. Ltd

43. Longhorn Kenya Ltd

44. Marshalls (E.A.) Ltd

45. Mumias Sugar Co. Ltd

46. Nation Media Group

47. National Bank of Kenya Ltd

48. NIC Bank Ltd

49. Nairobi Securities Exchange

50. Olympia Capital Holdings Ltd

51. Pan Africa Insurance Holdings Ltd

52. Rea Vipingo Plantations Ltd

53. Safaricom Ltd

54. Sameer Africa Ltd

55. Sasini Ltd

56. Scangroup Ltd

57. Standard Chartered Bank Ltd

58. Standard Group Ltd

59. Stanlib Fahari I-REIT

60. The Co-operative Bank of Kenya Ltd

61. Total Kenya Ltd

62. TPS Eastern Africa (Serena) Ltd

63. Trans-Century Ltd

64. Uchumi Supermarket Ltd

65. Umeme Ltd

66. Unga Group Ltd
67. Deacons Ltd
68. Nairobi Business Venture

Appendix II: Data Collection Sheet

Independent variable	Herd Behaviour	Loss Aversion	Mental Accounting	Investor Overconfidence	Stock Market Reactions (SMR)
Measurable variable	Return dispersion	Gains or loss ratio	Price-dividend ratio	Trading volume	Abnormal Returns
2004					
2005					
2006					
2007					
2008					
2009					
2010					
2011					
2012					
2013					
2014					
2015					
2016					

Appendix III: Measurements of Variables and Analysis of Objectives.

S/N	Variable name	Objectives	Source	Analytical tools used
1	Dependent Stock Market Reaction	To determine the effect of investor behaviour on stock market reactions in Kenya	Secondary data from NSE historical data on stock price, stock volume traded, number of deals and dividend yields.	Panel data regression model, Random Effect Model was used in the estimation. Tests were unit root test, multicollinearity.
2	Independent Herd behaviour	To determine the effect of herd behaviour on stock market reactions in Kenya	Secondary data from NSE historical data on stock price, stock volume traded, number of deals and dividend yields.	Panel data regression model, Random Effect Model was used in the estimation. Tests were unit root test, multicollinearity.
3	Independent Loss Aversion	To determine the effect of loss aversion on stock market reactions in Kenya	Secondary data from NSE historical data on stock price, stock volume traded, number of deals and dividend yields.	Panel data regression model, Random Effect Model was used in the estimation. Tests were unit root test, multicollinearity.
4	Independent Mental Accounting	To determine the effect of mental accounting on stock market reactions in Kenya	Secondary data from NSE historical data on stock price, stock volume traded, number of deals and dividend yields.	Panel data regression model, Random Effect Model was used in the estimation. Tests were unit root test, multicollinearity.
5.	Independent Overconfidence	To determine the effect of mental accounting on stock market reactions in Kenya	Secondary data from NSE historical data on stock price, stock volume traded, number of deals and dividend yields.	Panel data regression model, Random Effect Model was used in the estimation. Tests were unit root test, multicollinearity.

Appendix IV: Descriptive Statistics (Yearly)

