BEHAVIOURAL BIASES, DEMOGRAPHICS, INVESTMENT STRATEGY AND PORTFOLIO PERFORMANCE OF INDIVIDUAL INVESTORS AT THE NAIROBI SECURITIES EXCHANGE

By

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DECLARATION

I hereby declare that this PHD research thesis is my original work and has not been presented for a degree in any other University.

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I dedicate this Doctoral Thesis to my parents: Priscah Onsomu and the late Mathew Onsomu. Also my dear children: Ryan Nyasimi, Sam Nyasimi and Angel Nyasimi. You have inspired my life.

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ABBREVIATIONS AND ACROYNMS

A	Age of Investor
AMEX	American Stock Exchange
ANOVA	Analysis of Variance
B	Behavioural Biases
BAT	British American Tobacco
CAPM	Capital Asset Pricing Model
CDS	Central Depository System
CMA	Capital Markets Authority
D	Investor Demographics
EABL	East African Breweries Ltd
ED	Education level of investor
EMH	Efficient Market Hypothesis
EX	Experience of Investor
FTSE	Financial Times Stock Exchange
G	Gender of Investor
IPO	Initial Public Offer
IS	Investment Strategy

KCB	Kenya Commercial Bank
M^2	Modigliani and Modigliani
MPT	Modern Portfolio Theory
NASDAQ	National Association of Securities Dealers Automated Quotation
NASI	Nairobi All Share Index
NSE	Nairobi Securities Exchange
NYSE	New York Stock Exchange
P	Portfolio Performance
SEM	Structural Equation Modelling
VIF	Variance Inflation Factor

ABSTRACT

This study sought to establish the relationship among behavioural biases, demographics, investment strategies and portfolio performance of individual equity investors at the Nairobi Securities Exchange, Kenya. This was based on research gaps that were identified in literature, namely, conflicting results on the effect of behavioural biases on portfolio performance, contradicting evidence on whether the effect of biases differs significantly among individuals based on their demographics, and finally few studies have been done on the joint effect of behavioural biases, demographics, investment strategy on portfolio performance in Kenya. The study formulated four hypotheses so as to address the identified gaps. A sample of 400 investors was considered and questionnaires were used to collect data whereby a response rate of 69.7% was attained. Positivism research philosophy was applied to enable generalization of the findings to the whole population. The study used correlational descriptive survey design. The data was tested for reliability and validity and found appropriate for analysis. Regression diagnostics were conducted for linearity, multicollinearity and homoscedasticity. Descriptive statistics and specifically the mean, median, mode, skewness, kurtosis, and standard deviation were computed. Correlation analysis was carried out to establish the correlation among behavioural biases, demographics, investment strategy and portfolio performance. Lastly, regression analysis was carried out to test the hypotheses. The findings from the study were that there is a statistically significant relationship between behavioural biases and portfolio performance (Adjusted R^2=8.1%, F=25.636, p<0.05), there is a statistically significant moderating effect of demographics on the relationship between behavioural biases and investment strategy (Adjusted R^2=3.3%, F=4.191, p <0.05), there is a statistically significant intervening effect of investment strategy on the relationship between behavioural biases and portfolio performance (Adjusted R^2=8.3%, F= 6.002, p<0.05) and lastly, there is a statistically significant joint effect of behavioural biases, demographics and investment strategy on portfolio performance (Adjusted R^2= 10.1%, F= 5.45, p < 0.05). The findings from this study contribute to existing knowledge by firstly providing a position on the effect of behavioural biases on portfolio performance where a positive relationship was established. Secondly, by establishing the moderating effect of demographics where education was found to be a significant moderator on the relationship between behavioural biases and investment strategy. Thirdly, the mediating effect of investment strategy where contrarian strategy was found to be a significant mediator. Lastly, the joint effect of behavioural biases, demographics and investment strategy on portfolio performance, which was found to be statistically significant. This knowledge will aid agents and brokers who work with securities firms when advising investors on the appropriate investment opportunities based on their demographics. Also CMA as a regulator will use this findings to formulate policies on education programmes to be instituted so as to equip investors with knowledge on how to manage potential effects biases. The study faced a few limitations which were managed effectively by the researcher. For example some investors were unwilling to reveal information about their investments which prolonged the data collection period so as to obtain an adequate sample. The study suggests further research on other biases like local bias and ostrich effect bias as they have been scarcely studied locally. Also a study on other markets like the bond market and real assets markets to ascertain the effect of biases.

CHAPTER ONE: INTRODUCTION

1.1Background of the Study

Behavioural biases are defined as an inclination towards error which results from making decisions based on psychological influences (Shefrin, 2007). This violates the principles of optimality and leads to bounded rationality (Simon, 1957). Investors prone to behavioural biases may experience excessive trading (Barber & Odean, 2000), retaining loss making stocks while selling bullish stocks (Odean, 1998), holding under diversified portfolios (Goetzmann & Kumar, 2008), and holding stocks with higher idiosyncratic volatility (Kumar, 2009). Such behaviour may affect portfolio performance. Performance relates to the evaluation of a portfolio based on its inherent risk and return combinations (Chandra, 2008). This implies that investors should choose their stocks objectively after considering their fundamentals so that for every security selected, the returns outweigh the risk. However, for investors affected with behavioural biases, their subjectivity in decision making may affect portfolio performance. Also the effect of behavioural biases differs from one individual to another based on demographics such as gender (Barber & Odean, 1999), age (Obamuyi, 2013) and experience (Chen et al., 2007).

This study is anchored on Heurists Theory (Tversky & Kahneman, 1974), Dual Process Model which includes Elaboration Likelihood Model (Petty & Cacioppo, 1986) and Heuristic Systematic Model (Chaiken, 1980) and lastly Modern Portfolio Theory (Markowitz, 1952). According to Heuristics Theory, investors sometimes use mental short cuts when making decision under uncertainty. Elaboration Likelihood Model and

Heuristic Systematic Model focuses on how information processing by investors may affect their rationality in decision making. Modern Portfolio Theory contends that investors should make their decisions based on the mean – variance principles. Such a portfolio is considered to be optimal as it earns an investor the highest return for a given level of risk. However, in practice, investors make decisions based on heuristics which limit the mind's limited information processing capacity, emotions (Pfister & Bohm, 2008), and social influence (Wang, Simons & Bredart, 2001). This implies that bias prone investors may not consider the risk and return of the securities in decision making which may result in sub optimal decisions. Such portfolios may underperform the market portfolios as they are formed contrary to MPT tenets.

Individual investors, who trade at the Nairobi Securities Exchange (NSE), were considered for the study. This is because investment decisions by institutional investors are made by professionals and therefore the extent to which they are affected by behavioural biases may be different from individual investors. There were a total of 1,219,113 individual investors as at December, 2015 (CMA, 2015). The investors had 65 stocks which they could include in their portfolio comprising of the listed firms (NSE, 2015).The trading behaviour of investors at the Nairobi Securities Exchange has portrayed irrationalities. Such behaviour has been evidenced for example in IPOs where the subscription levels have been very high (Eveready-830%, Scan group-620%, and Safaricom-532%). The shares of most of the IPOs underperform the market in the long run. Also firms which report high profits experience high equity turnover (CMA, 2015).

For example Safaricom, Equity Bank, EABL and KCB. This implies that investors may be influenced by other factors in decision making instead of the stock fundamentals.

1.1.1 Behavioural Biases

Behavioural bias is exhibited when investors make decisions while under the influence of an underlying belief (Chira, Adams &Thornton, 2008). This implies that investment decisions may not be influenced by risk-return trade off as advocated by traditional finance but rather by psychological factors. Behavioural biases include status quo, anchoring bias, representativeness bias, availability bias, home bias, disposition effect and ostrich effect. Status quo is the preference for the current state regardless of the changes in the market (Samuelson & Zeckhauser, 1988). Investors prone to status quo do not change the composition of their portfolio regularly nor compare their returns with other stocks in the market. They consider the purchase of new stock as an increase in the level of portfolio risk or time consuming.

Anchoring bias was initiated by Tversky and Kahneman (1974) and it involves making decisions based on irrelevant benchmarks. As such, investors may use reference points like initial purchase price when they want to dispose a stock. This implies that time value of money or the performance of similar stocks in the market is not considered. Availability bias is exhibited when investors select stocks which they can recall with ease. This can be evidenced when investors buy stocks which are always trading high abnormal volumes, stocks with extreme one day returns, and stocks where aggressive

campaigns are done. This can be attributed to the fact that such stocks are easy to remember but may not necessarily be viable stocks.

Representativeness bias is when investors use characteristics of a small sample to generalize for the whole population (Tversky & Kahneman, 1974). This is evidenced when past performance of a stock is considered before buying with the expectation that similar trend will be replicated in the future; buy stocks from a sector where a company or companies reflect good performance; invest in companies with perceived competent management; and buying stocks from popular companies with the expectation that this will translate to better performance. Ostrich effect is when investors shun risky financial situations by pretending that they do not exist (Galai & Sade, 2006). As such, they tend to avoid bad news but search for more information on good news. This bias is evidenced when investors keenly observe the market when they are holding a winning stock than when they are holding a losing stock (Brown & Kagel, 2009). Home bias is where investors prefer to hold local securities than foreign securities in their portfolio (Kumar & Goyal, 2015). Lastly, disposition effect is the tendency to hold on to losing stocks while disposing the winning stocks (Shefrin & Statman, 1985).

Representativeness bias is measured by the extent to which investors overweight recent experiences while availability bias is measured by the ease with which investors buy stocks that they can easily recall. Also Anchoring bias is measured by the extent to which investors make use of irrelevant anchors in decision making (Rekik & Boujelbene, 2013).

Lastly, status quo is measured by the extent to which investors prefer their current state regardless of the changes in the market (Samuelson & Zeckhauser, 1988).