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
STOCK MARKET REACTION													
Mean	-0.82319	1.964631	0.959780	-0.733301	0.619312	-0.00285	0.139041	-0.3236	-0.452143	0.715254	0.580107	0.575178	-0.043516
Median	-1.56803	0.700807	-0.831012	-0.596945	0.455451	-0.49961	-0.636859	-0.535042	-0.865568	0.423247	-0.354294	0.034241	-0.080948
Std. Dev.	15.97085	12.52728	16.35429	13.16810	10.03827	12.54304	11.83203	9.263594	11.73005	9.460844	12.33439	10.85036	11.69673
Skewness	1.134357	1.780390	0.999966	-2.280423	0.624081	0.267727	-0.769891	-0.32397	1.958762	-1.374282	1.272458	1.826945	-0.365873
Kurtosis	18.15486	11.26667	13.25633	19.13262	7.923326	19.41608	19.00981	16.74566	33.18773	21.27570	18.20493	19.78263	12.89350
Jarque-Bera	3404.843	1174.747	2020.053	5340.193	490.1439	5125.713	5044.358	4165.988	21312.87	8026.565	5703.999	7080.181	2165.172
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	529	529	529	529	529	529	529	529	529	529	529	529	529
HERD BEHAVIOUR													
Mean	10.03526	7.945738	9.773843	7.689106	6.890157	7.891515	7.248051	6.203945	6.777437	6.153412	7.435219	6.869346	7.598786
Median	7.240438	5.180006	5.875066	4.843722	4.535030	5.406225	4.633472	4.564661	4.657131	4.436307	4.716650	5.102703	5.266652
Std. Dev.	12.43990	9.873544	13.13935	10.70914	7.319328	9.742430	9.347172	6.881651	9.580282	7.217224	9.853713	8.413781	8.886188
Skewness	4.383949	3.270245	3.497301	4.430914	2.599767	4.547661	4.351854	4.363964	5.851125	4.741959	4.185622	4.599126	3.551553
Kurtosis	30.220	17.619	18.377	28.835	12.741	34.216	31.226	33.858	54.095	40.610	28.924	36.347	21.629

	59	10	69	91	22	85	31	13	96	89	40	75	57
Jarque-Bera	11858.63	3719.195	5279.859	14174.50	2316.602	20087.11	17013.34	22624.82	63198.01	35356.31	17811.66	28720.33	8745.329
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	529	529	529	529	529	529	529	529	529	529	529	529	529
LOSS AVERSION													
Mean	-0.786967	-34.583	-22.53164	4.048861	17.22839	3.810163	-13.69174	22.15296	-20.49008	-20.1693	-7.079967	19.63490	14.54049
Median	1.046332	-15.607	-3.194897	1.133775	15.62902	2.741488	-2.570983	11.29398	-11.82087	-10.79184	0.700422	16.11630	8.960923
Std. Dev.	47.04385	112.2595	108.8486	94.23903	97.40087	103.5916	63.40279	101.3800	158.5818	94.01139	112.6079	124.3619	97.30464
Skewness	0.109811	-2.183	-1.463075	1.506489	-0.065956	-0.476638	-2.461258	-1.44605	-0.949895	0.245660	-0.875368	-1	0.211247
Kurtosis	19.17300	12.48631	12.34138	13.02929	5.268990	11.24947	16.30205	20.70117	19.90967	14.47792	17.57333	8.958695	12.21397
Jarque-Bera	3793.405	1581.148	1772.738	2083.630	98.14862	1310.287	3922.924	7077.305	6659.561	3101.627	5170.728	881.6445	1871.667
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	529	529	529	529	529	529	529	529	529	529	529	529	529
MENTAL ACCOUNTING													
Mean	0.777962	3.400998	7.149395	-1.230996	-0.827151	1.123137	0.491851	1.570062	-2.224323	0.544067	1.597715	2.640128	2.371001
Median	1.184158	1.528998	3.182776	-1.099952	0.457252	3.516458	2.190643	1.113331	-2.723282	-0.723531	-0.067441	2.439404	-2.302873

Std. Dev.	8.422756	6.498893	9.852685	6.195457	4.665147	7.168933	10.69976	4.759055	4.907522	3.772442	7.837303	4.469336	16.10464
Skewness	-0.563604	1.531383	0.959462	0.025130	-1.073291	-0.443992	-2.050069	0.410821	0.552764	0.764377	0.740993	0.047392	2.675892
Kurtosis	3.189397	4.847172	2.736749	2.792480	3.173713	2.091047	6.887976	2.766061	4.020880	2.913292	2.780944	1.604000	8.700253
Jarque-Bera	18.94381	185.4924	69.40407	0.866225	88.12185	30.67949	622.5861	16.05612	52.08097	55.09827	53.86247	46.98721	1344.958
Probability	0.000077	0.000000	0.000000	0.648488	0.000000	0.000000	0.000000	0.000326	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	529	529	529	529	529	529	529	529	529	529	529	529	529