1.1.2 Investment Strategy

Jones (2009) defines investment strategy as a set of rules and procedures that aid investors in choosing assets to be in their portfolio. Chandra (2008) identifies two broad categories of investment strategies: passive and active strategies. Passive strategies include buy and hold strategy and indexing strategy. Buy and hold strategy entails buying a stock and holding it over a long investment period. Indexing strategy is where investors replicate stocks representing the market index as it enables in tracking the performance of the index. Active strategies comprise of market timing, sector rotation, security selection and application of a specialized investment concept. Market timing is when investors are in the market when it is bullish and exit when it is bearish. Sector rotation involves changing the weights for the various sectors based on their performance. Security selection is where investors search stocks that are underpriced (contrarian strategy) for purchase. The last strategy is where investors apply a specialized investment concept or philosophy so as to attain superior returns. This strategy is dominant among irrational investors as they strive to beat the market. Barber and Odean (2000) observed that investors affected by behavioural biases traded excessively and preferred small and high beta stocks. There was also a tendency of holding under diversified portfolios (Goetzmann & Kumar, 2008).

Odean (1999) recognizes contrarian and momentum strategies. Contrarian investors tend to buy out-of favour stocks for example stocks which have recorded bearish performance are suitable for buying while bullish stocks should be sold. Momentum investors chase recent performers with the believe that the trend will persist in the future. Kaniel et al. (2008) found that individual investors were tilted towards contrarian strategy while Grinblatt, Titman and Wermers (1995) observed that institutional investors (mutual funds) applied momentum strategy in their investment. Bauman and Miller (1997) recognize growth stock style and value stock style. Growth stocks tend to be highly priced and have high price to earnings ratio while value stocks are lowly valued with low price to earnings ratio. Investment strategies applied by investors prone to biases are measured in terms of excessive trading, under diversification of portfolio, holding volatile stocks, and contrarian strategy (Barber & Odean, 2000; Goetzmann & Kumar, 2008; Odean, 1999).

1.1.3 Individual Demographics

Demographics refer to individual characteristics for example age, gender, occupation, income and education (Geetha & Ramesh, 2012). The study depicted that investment decisions differ from one person to another based on their demographics. It was found that demographics affected the type of investment, duration of investment, frequency of investment and the amount of savings by an individual. Ikeobi and Arinze (2016) found that demographics influenced investment objectives of the investors in terms of risk and return considerations.

Researchers have found that demographic variables may influence the relationship between behavioural biases and performance for example Lee et al. (2013). A significant difference between behavioural biases and portfolio performance in terms of gender was evidenced by Barber and Odean (2000). Gender was measured as one being male or female and male investors were found to be affected more by overconfidence bias which adversely affected their portfolio performance. Age and experience may also influence the relationship between behavioural biases and portfolio performance. Chen et al. (2007) observed that experienced investors were affected more by behavioural biases which affected their portfolio performance positively. Experience was measured in terms of how long an investor held an account. However, age had no significant influence on the relationship between investor biases and portfolio returns. Obamuyi (2013) also found that the effect of behavioural biases on portfolio performance differed based on age, gender and education qualifications. In the study, educational qualifications were categorized into five: Less than high school, high school or equivalent, diploma or equivalent, high diploma or Bachelor and graduate (Masters or PHD). Age was also measured as the number of years of an investor.

1.1.4 Portfolio Performance

Portfolio performance entails evaluating the viability of the investments (Chandra, 2008). According to traditional finance, portfolio performance is based on mean variance theorem (Markowitz, 1952). Portfolio performance is considered optimal when the mean returns are commensurate to the level of risk. As such, high risk portfolios should earn high returns so as to compensate the investor for the risk taken. Chandra (2008) identifies

four measures of portfolio performance: Treynor, Jensen, Sharpe and M^2. Treynor measure relates the excess return on a portfolio to the portfolio beta. Jensen measure compares portfolio returns with the return the portfolio could have earned under the capital asset pricing model. Sharpe measure relates the excess return earned per unit of its total risk. Lastly, M^2 compares the return on an "adjusted" portfolio whose volatility matches that of the market index and the return on the market index.

According to Barber and Odean (2000) portfolio performance is evaluated by comparing portfolio returns with a benchmark index. The benchmarks include own benchmark, mean monthly market-adjusted, Jensen Alpha, and three factor model (Fama & French, 1993). Lastly, Fama and French (2012) introduced a four factor model for measuring portfolio performance. As a benchmark for portfolio performance evaluation, it considers the variable in the three factor model and a momentum factor which represents the difference in returns between winning portfolios and losing portfolios. The Jensen's Alpha, Treynor, three factor model and four factor model uses beta as a measure of risk which is appropriate in a market where all the unsystematic risk has been fully diversified. In a financial market where investors are prone to irrationalities, it may not be possible to fully diversify the unsystematic risk. As such, a measure which considers total risk like Sharpe ratio is appropriate.

1.1.5 Individual Investors at the Nairobi Securities Exchange

Individual investors are those who manage their own equity investments (Barber & Odean, 2000). In order to trade, an investor is required to identify a brokerage firm which

facilitates the opening of a Central Depository System (CDS) account. Each individual is allowed one account which enables an investor to buy and sell securities at the NSE and the trading is done online. Individual equity investors at the NSE totalled 1,629,746 as at December, 2015 (CMA, 2015). These were categorized into three groups: East African individuals, foreign investors and local individuals. The male investors comprised of 1,104,395 and female were 525,351. The participants at the NSE are expected to be of over 18 years. Equity investors at the NSE have been found to be influenced by behavioural biases in their decision making. For example Aduda, Oduor and Onwonga (2012) evidenced existence of herding effect and heuristics among the investors. Also Nyamute (2016) found that overconfidence, herding and disposition effect was dominant among the investors. The same study evidenced four investment strategies being applied by investors at the Nairobi Securities Exchange: passive, active, growth and value strategies.

There were 65 shares (CMA, 2015) representing all the segments. At the NSE, the market performance is measured using four market indices: NSE 20 share Index, NSE All Share Index (NASI) and FTSE Indices. The NSE 20 share index is equal-weighed geometric mean of 20 large ordinary stocks traded on the Nairobi Securities Exchange. All Share Index (NASI) is an overall indicator of market performance as it considers all the listed firms. FTSE NSE Kenya 25 Index reflects the performance of the 25 most liquid stocks trading and FTSE NSE Kenya 15 Index reflects the performance of the largest 15 stocks trading at the NSE. Individual investors can compare their performance with the above

indices or other benchmarks; own benchmark, mean market adjusted returns, Jensen Alpha, three factor model and four factor model.

1.1.6 Research Problem

Behavioural biases are manifested in irrational decision making which is contrary to the tenets of optimality that require the application of mean-variance theory in portfolio formulation. This is evidenced in over trading (Park et al., 2010), buying stocks that are easy to recall (Barber & Odean, 2008), failure to diversify (Goetzmann & Kumar, 2008). According to Barber, Lee, and Liu (2009) such actions may result in a portfolio that underperforms the market due to the associated costs and high risk that may not be compensated by the prevailing returns. However, in some cases behavioural biases may lead to superior selection of stocks which may positively impact on portfolio performance (Vijaya, 2016). The influence of behavioural biases differs from one individual to another based on their characteristics for example gender, age, experience, education, income, location and wealth. As such, the effect of demographics causes investors to adopt different investment strategies which affect the portfolio performance. For example overconfidence bias has been found to affect men more than women which causes the men to have high trading intensity and this leads to poor portfolio performance (Barber & Odean, 2000).

Behavioural biases have gained prominence in Kenya and especially at the stock market because of the actions of the investors which in some cases are not rational. Such behaviour includes buying stocks of companies that have reported high profits and herding (Aduda, Oduor & Onwonga, 2012). In terms of trading, few big companies

experience high equity turnover as compared to the other companies for example Safaricom, Equity Bank, EABL, and BAT. Such companies are visible to the public and can easily attract investors. This has drawn the attention of the NSE which has established investor education programmes so as to increase awareness and increase financial literacy among investors (NSE, 2015). This is because irrational trading may affect individual investors' portfolio returns and even the stock market performance (Babajide & Adetiloye, 2012).

Empirical review on the relationship between behavioural biases and portfolio performance has shown contrary results. Most studies support an inverse relationship between behavioural biases and portfolio performance (Barber & Odean, 2000; Brown & Kagel 2009; Lee et al., 2013) because of the inherent transactions costs associated with excessive trading. Other studies for example Chen et al. (2007) and Vijaya (2016) evidenced a positive relationship between behavioural biases and portfolio performance. The contradiction may be due to the different countries where the studies were carried out because the effect of biases differs among individuals based on location. This is because countries have different beliefs and cultures which influence the impact of biases. Methodological differences are also evidenced. There are studies that used simulated experiments for example Brown and Kagel (2009), Lee et al. (2013) and Hillon and Mazurier (2005). Results from experiments are limited in terms of application because of the controlled environment in which they are carried out. Some studies have also used secondary data in their analysis for example Odean (1999), which may not appropriately measure behavioural biases that are associated with human influences. Other studies have

considered students as a sample of their study (Nosic, Weber, & Glaser, 2011) which may limit the generalization of the results because students may not be actual investors in the stock market.

In Kenya, studies that have been done have identified factors influencing investor decisions. Wamae (2013) found that anchoring biases, risk aversion, herding effect, and prospecting influenced investment decisions. Aduda, Oduor and Onwonga (2012) depicted that investors were affected by herd behaviour, family and religious background, improved exchange rate, day to day profits, past profitability, management stability, availability of shares and regret aversion in their decision making. Waweru, Munyoki and Uliana (2008) established that behavioural factors such as mental accounting, overconfidence, availability bias, representativeness, gambler's fallacy, anchoring, loss aversion, and regret aversion affected the decisions of institutional investors. These studies did not establish the effect of the investor decisions on portfolio performance. A few studies have considered the moderating and intervening variables on the relationship between behavioural biases and portfolio performance. One of such studies is Nyamute (2016) where the data used included an electioneering period and therefore may not reflect the normal trading behaviour of investors. The study considered overconfidence bias, herding effect and disposition effect while investors can be affected by other biases. The study also considered age, gender and financial literacy as moderating variables but other variables can also moderate for example experience, education, and income and wealth level.