OVERCONFIDENCE

Mean	4.911141	4.656380	7.890611	7.780040	7.748362	7.794864	8.142492	7.973674	8.281627	8.233825	8.330174	5.289789	8.263496
Median	4.920062	4.870984	7.686851	7.625317	7.663655	7.799240	8.062568	7.884530	8.154053	8.166818	8.175139	5.174350	8.219870
Std. Dev.	1.656400	1.656194	1.270373	1.178633	1.081289	1.165890	1.192584	1.303768	1.387142	1.267248	1.304469	1.309441	1.576913
Skewness	0.060383	-0.385	1.246781	1.839255	1.533293	0.479569	0.725312	0.824551	0.647339	0.531395	0.801560	0.770065	0.302528
Kurtosis	3.198239	3.314241	5.913384	9.500592	9.569535	4.756028	5.182998	4.315305	3.682993	3.767923	4.465240	4.364356	3.088489
Jarque-Bera	0.781305	10.02522	272.0548	1059.994	998.6922	76.06801	133.9609	97.89035	49.28147	40.40182	113.2061	101.6032	8.226293
Probability	0.676615	0.006654	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.016356
Observations	529	529	529	529	529	529	529	529	529	529	529	529	529

Appendix V: Pooled Regression Results

Dependent Variable: Stock Market Reactions; Method: Panel Least Squares; Periods included: 13;Cross-sections included: 48;Total panel (unbalanced) observations:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Overconfidence	-0.131279	0.054222	-2.421123	0.0158
Loss Aversion	-0.081713	0.002762	-29.58095	0.0000
Herd Behavior	0.027536	0.022919	1.201433	0.2302
Mental Accounting	-0.016385	0.038220	-0.428695	0.6683
C	0.728627	0.469086	1.553291	0.1210

R-squared	0.667301	Mean dependent var		0.257156
Adjusted R-squared	0.664505	S.D. dependent var		3.171833
S.E. of regression	1.837187	Akaike info criterion		4.064689
Sum squared resid	1606.622	Schwarz criterion		4.108097
Log likelihood	-972.5577	Hannan-Quinn criter.		4.081750
F-statistic	238.6804	Durbin-Watson stat		1.906137
Prob(F-statistic)	0.000000			

5% significance level

Appendix VI: Fixed Effect Model

Dependent Variable: Stock Market Reaction; Method: Panel Least Squares; (Cross-section Fixed effects): Periods included: 13; Cross-sections included: 48; Total panel (unbalanced) observations:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Overconfidence	-0.124507	0.064819	-1.920836	0.0554
Loss Aversion	-0.080152	0.002924	-27.40815	0.0000
Herd behaviour	0.022466	0.026225	0.856677	0.3921
Mental accounting	-0.011816	0.039678	-0.297806	0.7660
C	0.717006	0.557835	1.285337	0.1994

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.683975	Mean dependent var	0.257156
Adjusted R-squared	0.646405	S.D. dependent var	3.171833
S.E. of regression	1.886094	Akaike info criterion	4.208699
Sum squared resid	1526.103	Schwarz criterion	4.660144
Log likelihood	-960.1920	Hannan-Quinn criter.	4.386136
F-statistic	18.20560	Durbin-Watson stat	2.000301
Prob(F-statistic)	0.000000		

5% significance level

Appendix VII: Random Effect Model

Dependent Variable: Stock Market Reactions; Method: Panel EGLS (Cross-section random effects) Periods included: 13; Cross-sections included: 48; Total panel (unbalanced) observations; Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Overconfidence	-0.131279	0.055666	-2.358343	0.0188
Loss aversion	-0.081713	0.002836	-28.81391	0.0000
Herd behaviour	0.027536	0.023530	1.170279	0.2425
Mental accounting behaviour	-0.016385	0.039237	-0.417579	0.6764
C	0.728627	0.481573	1.513014	0.1309