The international studies reviewed had contradicting results on the effect of behavioural biases on portfolio performance which provided a conceptual gap for a researcher to provide a position on the same. Conceptual gap is also evidenced in that none of the studies reviewed had considered the relationship between status quo, availability bias, anchoring bias and representativeness and portfolio performance. Lastly few studies of those reviewed had considered the four variables together: portfolio performance, behavioural biases, demographics (moderating variables) and investment strategy (intervening variable). A contextual gap exists because few studies which have been done locally have addressed the four variables together. Given the research gaps identified, more empirical research is needed to better understand the relationship between behavioural biases and portfolio performance while considering the moderating effect of demographics and intervening effect of investment strategy. This study represented one such attempt. The study answered the research question: what is the effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange?

1.1.7 Research Objectives

The general objective of the study was to determine the effect of demographics and investment strategy on the relationship between behavioural biases and portfolio performance. The specific objectives were:

i) To determine the relationship between behavioural biases and portfolio performance of individual investors at the Nairobi Securities Exchange.

ii) To determine the effect of demographics on the relationship between behavioural biases and investment strategy of individual investors at the Nairobi Securities Exchange.

iii) To determine the effect of investment strategy on the relationship between behavioural biases and portfolio performance of individual investors at the Nairobi Securities Exchange.

iv) To determine the joint effect of behavioural biases, demographics and investment strategy on portfolio performance of individual investors at the Nairobi Securities Exchange.

1.1.8 Value of the Study

The findings of this study contribute to existing knowledge in the area of behavioural biases, investment strategy, demographics and portfolio performance of individual investors. The specific contributions are: ascertaining whether investors in Kenya are affected by availability bias, representativeness bias, anchoring bias and status quo; investment strategies applied by investors; determining the moderating effect of demographics on the relationship between behavioural biases and investment strategy; and determining the intervening effect of investment strategy on the relationship between behavioural biases and portfolio performance.

The findings from this study are of use by regulators like CMA by enabling the understanding on the relationship among behavioural biases, investment strategy, demographics and portfolio performance. This study provides evidence about the irrationality exhibited by investors at the NSE which will enable CMA to formulate

appropriate literacy programs which can be disseminated to the public to create awareness.

The findings from this study are of importance to financial advisors who deal directly with retail clients. This will enable them assess their clients to establish whether they are affected by biases or not. As such, they will be able to offer appropriate advice. For example they can advise investors on the appropriate strategy to use so as to optimize their portfolio performance. Individual investors will also benefit from this study as they will gain knowledge on the effect of behavioural biases in their decision making. As such, they will strive to make optimal decisions based on the prevailing circumstances.

CHAPTER TWO: LITERATURE REVIEW

2.1Introduction

This chapter presents the theoretical review, empirical literature review on behavioural biases, summary of previous studies and research gaps, conceptual framework and the conceptual hypotheses.

2.2 Theoretical Review

This section presents the theoretical review and critique of Modern Portfolio Theory (Markowitz, 1952), Heuristics Theory (Tversky & Kahneman, 1974), and Dual Process Theory [Petty & Cacioppo (1986) and Chaiken (1980)].

2.2.1Modern Portfolio Theory

Modern Portfolio Theory (MPT) was proposed by Markowitz (1952). The theory analyzes how wealth can be optimally invested in assets which differ in terms of their expected return and risk and came up with the mean – variance analysis in portfolio choice and suggested that investor behaviour was consistent with maximizing expected utility. This theory assumes rationality of the investors when making investment decisions. As such they are bound by asset fundamentals (risk and returns) when making their choices. This implies that investors ought to receive compensation for the risk incurred in an investment, both systematic and unsystematic risk.

Portfolios formed by investors affected by behavioural biases may not be optimal. This is because behavioural portfolio theory advocates that the need for security, expected

wealth and aspiration levels should be considered when choosing portfolios (Shefrin & Statman, 2000). This is in contrast to mean variance investors who put emphasis on risk and return when making decisions. As such, behavioural portfolios may underperform mean-variance portfolios because of the inherent irrationalities which may lead to sub optimal decisions. However, the mental shortcuts may result in superior portfolios which outperform the market especially in scenarios where an investor has experience in trading or is knowledgeable on financial issues.

The theory has been critiqued by Omisore, Yusuf and Nwufo (2012) where it was argued the parameters used in modern portfolio theory (return, risk and correlations) are based on past market data and may fail to incorporate any new information in the market. When a market is efficient, any new information is quickly incorporated in the prices which may affect the returns. The study also suggests that the use of asset prices in the model implying that it may be affected by market failures for example information inefficiency. Haugen and Baker (1996) noted that risk was not a determinant of expected returns as required in MPT. Rather, factors like accounting ratios and past returns influenced expected returns. This indicates that MPT may not be applicable in some scenarios.

Researchers in support of MPT have argued that it is viable to investors because it studies the capital markets and then advises investors on how they can exploit the opportunities in the market for their own benefit (Curtis, 2004). Large gains can be earned when investors identify stocks whose returns are high and have low risk. Elton and Gruber (1997) suggest that the parameters applied in MPT: risk, return and correlations between

the assets are important considerations when adding an asset to a portfolio. This implies that MPT is still relevant in decision not withstanding its limitations as investors still consider risk and return principles when making investment decisions. MPT contributes to the conceptual framework because the effect of behavioural biases is exhibited in portfolio performance. The performance may differ from one individual to another because demographics influence the vulnerability to behaviour biases which in turn determine the investment strategy applied.

2.2.2 Heuristics Theory

Heuristics are rules of thumb for decision making in situations that are difficult and not easy to understand (Simon, 1957). It contends that people operate within bounded rationality and accept choices that they are satisfied with although optimal results could be obtained. The use of heuristics theory in human decision making was suggested by Tversky and Kahneman (1974) where heuristics that can be used when making decisions under uncertainty were derived: availability bias, representativeness bias and anchoring bias. Availability bias is when investors make a choice based on the ease with which they can recall. Stocks which are popular, always in the media or reporting high abnormal returns are potential stocks for buying (Barber & Odean, 2008). This view is supported by Grullon, Kanatas and Weston (2004) where it was evidenced that firms that were visible to the public which was attributed to the advertising intensity were likely to experience high trading activity. Also Gervais, Kaniel, and Mingelgrin (2001) evidenced that stocks which reported abnormally high trading volume over a day or a week experienced a price appreciation during the following month due to increased attention.

Buying attention grabbing stocks may be a suboptimal decision as a stock can be in the public for wrong reasons for example due to corporate governance problems.

Representativeness bias has been associated with a similarity problem among the individuals. As such, investors may use past performance to make a decision as whether to purchase or dispose a stock with the assumption that it will be replicated in the future (De Bondt, 1993). They also tend to extrapolate future stock performance which signifies overreliance on past returns (Rekik & Boujelbene, 2013). Rational decision making requires investors to study the market and choose securities based on knowledge about their fundamentals. The use of mental short cuts exhibited under representativeness bias demonstrates ignorance on an investor as events which occurred in the past may not reoccur. Anchoring bias is exhibited when investors are making decision whereby they start from an initial value and adjust their estimates around the anchor. Epley and Gilovich (2006) argue that the starting points generated by individuals are incorrect but close to the target value. According to Odean (1998), the average purchase price is an appropriate anchor. This heuristic has been manifested in investors as depicted in studies for example Rekik and Boujelbene (2013), Wamae (2013) and Lee et al., (2013). An anchor should be appropriate so as to avoid making suboptimal decisions. The use of purchase price may not be appropriate as value depreciates with time. For example a stock purchased at sh. 10, five years ago, may not have the same value currently, and this is attributed to time value of money and opportunity costs.

Proponents of heuristics have argued that it is easy to use as compared to the formal approaches (Pothos & Busemeyer, 2011). This explains their dominance in financial decision making as some investors lack knowledge and those who have the knowledge consider the formal approaches as time consuming. Heuristics may also offer better results in comparison with the formal approaches (Gigerenzer & Todd, 1999). This may be associated with luck as decisions are made based on intuition. Heuristics theory has been criticized on varying grounds. Gilovich, Dale and Kahneman (2002) argue that although heuristics provide quick solutions, they rely on underlying processes for example memory retrieval which is highly sophisticated. They also critic heuristics on the basis of ecological validity in the sense that observed behaviour in the laboratory may not be generalized to natural behaviour in the world. Hertwig and Ortman (2000) contend that heuristics offer a pessimistic assessment of the average person's ability to make sound and effective judgments.

The use of heuristics in financial markets is evident in the form of irrationalities which are observed. Investors are attracted to stocks that are visible to the public eye. This is evidenced in daily reporting of high trading turnover at the stock market that constitutes of a few companies (CMA, 2015). Such firms are highly visible for example Safaricom. When investors choose to sell a stock, they tend to apply the purchase price as the anchor (Kengatharan & Kengatharan, 2014). The effect of representativeness bias is also observed in incidences where investors consider past performance of a company in making a decision as to whether to purchase the stock or not (Aduda, Oduor & Onwonga,

2012). Such behaviour may have an impact on stock portfolio performance as investors may select stocks with high risk with no corresponding returns. Heuristics theory is relevant in the conceptual framework as it provides some of the indicators of behavioural biases: availability bias, representativeness bias, and anchoring bias. Heuristics contribute to irrationality in decision making which influences the performance of the investor portfolio. This relationship is affected by demographics and investment strategy.

2.2.3 Dual Process Theory

Dual process theory explains how human beings make decisions while being influenced by either emotional responses or conscious controlled cognitive processes (Greene et al., 2001). The theory includes Elaboration Likelihood Model and Heuristic-Systematic Model. Elaboration Likelihood Model was proposed by Petty and Cacioppo (1986). The model assumes that people differ in the way they process information. Their varying levels of thought (elaboration) are affected by the level of motivation and ability. The model recognizes two ways of information processing: central route and peripheral route. In the central route, individuals are motivated and are able to think about the message. As such, individuals analyze the information in order to ascertain whether the proposal makes sense and whether it will be of beneficial to them. In the peripheral route, individuals show little or no interest in the subject and/or have a lesser ability to process the message. This makes them prone to the use of mental shortcuts in processing the information contained in the message. Such individuals may be affected by emotional state for example happiness in their decision making or herd behaviour where they consider the responses of other people exposed to the same message.

Heuristic-Systematic model was proposed by Chaiken (1980). It identifies two ways of thinking about information: systematic and heuristic processing. Heuristic processing is where an individual is governed by availability, accessibility and applicability. This implies that investors are selective on the kind of information they will use in decision making and such behaviour may result in systematic biases (Kahneman, Slovic & Tversky, 1982). This has an impact on an individual as he/she may exercise irrationality and agree with the message accepted by others without fully processing the content. Systematic processing is where an individual understands the available information through careful analysis which reduces their vulnerability to behavioural biases.

This implies the type of thinking an individual adapts will determine whether they are affected by biases or not. Rational thinking leads to objective processing of information which may result in optimal decisions being made. This may contribute to thorough analysis of the stocks, sector by sector and also collecting information on the specific company of interest. Information such as the management of the company and future investment plans may assist in making decisions. However, irrationality leads to the use of mental short cuts which causes biases in decision making. The impact may be evidenced in poor selection of securities. The effect of biases may be evidenced in portfolio performance as suboptimal decisions may adversely affect the performance (Brown & Kagel, 2009).

Dual process theory has been critiqued on the ground that the two different ways may override each and are therefore not distinct. In most cases the systematic approach tends to override heuristic approach (Neys, 2006). At the initial point, investors may not process the information well but with time thorough processing is done. This implies that investors cannot be categorized as either being heuristic or systematic. The two approaches can work together at the same time. The proponents of dual process theory have argued that the degree of processing of information by investors affects their decision making. Thorough processing of information leads to deliberate and accurate decisions. On the other hand inadequate processing of information results in guess work of solutions to problems (Hammond, 1996). In order to choose securities based on their fundamentals, investors are expected to collect information and analyse it so as to make optimal decisions based on mean-variance framework. Guess work associated with poor processing of information may result in irrational decision making. As such, investors who have an advantage in terms of information procession may attain better performance. Dual process theory contributes to the conceptual framework by providing an explanation that error in information processing makes investors to be prone to behavioural biases which eventually affects portfolio performance.

2.3 Review of Empirical Literature

This section reviews empirical literature on the relationship between behavioural biases and portfolio performance, the moderating role of demographics on the relationship between behavioural biases and investment strategy, the intervening effect of investment strategy on the relationship between behavioural biases and portfolio performance and

lastly the combined effect of demographics and investment strategy on the relationship between behavioural biases and portfolio performance.

2.3.1 Behavioural Biases and Portfolio Performance

The concept of behavioural biases emerged in the 1970s when the events in the financial markets could not be explained by EMH. Empirical tests carried out examine the hypothesis that behavioural biases negatively affect the portfolio performance (Barber & Odean, 1999). This has been attributed to irrationality associated with the biases effect, which leads to suboptimal decisions. Such decisions may result in high transaction costs and holding highly risky portfolios which may adversely affect portfolio performance.

A survey was conducted by De Bondt and Thaler (1985) to test whether the stock market overreacts and its effect on performance. The duration considered was 1926-1982 and monthly returns were considered. The investors' portrayed irrationally by reacting to news whether bad or good. The overreaction resulted in past losers being underpriced and past winners to be overpriced which caused loser portfolios to perform better than the winner portfolios. The portfolios were tested for CAPM-betas to ascertain the risk level. Betas of the securities in the winner portfolios and loser portfolios were significantly different. The results were attributed to overconfidence bias which hinders investors from seeking information as they believe they know better than anyone else. The use of CAPM-betas assumes efficiency of the capital markets and this may not apply in markets which are inefficient. The study also used cumulative abnormal returns to test for

overreaction which were not risk adjusted. Risk is one of the fundamental aspects which should be considered when selecting a security and therefore risk-adjusted returns may be a better measure of performance.

Odean (1998) tested the hypotheses that the amount of gains realized was more than the amount of losses realized and that investors willingly sold losers in December than winners. The context was U.S and the duration of the study was 1987 – 1993. The findings depicted that the investors sold profit making stocks and held on to loss making stocks. Also investors disposed losing stocks in December which may be associated with the objective of gaining from tax benefits accruing from the losses. It was found that the winning stocks that were disposed eventually performed better than the losing stocks that were not sold. The choice to sell winning stocks adversely affected the investors as the tax savings were less as compared to holding the stocks for a longer durations. This is an indication of disposition effect which negatively affected performance.

Odean (1999) tested hypotheses to ascertain whether investors trade excessively. The first hypothesis was that the returns to securities that were sold were less than those that were purchased and the second hypothesis was that the returns to securities bought were less than returns for those sold. Secondary data for trades on NASDAQ, NYSE and American Stock Exchange for 10,000 accounts for the duration 1987 and 1993 was used. The findings showed that the securities that were purchased performed poorly than those that were sold. The performance of the accounts was below the market benchmarks. Investors

paid more attention to securities that had experienced above normal performance whether good or bad. The study concluded that investors traded excessively due to overconfidence.

Rationality dictates that investors select their securities based on risk-return expectations. However, this may not always be the case as found by Barber and Odean (2008). An investigation was conducted among the U.S. investors to determine whether attention and news influence buying behaviour of the investors. Secondary data was used. It was hypothesized that investors bought stocks that first caught their attention. The results depicted that investors were influenced by news when making buying decisions. The stocks that received media attention were considered for purchase irrespective of their fundamentals. Investors were also attracted to stocks that had experienced above normal trading volume without gathering information on what the high volume was attributed to. The study concluded that attention-grabbing stocks did not earn the investors better returns.

An experiment was performed by Brown and Kagel (2009) to ascertain whether investors deviate from established traditional finance theories on profit maximization among U.S investors. The biases tested were the ostrich effect, status quo bias, and disposition effect. There was no evidence of ostrich effect as the respondents observed the market more when they held losing stocks than winning stocks. Disposition effect could not be proved in the experiment but the respondents had a higher chance of holding to winners than

losers. In terms of status quo, a large percentage of the investors preferred to hold on to their current portfolio. The subjects who held a non-optimal stock, 19.8% switched to an optimal policy while 37.6% continued their non optimal stock. The subjects' choice not to observe the market and moved to a less performing stock led to a loss of 46.6%. This study used experiments which are limited on what can be tested. Investor behaviour deals with human feelings and emotions which may not be appropriately measured using experiments.

Investors lose their wealth by trading as depicted by Barber et al. (2009). In a study carried out among Taiwanese investors for a five year period (1995-1999), aggressive trading among the investors resulted in poor performance among individual investors. The reverse was witnessed with institutional investors where excessive trading earned positive results. The excessive trading was associated with behavioural biases (overconfidence) but there was no prove from the data analysed. The study was conducted during the period of financial crisis and specifically the Asian financial crisis which occurred in 1997. A financial crisis may cause panic among the investors which can spread to the financial markets and trigger non rational decisions which under normal conditions may not have been made.

To test the rationality of investors for companies listed at the NSE, Aduda and Muimi (2011) considered 56 companies for a study period of 2001-2009. The study tested the overreaction to both bad and good news by investors. To achieve the objective, stocks

were categorized into quartiles in terms of their performance. Firms in the upper (winner) quartile and lower (loser) quartile were investigated. After the study duration had elapsed, the firms in the lower quartile had performed better than the portfolios in the upper quartile. The study evidenced that investors adversely reacted to negative or perceived negative news and outcome than to positive or perceived positive news and outcome. The overreaction to news is an evidence of irrationality which is associated with behavioural biases. The use of holding period returns implies that the returns were not risk adjusted.

Babajide and Adetiloye (2012) conducted a study on the effect of behavioural biases on a security's market in Nigeria by A sample of 300 was considered and primary data was collected using questionnaires. The data was analyzed using one sample t-test and Pearson correlation coefficients. There was evidence of status quo biases, overconfidence, framing bias, loss aversion, and myopic loss biases. When the relationship between behavioural biases and market performance was ascertained, overconfidence had an inverse relationship with market performance which was significant. Loss aversion had a weak, negative and significant relationship with the stock market performance. Confirmation bias and anchoring impacted positively on the stock market performance, but the relationship was insignificant. Lastly, framing bias and status quo exhibited a negative and significant relationship with market performance.

Aduda, Oduor and Onwonga (2012) conducted an investigation to establish the factors that influenced individual investors in making decisions about their investments and the effect on financial performance. A sample of 50 investors was selected for the study. The findings depicted the factors that influence investors' decisions included: influence of friends, herding, heuristic biases which resulted from reliance on public opinions, past profitability, religious background, inflation, exchange rate management stability, market capitalization of company, availability of shares, and day to day profits. In terms of financial performance, the study considered three top most companies from which investors sold off stock. Upon analysis, the results depicted that investors sold stocks that earned abnormal returns.

Behavioural factors also affect investment decisions and performance as found by Kengatharan and Kengatharan (2014) among investors at the Colombo Stock Exchange, Sri Lanka. The statistical techniques used were factor analysis, descriptive statistics and multiple regression analysis. The results from factor analysis identified herding, market, prospect and heuristics as influencing investment decisions. Over confidence, loss aversion and regret aversion (prospect theory) moderately affected investor decision making. Anchoring highly impacted investor decisions while herding had a low impact. Behavioural factors were found to influence whereby overconfidence was found to have an adverse on investment performance which was significant. This may be attributed to the excessive trading and the associated transaction costs. Loss aversion and regret aversion had an insignificant influence while herding had a negative influence. This may

result from the buying of stocks which other people are buying without considering the fundamentals. Lastly, anchoring bias had direct relationship with performance which was also significant.

Obara (2015) tested the influence of overconfidence bias, anchoring bias and representativeness bias on returns of unit trusts in Kenya. A census was conducted among 56 unit trust funds. The results showed that there was a significant relationship between overconfidence and investment returns. This was also manifested in the relationship between representativeness bias and investment returns. The regression results showed that overconfidence bias, anchoring bias and representativeness bias significantly affected the returns of the unit trust funds.