Effects Specification

			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			1.886094	1.0000

Weighted Statistics

R-squared	0.667301	Mean dependent var	0.257156
Adjusted R-squared	0.664505	S.D. dependent var	3.171833
S.E. of regression	1.837187	Sum squared resid	1606.622
F-statistic	238.6804	Durbin-Watson stat	1.906137
Prob(F-statistic)	0.000000		

Unweighted Statistics

|			
R-squared	0.667301	Mean dependent var	0.257156
Sum squared resid	1606.622	Durbin-Watson stat	1.906137

5% significance level

Appendix VIII: Panel EGLS Period Random Effect Model - Weights

Dependent Variable: Stock Market Reactions; Method: Panel EGLS (Period random effects); Periods included: 13; Cross-sections included: 48; panel (unbalanced); Wansbeek and Kapteyn estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Overconfidence	-0.131279	0.030146	-4.354716	0.0000
Loss Aversion r	-0.081713	0.001536	-53.20532	0.0000
Herd Behaviour	0.027536	0.012743	2.160938	0.0312
Mental Accounting	-0.016385	0.021249	-0.771065	0.4411
C	0.728627	0.260801	2.793803	0.0054

Effects Specification

			S.D.	Rho
Period random			0.000000	0.0000
Idiosyncratic random			1.021434	1.0000

Weighted Statistics

R-squared	0.667301	Mean dependent var	0.257156
Adjusted R-squared	0.664505	S.D. dependent var	3.171833
S.E. of regression	1.837187	Sum squared resid	1606.622
F-statistic	238.6804	Durbin-Watson stat	1.906137
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.667301	Mean dependent var	0.257156
Sum squared resid	1606.622	Durbin-Watson stat	1.906137

5% significance level

Appendix IX: Residuals Plot

PERIOD RANDOM RESIDUALS
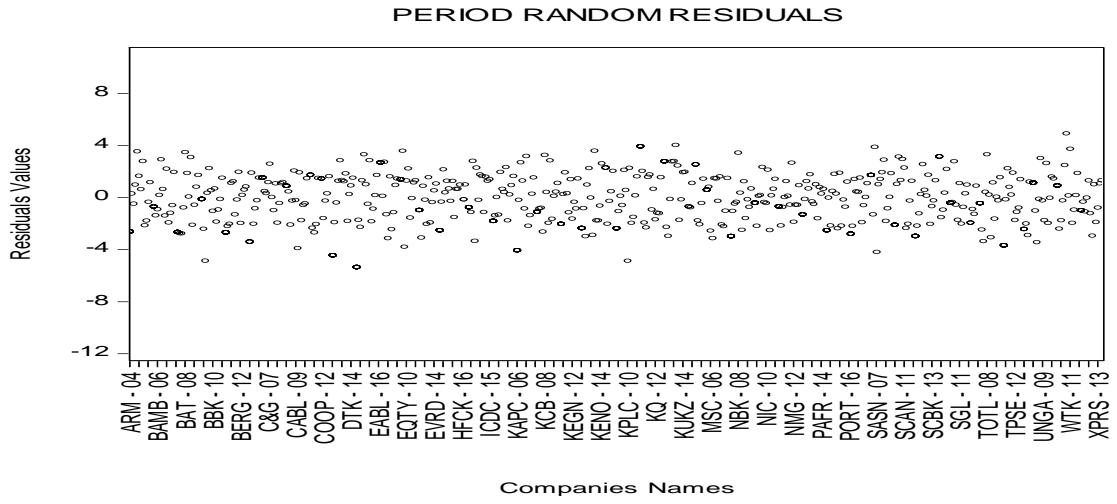
Appendix X: Heteroscedasticity Test