An investigation was conducted by Vijaya (2016) on the behavioural patterns of Indian individual investors. A sample of 182 investors was used and a data collection period of three months was considered. The data was analyzed using SEM. The findings depicted that overconfidence had a positive impact on portfolio performance. This evidences that the higher the overconfidence bias the higher the returns. Emotional factors also positively impacted portfolio investment performance. However, herding and market factors had a negative impact on investment performance.

2.3.2 Behavioural biases, Demographics and Investment Strategy

The researcher observed that researches including investment strategy were scarcely done. This explains the few empirical studies reviewed. Barber and Odean (1999) tested the disposition effect and overconfidence bias in the U.S. The findings showed that the investors disposed winners and retained loss making stocks. In terms of overconfidence bias, men were found to be more overconfident than women which was evidenced in an investment strategy of excessive trading.

Don and Huberman (2005) conducted an investigation among Germany investors to establish the reasons behind their under diversified portfolios. A sample of 2420 investors was considered comprising of 2,300 active clients and 120 former clients. The results depicted that overconfidence did not influence portfolio choice. Investors with more wealth and experience diversified their portfolios. Diversification was found to be influenced by risk tolerance levels among the investors. Gender, age, education and level of wealth was found to influence trading intensity with male and young investors exhibiting high trading levels (investment strategy) as compared to female and older investors. However, overconfidence did not influence the trading intensity of the investors as it was affected by tolerance levels.

A study was conducted by Grinblatt and Keloharju (2009) among Finland investors to ascertain whether trading intensity was influenced by sensation seeking and overconfidence bias. The duration considered was 1995 and 2002. The findings showed that trading activity was affected by overconfidence bias and the relationship was

positive. Male investors were found to be more overconfident and traded excessively. However, high turnover was associated with sensation seeking. Age was found to have an inverse relationship with trading activity except for investors under 23 years.

2.3.3 Behavioural Biases, Investment Strategy and Portfolio Performance

An investigation was conducted by Barber and Odean (2000) on whether trading was harmful to an investor's wealth. The focus was on trading in common stocks of individuals in the U.S for the period 1991-1996. The households considered were 78,000. The findings depicted that average households were affected by overconfidence bias which was exhibited in excessive trading. As a result, the investors incurred high transaction costs which adversely affected their returns. Also the investors tilted their investments toward small and high-beta stocks. According to modern portfolio theory, high risky investments should also earn high returns, if not, then it affects portfolio performance. Due to the irrationalities evidenced among the investors, the portfolios underperformed the market benchmark.

Psychological factors may affect information processing which may influence investment experience and actual performance as depicted by Park et al. (2010). A field experiment was conducted among investors in South Korea to test for confirmation bias. 502 responses were received from investors and the results evidenced that that there was inefficient processing of information which led to poor decision making. Rationality demands that investors should process the available information and use it to make

optimal decisions. Investors also exhibited confirmation bias and those with higher confirmation bias had more overconfidence bias. Those investors with higher expectations about their performance, traded excessively, but reported poor performance.

2.3.4 Behavioural Biases, Demographics, Investment Strategy and Portfolio Performance

Barber and Odean (2001) investigated whether overconfidence bias differs between men and women and how it influences performance. A sample of 78,000 households was considered for the study and duration of six years was used. The findings evidenced that women held smaller portfolios as compared to men but the turnover for men was more than for women. The high turnover for men implies that they engaged in excessive trading. Both men and women purchased stocks that performed poorly as compared to the stocks they sold which evidenced irrational trading. Logically, with the existence of transaction costs, the stocks that are bought should perform better than the disposed stocks. It was also found that men held small-cap stocks with higher risk levels. The behaviour of men of trading excessively affected their performance negatively.

Biais, Hillon and Mazurier (2005) performed an experiment to test the effect of overconfidence and self-monitoring on performance. The participants were university students from Toulouse University and London Business School. The results depicted that participants with higher overconfidence levels had their performance negatively affected. The performance differed in terms of gender with female participants not

significantly affected while the performance for male participants reduced. However, overconfidence levels did not differ significantly between male and female participants. Self-monitoring participants invested strategically and earned higher profits.

An investigation on investment decision making among Chinese investors and how they are affected by biases was conducted by Chen et al. (2007). The biases studied were disposition effect, overconfidence, and representativeness bias in their investment decisions. A total of 46,969 accounts for individual investors and 212 institutional accounts were considered for the study. Individual investors were found to be affected more by the disposition effect than institutional investors. The individual investors who had exhibited lower disposition effect had better performance. In terms of age, middle aged investors were found to be poor investors. Overconfidence bias was also evidenced among the investors with the experienced investors having high turnover and higher returns. Age had no effect on overconfidence bias and performance. Investors were also found to be affected by representativeness bias as they relied on the most recent performance when trading securities. This implied that past winners were potential stocks for purchase with the assumption that the past trend would replicate itself in the future. Experienced investors were not affected by representativeness bias and also the middle aged investors.

A study carried out by Goetzmann and Kumar (2008) on equity portfolio diversification in the U.S. found that investors held concentrated portfolios. They exhibited over-

confidence bias, local bias and trend-following behavior. Demographics (age, income, occupation and trading frequency) were found to influence behaviour and portfolio performance. In evaluating the performance of the investor portfolios, the study compared the investor portfolio with the market portfolio that was formed under CAPM assumptions. The results showed that most of the investors underperformed the market portfolio. However, the use of CAPM implies that the assumption of market efficiency holds which may not apply in a market where investors are prone to biases.

An investigation to ascertain whether investment behavior differs between men and women was carried out by Feng and Seasholes (2008). The context of the study was China and the sample of the study constituted 51,218 individual investors for the duration January 1999 and December 2000. Home bias was evidenced among the investors with the local stocks being over weighted by 9.1% as compared to CAPM requirements. Investors were found to hold risky portfolio with men holding more risky and larger portfolios as compared to women. This may be attributed to the overconfident nature of men which makes them to be more risk tolerant. Both men and women held under diversified portfolios but the difference was not statistically different. The portfolio performance and trading levels were similar for the men and women.

Gambling has also been associated with the stock market where investors select their stocks without considering the fundamental principles of investment. Kumar (2009) examined gambling in the stock market using data for individual investors in the U.S.

The findings showed that investors prefer lottery-type stocks which have lower price, higher idiosyncratic volatility and had higher skewness. This was associated with overconfident investors who belief that they can outperform the market. Risk adjusted portfolio performance was lower for the lottery type stocks. In terms of demographics race, religion, political ideology, age, and gender influence portfolio choices.

Talpsepp (2013) studied whether the effect of overconfidence bias differs in terms of age and gender among investors at the Estonian stock market. A total of 20,758 accounts were considered for the duration between 2004 and 2008. The findings showed that men were affected more by disposition bias but it decreased with age. There was an inverse relationship between disposition bias and investor returns. This implies that an increase in the disposition effect reduced the investor returns. The portfolios for the female and more aged investors outperformed the portfolios for men investors. Lower portfolio returns for men investors was associated with excessive trading and short term stock holding which increased transaction costs.

Lee et al. (2013) examined the effect of gender behavioural differences on portfolio performance among university students in U.S.A. A simulated experiment was conducted on 10,000 subjects for a duration of one semester. There was evidence of mental accounting, anchoring bias, overconfidence effect, loss aversion and optimism bias. The results demonstrated that overconfidence had a negative influence on performance while optimism bias and overconfidence positively impacted performance. Gender differences

were manifested in anchoring and adjustment bias, mental accounting bias and loss aversion. Anchoring bias and loss aversion bias were more prevalent in females and mental accounting bias was more prevalent in males. The effect of the biases on performance differed in terms of gender. In terms of optimism bias, it impacted the returns of males positively while overconfidence bias negatively affected the female subjects. Differences were also evidenced in risk tolerance. It was found that male subjects were more risk tolerant.

2.4 Summary of Previous Studies and Research Gaps

The literature reviewed on the relationship between behavioural biases, demographics, investment strategy and portfolio performance does not give conclusive evidence. There are contradicting evidences especially on the relationship between behavioural biases and portfolio returns. There are studies which suggest a negative relationship between behavioural biases and portfolio returns (Brown & Kegel, 2009) which is reasonable due to the irrationalities associated with behavioural biases, while others support a positive relationship (Vijaya, 2016).

Conceptual gaps emanate from lack of consensus on how behavioural biases and portfolio returns are related and also on the moderating effect of demographics. In terms of moderation, there is contradicting evidence on the moderating effect of gender on the relationship between behavioural biases and portfolio performance. This study has included gender as one of the moderating variables so as to provide a position on the same. In terms of the contextual gap, studies on behavioural biases while incorporating

moderating and intervening variables are scarce in Kenya. This study has provided more evidence on the relationship between behavioural biases and portfolio performance by including moderating variables (education, experience, age and gender) and also intervening variable (investment strategy).

Methodological gaps are also evidenced in the researches reviewed. First, most of the studies conducted have used secondary data in their analysis of behavioural biases. The use of secondary data to identify biases may not adequately measure actual investor behaviour. This is because biases emanate from feelings and intuitions of individuals which may be appropriately measured through primary data. Secondly, some studies have used experiments to measure the level of biasness in the subjects. Such findings may not apply in the actual market place because experiments are carried out in a controlled environment.

Table 2.1 is a summary of previous studies on the research variables; behavioural biases, investment strategy, demographics and portfolio performance. Methodology used in the study, findings, research gaps and how the current study addresses these gaps have been shown.

Table 2.1: Summary of Research Gaps

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
Barber and Odean(2000)	Trading is Hazardous to your Wealth: the Common Stock Investment Performance of Individual Investors-USA	Measured portfolio performance using: -Jensen Alpha -Three-factor model -own benchmark return -subtracting returns on a market index from individual returns.	-The findings depicted that average households were affected by overconfidence bias -The portfolio performance of the households was below the market benchmark	-This study was carried out in a developed financial market and the results may not be applicable in developing financial markets.	The current study was carried out in a developing financial market.
Barberis and Huang (2001)	Mental Accounting, Loss Aversion and Individual Stock Returns.	Biases considered: mental accounting and loss aversion.	-Returns were found to have high mean and excess volatility.	-This study did not address the influence of demographics	This study considered the moderating effect of demographics on the relationship between behavioural biases and portfolio performance.
Rauf (2004)	Individual	Considered the	-Investors were affected	-This study did	The. current

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
	Investor Behaviour: Pre and Post Crisis Study on Bahrain	following biases: Representativeness bias, overconfidence bias, loss aversion, herd behaviour and regret emotion.	by representativeness bias, overconfidence bias and loss aversion before the financial crisis. - Investors were also affected by regret emotion and relied on advice from family and friends	not consider the influence of demographics on investor behaviour.	study incorporated demographics: age, gender, experience and education
Dorn and Huberman (2005)	Talk and Action: What Individual Investors Say and What They Do-Germany	Biases considered: local bias, overconfidence risk aversion and illusion of control	-Investors who were more risk tolerant held concentrated portfolios. -Investors who had more experience and were knowledgeable had better diversified portfolios.	-The study did not consider the influence of diversification on investor portfolio performance.	The current study incorporated the effect of diversification on portfolio performance.
Goetzmann and Kumar(2008)	Equity Portfolio Diversification-U.S.A	Compared investor portfolio with market portfolio	- The investors' portfolio underperformed the market portfolio.	-The study compared investor portfolios with market portfolio which was formulated based on CAPM model. This may not hold in an inefficient market.	The current study Sharpe index to evaluate the portfolio performance.
Chira et al. (2008)	Behavioral Bias Within The	Data was analyzed using	-Students were not affected by illusion of	-The use of students as the	The current study used

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
	Decision Making Process-U.S.A	Chi-square test.	control, overconfidence bias and familiarity heuristic. - Men were affected more by overconfidence bias.	study sample may not apply in the actual securities market place.	actual investors in the stock market.
Kumar (2009)	Who Gambles in the Stock Market?-U.S.A	Regression analysis	-Investors had strong preference for lottery type of stocks which had lower mean returns, higher volatility and lower price. They had aversion for stocks with non-lottery features.	-The study used secondary data which may not appropriately measure investor behaviour.	The current study used primary data.
Lutfi (2010)	The Relationship between Demographic Factors and Investment Decision in Surabaya-Indonesia.	Chi square test was used to analyze data.	-Marital status, income, gender, number of family, marital status and age affected investment decisions (bank products, capital market instruments and physical assets).	-This study did not consider whether there was any difference in investor returns based on their demographics.	The current study considered age, gender, experience and education as the moderating variables.
Seasholes, Tai and Yang (2011)	Individual Investors and Portfolio Choice-China.	Tested factors affecting portfolio choice: home bias, cultural affinity and location trade	-Investor portfolio choice is not determined by information but rather by home bias, cultural affinity and location trade.	-The study did not consider the effect of portfolio choice on portfolio performance.	The current study considered the effect of behavioural biases on portfolio selection and performance.

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
Nosic, Weber and Glaser (2011)	Opening the Black Box: From an Individual Bias to Portfolio Performance.	It used experimental design to study overreaction and overconfidence bias.	-Investors were affected by overconfidence bias.	-Experiments are carried out in a controlled environment and the findings may not be applicable in the market place.	The current study used primary data which may portray a true picture.
Fares and Khamis (2011)	Individual Investors' Stock Trading Behaviour at Amman Stock Exchange.	Multiple regression analysis was used.	-Trading behavior of the investors was affected by age, interaction between investor and broker, education and access to internet.	-This study did not link the investor trading behaviour with their portfolio performance.	The current study considered the effect of trading behaviour on portfolio performance.
Aduda, Oduor and Onwonga (2012	The Behavior and Financial Performance of Individual Investors in the Trading Shares-Kenya	-Determined abnormal return for the 3 topmost firms.	-The study identified factors that affect investors behaviour for example herd behaviour, management stability, availability of shares and regret aversion in their decision making.	-The study considered the performance of the three topmost companies which may not adequately represent all the stocks in the market.	The current study considered performance from all the stocks held by an individual investor.
Jain and Mandot (2012)	Impact of Demographic Factors on	Chi square and correlation analysis was	Investment decisions were affected by qualification, occupation, age, income	This study did not relate investment decisions with the	The current study determined the effect of

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
	Investment Decision of Investors in Rajasthan	used.	level, occupation, and marital status.	investor portfolio performance.	investment decisions while under the influence of behavioural biases on portfolio performance.
Islam (2012)	Behavioural Finance of an Inefficient Market-Dhaka Stock Exchange	Principal Component Analysis was used to identify the relevant factors which affect investor decision making.	Psychological factors were found to have more influence on investor decision making.	This study did not determine the effect of the investors decisions on their portfolio returns.	The current study considered how the investor decisions arising from the effect of biases influence portfolio performance.
Hussain, Shah, Latif, Bashir and Yasir (2013)	Hindsight bias and investment decisions making empirical evidence form an emerging financial market-Pakistan	Hindsight bias was studied.	-Hindsight bias affected the investors investment decisions	Only one bias was considered, hindsight bias.	The current study considered other four biases: representativeness bias, anchoring, availability bias and status quo bias.

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
Rekik and Boujelbene (2013)	Determinants of Individual Investors' Behaviors: Evidence from Tunisian Stock Market	Data was analyzed using the principle component analysis, factor analysis and Chi square test.	-Investors were affected by representativeness, herding attitude, loss aversion, mental accounting, and anchoring. -Experience, gender and age were found to influence decision making.	The study did not consider the effect of investor behaviour on investor returns	The current study considered the effect of behavioural biases on portfolio performance.
Han and Kumar (2013)	Speculative Retail Trading and Asset Prices	Excess returns were determined using Alpha.	-Speculative trading affected returns negatively. -stocks traded were overpriced. -The behaviour was prevalent in younger, lower education levels, lower income, and non professional investors. -Also men and unmarried investors were affected.	-This study did not associate the irrationality to investor biases.	The current study identified biases that are associated with the irrational behaviour.
Hassan et al.(2013)	Measuring Validity of Determinants of Individual Investor Decision Making	Variables considered affect heuristic, anger and fear.	Investors in Pakistan were affected by affect heuristic, anger and fear.	-This study considered the determinants of decision making but did not incorporate the effect of the	The current study considered the effect of behavioural biases on investor

Researcher(s)	Focus of Study and Context	Study Model/ Variables	Findings	Research Gaps	Addressing the gaps in the current Study
	Investing in Islamabad Stock Exchange of Pakistan			decision making on portfolio performance.	decision making and how this affects portfolio performance.
Obara (2015)	The Effect of Heuristic Biases on Investment Returns by Unit Trusts in Kenya	Biases considered: representativeness bias, overconfidence bias and anchoring bias	-Unit trust companies are affected by representativeness bias, overconfidence bias and anchoring bias. - The biases have an insignificant effect on returns.	-The study used unit trusts companies which are managed by professionals. -There is need to establish whether individual investors who may lack professional skills are affected by biases.	-The current study considered the effect of behavioural biases on individual investors
Vijaya (2016)	An Empirical Analysis on Behavioural Patterns of Indian Retail Equity Investors	SEM was used for data analysis	-Overconfidence and emotional factors positively affect investment performance. -Herding had a low positive influence on investment performance -Market factors had a negative effect on investment performance.	- The study period of three months makes the data to be affected by seasonal fluctuations.	- The current study used a longer period, one year.

Source: Author, 2016

2.5 The Conceptual Framework and Research Hypotheses

The study is based on the tenets of modern portfolio theory which advocates for the application of mean – variance principles in portfolio formulation. MPT supports the diversification of total risk so as to attain optimality. The purpose of this study is to ascertain whether with the inclusion of behavioural biases, modern portfolio theory holds. This section presents the conceptual framework and research hypothesis.

2.5.1 The Conceptual Framework

The dependent variable in this study is the portfolio performance of individual investors which is measured using Sharpe ratio. The choice of Sharpe ratio is based on the fact that it uses standard deviation as a measure of risk and therefore does not assume total diversification of risk. Other measures of portfolio performance (Treynor and Jensen) use beta as the measure of risk. Beta measures systematic risk and this means that they assume total diversification of the unsystematic risk. Behavioural biases represent the independent variable. The biases considered were availability bias, representativeness bias, anchoring bias and status quo bias.

The intervening variable is investment strategy which is measured using four variables: contrarian strategy and volatility of stocks (Kumar, 2009), excessive trading (Barber & Odean, 2000) and under diversification of portfolio (Goetzmann & Kumar, 2008). When investors are affected by behavioural biases, they apply various investment strategies which affect the portfolio performance. The relationship between behavioural biases and investment strategy is assumed to be moderated by demographic characteristics of the

investors. This is because when investors are affected by behavioural biases, the effect differs from one individual to another based on their characteristics and this has an influence on the investment strategy they apply. The variables considered were age, education, experience and gender. Age was measured using the number of years of the investors, experience was measured using the number of times an investor had traded in 2015, and gender was measured as one being either male or female, while education was measured using five criteria: certificate, diploma, graduate, post graduate and "any other".