Dependent Variable: Residuals squared
Method: Panel Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Residuals (ARCH) (-1)	0.045073	0.049776	0.905525	0.3658
Residuals (GARCH) (-2)	0.041677	0.033117	1.258467	0.2090
C	2.666262	0.274524	9.712308	0.0000
Statistics				
R-squared	0.006161	Mean dependent variable		2.961998
Adjusted R-squared	0.000958	S.D. dependent variable		3.723056
S.E. of regression	3.721273	Akaike info criterion		5.473770
Sum squared residuals	5289.886	Schwarz criterion		5.504575
F-statistic	1.184128	Durbin-Watson stat		2.033723
Prob(F-statistic)	0.307133			

5% significance level

Appendix XI: Autocorrelation Test

Dependent Variable: Residuals; Method: Panel Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Herd Behavior	0.004272	0.023645	0.180674	0.8567
Loss Aversion	0.001566	0.002689	0.582448	0.5606
Mental Accounting	0.015342	0.040189	0.381739	0.7028
Overconfidence	-0.076700	0.056713	-1.352409	0.1770
Residuals (-1)	0.015207	0.046389	0.327825	0.7432
C	0.607378	0.483682	1.255739	0.2099
Statistics				
R-squared	0.006733	Mean dependent var		0.070655
Adjusted R-squared	-0.004898	S.D. dependent var		1.713400
S.E. of regression	1.717591	Akaike info criterion		3.933483
Sum squared resid	1259.701	Schwarz criterion		3.989890
F-statistic	0.578914	Durbin-Watson stat		2.113662
Prob(F-statistic)	0.716182			
5% significance level				

Appendix XII: Breusch-Godfrey Serial Correlation Lm Test

:

F-Statistic	0.011425	Prob. F(1,475)	0.9149
Obs*R-Squared	0.011569	Prob. Chi-Square(1)	0.9143

Test Equation:

Dependent Variable: Residuals

Method: Least Squares

Date: 04/23/18   Time: 20:18

Sample: 1 528

Included Observations: 481

Pre-Sample And Interior Missing Value Lagged Residuals Set To Zero.

Variable	Coefficient	Std. Error	T-Statistic	Prob.
Overconfidence	4.98e-05	0.052904	0.000942	0.9992
Loss Aversion	2.31e-05	0.002704	0.008561	0.9932
Herd behaviour	-0.000295	0.022531	-0.013105	0.9895
Mental Accounting	0.000951	0.038336	0.024813	0.9802
C	0.001557	0.457890	0.003400	0.9973
Residual (-1)	0.005285	0.049443	0.106887	0.9149

R-Squared	0.000024	Mean Dependent Var	-1.55e-16
Adjusted R-Squared	-0.010502	S.D. Dependent Var	1.783093
S.E. Of Regression	1.792432	Akaike Info Criterion	4.017419
Sum Squared Resid	1526.086	Schwarz Criterion	4.069509
Log Likelihood	-960.1894	Hannan-Quinn Criter.	4.037893
F-Statistic	0.002285	Durbin-Watson Stat	1.957764
Prob(F-Statistic)	0.999999		

Appendix XIII: Heteroskedasticity Test: ARCH

F-statistic	1.846046	Prob. F(2,382)	0.1593
Obs*R-squared	3.685467	Prob. Chi-Square(2)	0.1584

Test Equation:

Dependent Variable: Residual^2

Method: Least Squares

Date: 04/23/18   Time: 20:20

Sample (adjusted): 3 528

Included observations: 385 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.582737	0.290000	8.905991	0.0000
RESID^2(-1)	0.038696	0.049623	0.779803	0.4360
RESID^2(-2)	0.078228	0.044828	1.745053	0.0818

R-squared	0.009573	Mean dependent var	2.980887
Adjusted R-squared	0.004387	S.D. dependent var	3.739015
S.E. of regression	3.730804	Akaike info criterion	5.478887
Sum squared resid	5317.020	Schwarz criterion	5.509691
Log likelihood	-1051.686	Hannan-Quinn criter.	5.491104
F-statistic	1.846046	Durbin-Watson stat	2.021671
Prob(F-statistic)	0.159266		

5% significance level