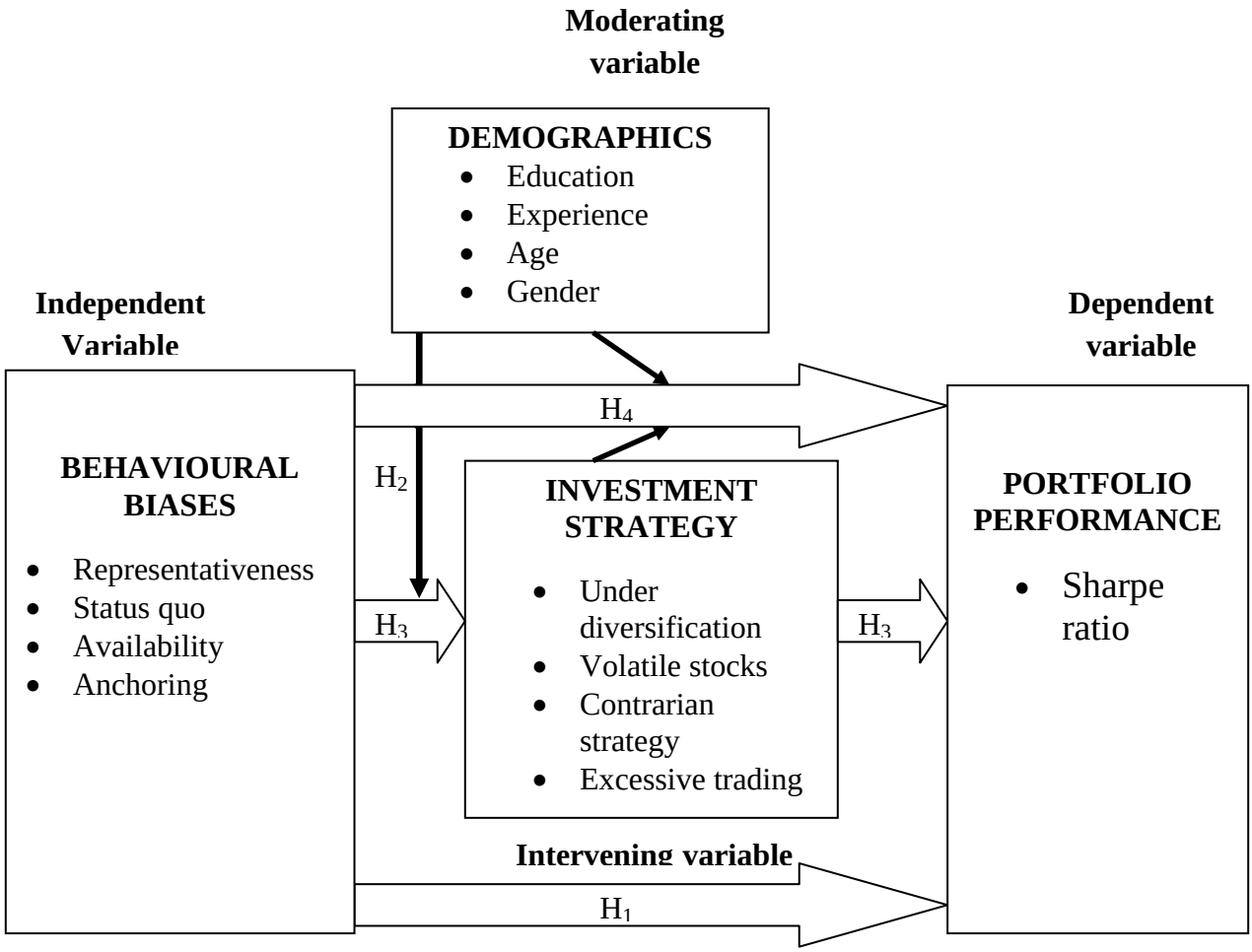

Figure 2.1: The Conceptual Model

Source: Author, 2016

2.5.2 Conceptual Hypotheses

This study sought to ascertain the relationship between behavioural biases and portfolio performance while considering the moderating effect of demographics on the relationship between behavioural biases and investment strategy. The mediating effect of investment strategy on the relationship between behavioural biases and portfolio performance was also considered. This was achieved by testing four hypotheses whereby the first hypothesis tests the relationship between behavioural biases and portfolio performance, the second hypothesis tests the moderating effect of demographics, the third hypothesis tests is on the intervening effect of investment strategy and the fourth hypothesis is on the joint effect of behavioural biases, demographics, and investment strategy on portfolio performance. The hypotheses are as stated below:

H_1: The relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange is not significant.

H_2: The moderating effect of demographics on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant. The sub hypotheses were:

H_{21}: The moderating effect of age on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant.

H_{22}: The moderating effect of education on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant.

H_{23}: The moderating effect of experience on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant.

H_{24}: The moderating effect of gender on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant.

H_3: The mediating effect of investment strategy on the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange is not significant.

H_4: The joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange is not significant.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the philosophy of the study, research design, population and sample of the study, data collection, model conceptualization, reliability and validity of the instrument, regression diagnostics, operationalization of the study variables and analysis of data.

3.2 Philosophy of the Study

Saunders, Lewis and Thornhill (2013) identify four philosophies which a study can adopt: realism, pragmatism, interpretivism, and positivism. Realism is based on the assumption that what the senses show as a reality is the truth and information is interpreted through social conditioning. Interpretivism advocates that a researcher should understand differences in individuals and groups because they interpret situations based upon their experience, expectations and memories. This may result in differing interpretations. Pragmatism allows a researcher to use any method which appears best suited to the research problem. Positivism entails working with an observable social reality and the end product can be law-like generalizations. The existing theory is used to develop hypothesis which is tested.

Positivists believe that an objective reality exists outside personal experiences with its own cause-and-effect relationship (Babbie & Mouton, 2008). According to Welman et al. (2009) positivism aims at deriving laws which can be generalized to populations. Also

positivism provides hypotheses which are empirically tested (De Vos et al., 2011).This study applied the positivism philosophy. This is because it ascertained the behavioral biases of investors in the stock market and how this affected their portfolio performance. This facilitated in the generalization of the relationship between behavioural biases, demographics, investment strategy and portfolio performance to the entire population.The study also had four hypotheses which were subjected to empirical examination.

3.3 Research Design

Babbie and Mouton (2008) define a research design as a plan according to which research is carried out. Saunders et *al*. (2013) recognized three types of research designs: exploratory, descriptive and explanatory (causal). Exploratory design is appropriate when a researcher wishes to have a more understanding of a problem so as to provide a foundation for future studies. Descriptive design enables a researcher to describe phenomenon through profiling. Explanatory design involves determining causal relationships between variables.

The study adopted a correlational descriptive survey design. Correlational analysis establishes the joint variation between two or more variables (Kothari & Garg, 2014). According to Saunders et *al*. (2013), a researcher may use descriptive design to outline the features of a scenario while a survey allows a researcher to collect data from a large population. This design was appropriate for this study because a survey enabled

collection of data from a large population while correlation analysis was used to ascertain the nature of the relationship between behavioural biases, demographics, investment strategy and portfolio performance. Descriptive design was used to profile the variables in the study.

3.4 Population of the Study

The study considered local individual equity investors at the NSE. There were a total of 1, 219,113 local individual investors as at December, 2015 (CMA, 2015).

3.5 Sample of the Study

The sample size was determined using Yamane's formula (Yamane, 1967):

$$\text{Sample size} = \frac{N}{1 + Ne^2}$$

Where, N is the total population, and e is the error margin.

$$\text{Sample size} = \frac{1,219,113}{1 + 1,219,113 * 0.05^2}$$

Sample size ≈ 400

Investors who formed part of the sample were selected from the brokerage firms which are registered at the Nairobi Securities Exchange. Convenient sampling was used as any client who visited the firms during the study period was requested to participate. In some cases, brokers contacted their clients and for those who agreed to participate, the researcher E-mailed the questionnaires to them which were returned upon filling.

3.6 Data Collection

The study used data from both primary sources and secondary sources. In collecting primary data, self-administered questionnaires were used and were personally administered to investors who trade at the NSE through the brokerage firms. This was necessary so as to address any queries from the investors as they filled the questionnaire. The questionnaire was adapted from literature and contained questions on the study variables: behavioural biases, investment strategy and demographics. The data collection period was June 2016 – December 2016.

The questionnaire was categorized into four parts. The first part contained the background information of the investors in relation to age, gender, education and experience. The second part comprised the behavioural biases: availability bias, representativeness bias, anchoring bias and status quo. The third part had the investment strategy and part four measured diversification of the investors

The secondary data comprised of share prices and NASI index which were obtained from NSE. Share prices were collected for the year 2015 only because there are questions which required the investors to recall. As such, it was not possible to consider many years as it could have been difficult for the investors to remember.

3.7 Operationalization of Study Variables

According to Saunders et al. (2013) operationalization enables facts to be measured quantitatively so as to enhance understanding. The study variables: behavioural biases,

demographics, investment strategy and portfolio performance were operationalized according to previous studies as shown below.

3.7.1 Operationalization of Behavioural Biases

The study considered four biases: representativeness bias, status quo bias, availability bias, and anchoring bias. The biases were operationalized as shown in Table 3.1. Status quo bias was operationalized according to Samuelsson and Zeckhauser (1988) where it relates to preference for the current state regardless of the changes in the market. Representativeness bias, anchoring bias and availability bias were operationalized according to Rekik and Boujelbene (2013) as shown in Table 3.1.

Table 3.1: Operationalization of Behavioural Biases

Indicator	Operational Definitions	Empirical studies adapted from	Scale	Questionnaire Reference
Status quo	Inability to change the composition of the portfolio, buying more of the stock already in the portfolio, demanding a higher price for an item than one can pay for it, and not comparing individual stock returns with other stocks in the market.	Samuelson and Zeckhauser (1988).	Interval	Q5
Representativeness	Considering the performance of a stock in the recent past before buying, buying stocks from a sector where a company or companies reflect good performance, rebalancing of portfolio based on past returns of stocks and extrapolating past returns	Rekik and Boujelbene (2013).	Interval	Q6
Anchoring	Considering the purchase price when selling a stock, not considering new information in the market making a decision to sell a stock and using past returns achieved on the market in the past, as the benchmark in estimating return on my future investment.		Interval	Q8
Availability bias	Buying stocks always in the news, experiencing high abnormal trading volume, stocks with extreme one day returns and stocks with large price moves in the past.		Interval	Q7

Source: Author, 2016.

3.7.2 Operationalization of Demographics

Demographics were made up of education, experience, age and gender. Education was operationalized according to Obamuyi (2013) where it was measured using the following categories: certificate level, diploma level, graduate level, post graduate and 'any other' to represent those investors who did not qualify to be in the above categories of education. Experience was measured using the number of transactions conducted by the investor. However, none of the studies reviewed had applied a similar indicator. Age was operationalized based on the number of years of the investor. Gender was measured as one being either male or female (Barber & Odean, 2000) as shown in Table 3.3 below.

Table 3.3: Operationalization of Demographics

Indicator	**Operational Definitions**	**Scale**	**Empirical studies adapted from**	**Questionnaire Reference**
Education	Certificate level, diploma level, graduate level, post graduate level and any other.	Interval	Obamuyi (2013)	Q3
Experience	Number of transactions	Ratio		Q4
Age	Age category	Interval	Chen et al. (2007)	Q2
Gender	Male or female	Nominal	Barber and Odean (2000)	Q1

Source: Author, 2016

3.7.3 Operationalization of Investment Strategy

Investment strategy comprised of contrarian strategy, buying high volatile stocks, excessive trading and under diversification. Contrarian strategy and volatility of stocks were operationalized according to Kumar (2009). Contrarian strategy related to

low priced stocks while volatility was measured using the standard deviation. Excessive trading was operationalized in accordance to Barber and Odean (2000) where it was attributed to over trading. Under diversification was operationalized according to Goetzmann and Kumar (2008) where normalized portfolio variance was used and the lower the value the more the diversification. This is depicted in Table 3.2 below.

Table 3.2: Operationalization of Investment Strategies

Indicator	**Operational Definitions**	**Scale**	**Empirical studies adapted from**	**Questionnaire Reference**
Contrarian strategy	Investors who prefer to buy low priced stocks	Interval	Kumar (2009)	Q9(a)
Excessive trading	Investors who enjoy investing and gambling	Interval	Barber and Odean (2001)	Q9(b, c, d, e)
Under diversification	Level of diversification	Ratio	Goetzmann and Kumar (2008)	Secondary data
Volatile stocks	Standard deviation	Ratio	Kumar (2009)	Secondary data

Source: Author, 2016

3.7.4 Operationalization of Portfolio Performance

To measure the portfolio performance, Sharpe ratio was used. This is because Sharpe ratio does not assume total diversification of risk. The same has been applied in other studies for example Lee et al. (2013). To determine the sharpe ratio, portfolio returns were obtained by aggregating the holding period returns of the stocks held by an investor. The Treasury bill rate was used as the risk free rate. The difference between the portfolio returns and risk free rate was ascertained and the difference divided by the standard deviation of the portfolio returns to obtain the Sharpe ratio.

Table 3.4: Operationalization of Portfolio Performance

Indicator	Operational Definitions	Scale	Empirical studies adapted from	Questionnaire Reference
Sharpe ratio	Portfolio performance measure	Ratio	Lee et al. (2013)	Secondary data

Source: Author, 2016

3.8 Reliability and Validity of the Instrument

Reliability of the instrument indicates the extent to which the instrument is free from bias and hence ensures consistent measurement across time and across the various items in the instrument (Sekaran, 2005). Reliability ensures replicability of the results. Kirk and Miller (1986) recognize three types of reliability: the extent to which a measurement remains the same even when it is given repeatedly, how stable a measurement is overtime and similarity of measurements within a given duration. To increase reliability the researcher used multiple measures or indicators for the variables, questions that were not clear were eliminated, easy questions were used and instructions were standardized. To test the reliability, cronbach's alpha was computed for the questions on the Likert scale and a value of at least 0.70 was considered adequate (Nosic, Weber & Glaser, 2011).

Validity is concerned with whether the research findings are really about what they appear to be about (Saunders et al., 2013). To ensure validity, the questionnaire was thoroughly reviewed by the researcher and also research experts from the University of Nairobi, School of Business. To test the suitability of the questionnaire, a pilot study was conducted among 20 respondents and the responses from the respondents were used to make adjustments necessary in the questionnaire.

3.9 Regression Diagnostics.

Regression analysis relies on assumptions which if not met can result in Type I or type II error, or over-or underestimation of the effect (Osborn, Jason & Waters, 2002). The assumptions which were relevant for this study were linearity, lack of multicollinearity, and lack of heteroscedasticity. Homoscedasticity implies that the variance of errors is the same across all levels of the independent variables. To test this assumption, Breush-Pagan and Koenker tests were used. Breush-Pagan test is sensitive to deviations from normality or sample sizes which are small unlike the Koenker test.

Thompson (2006) defines multicollinearity as the extent to which the predictor variables have non-zero correlations with each other. Multicollinearity may cause uncertainty about the effect of a particular predictor variable on the response variable. In this study, multicollinearity between the behavioural biases (representativeness bias, status quo bias, availability bias and anchoring bias) demographics, and investment strategy was determined using the variance inflation factor (VIF). A VIF value of more than 10 is an indication of multicollinearity (Saunders et al., 2013). Linearity refers to the degree to which the change in the dependent variable is related to the change in the predictor variables (Saunders *et al.,* 2013). Linearity was established using the scatter graph.

3.10 Data Analysis

The data was edited by checking its completeness and accuracy. It was then coded and tabulated. Descriptive statistics was used to describe and compare variables numerically. According to Kothari and Garg (2014) descriptive statistics comprise of

measures of central tendency, measures of dispersion, measures of asymmetry and measures of relationship. Measures of central tendency were used in determining the arithmetic mean of the variables on the Likert scale and also for the other variables. The standard deviation was used to measure the level of dispersion in the distributions. To measure the degree of asymmetry, skewness and kurtosis were used. Skewness measures the symmetry in the distribution. If a distribution has a long tail to the right, it is considered to be positively skewed. A long tail to the left depicts a negatively skewed distribution. If the data is equally distributed on either side, then it is considered to be symmetrically distributed. Kurtosis measures the pointedness or flatness of data compared with the normal distribution. If data is more peaked, the kurtosis value is positive and it is considered to be leptokurtic. If the distribution is flatter, the kurtosis value is negative and it is considered to be platykurtic. A distribution that is in between the extremes has a kurtosis of zero and is considered to be mesorkutic (Saunders et al., 2013).

To assess the strength of relationship between two variables, Pearson's Product Moment Correlation was used. The coefficient has values from -1 to +1. A value of +1 depicts a perfect positive correlation; a value of -1 shows a negative correlation. A value of zero implies that the variables are independent (Saunders et al., 2013). Correlation analysis was used to measure the strength of the relationship between behavioural biases and portfolio performance, behavioural biases and investment strategy and investment strategy and portfolio performance. This aided in establishing whether there was a strong and significant relationship between behavioural biases and portfolio performance, behavioural biases and investment strategy and investment strategy and portfolio performance.

Regression analysis was used to determine the mathematical relationship between or among variables (Kothari & Garg, 2014). The predictive ability of the model was measured using the F-test. The adjusted coefficient of determination (R^2) was used to measure the degree of change of the dependent variable which was attributed to the change of the independent variable so as to establish the goodness of the fitted model. The t-test was used to ascertain the significance of the individual parameters.

3.10.1Data Analysis Techniques

To calculate the daily returns on an individual portfolio, holding period returns were used (Lee et al., 2013) as follows in equation 3.1:

$$HPR_{i,n} = \sum \frac{P_t - P_0 + D}{P_0} \quad \text{..... (3.1)}$$

Where:

$HPR_{i,n}$ is the holding period return for each investor for each stock held.

P_t is the ending daily price, P_0 is the opening daily price, and D is the dividends paid.

Portfolio returns were obtained by aggregating the individual stock returns held by the investors. To measure the extent to which an individual portfolio is diversified, the level of unsystematic risk was measured using the normalized portfolio variance (NV) as shown in equation 3.2. According to Goetzmann and Kumar (2008) increase in diversification results in reduced normalized portfolio variance.

$$NV = \sigma^2_p / \tilde{\sigma}^2 \quad \text{..... (3.2)}$$

Where:

NV is the normalized variance

σ^2_p is the portfolio variance

$\tilde{\sigma}^2$ is the average variance of stocks in the portfolio

Stock returns fluctuate overtime and to measure the level of volatility, standard deviation was used (Chandra, 2008) as shown in equation 3.3

$$\sigma = \sqrt{\left[\frac{\sum_{i=1}^{n}(R_i-\bar{R})^2}{n-1}\right]} \quad \text{..... (3.3)}$$

Where:

σ is standard deviation of the individual returns

R_i is the Holding Period Return from an individual portfolio.

$\bar{R}$ is the individual portfolio arithmetic mean of holding period return

n is the sample size

In measuring portfolio performance, the Sharpe ratio was used as shown in equation 3.4

$$S = \frac{R_p - R_f}{\sigma} \quad \text{.....(3.4)}$$

Where:

S is Sharpe Index

R_p is the portfolio returns

R_f is the risk free rate

σ is the portfolio standard deviation

3.10.2 Relationship between Behavioural Biases and Portfolio Performance

The following model was used to test the hypothesis that there was no significant relationship between behavioural biases and portfolio returns was as follows:

$P = \beta_0 + \beta_1 B + \varepsilon_i$……..... (3.5)

Where:

P is the portfolio performance

β_0 is the regression, β_1 is the regression coefficient, B is the mean of the composite scores for individual biases, and ε_i is a random error term that accounts for the unexplained variations.

3.10.3 Relationship between Behavioural Biases, Demographics and Investment Strategy

Baron and Kenny (1986) define a moderator as a qualitative variable that affects the direction and/or strength of the relation between a predictor variable and an independent variable. In this study, the demographics considered were gender, age, experience and education. When behavioural biases affect investors, the effect tends to differ from one individual to another based on their demographics (moderating variable). As such, this affects the type of investment strategy they apply in their stock selection. A model proposed by Fairchild and Mackinnon (2009) was used to ascertain the moderating effect of demographics on the relationship between behavioural biases and investment strategy. Investment strategy is the dependent variable and therefore a composite score was obtained by determining the mean of the individual components score. The model is as follows:

$IS = \beta_0 + \beta_1 B + \beta_2 D + \beta_3 BD + \varepsilon_i$……..... (3.6)

Where IS is the composite score for investment strategy, β_0 and β_1 is as defined in 3.5

β_2 is the regression coefficient for the moderator, β_3 is the regression coefficient for the moderation effect. If β_3 is statistically different from zero, the moderation effect of

the B - IS relationship is significant. The moderation effect of each of the demographic variables (age, education, experience and gender) was tested separately.

3.10.4 Relationship between Behavioural Biases, Investment Strategy and Portfolio Performance

This section evaluates the mediating effect of investment strategy on the relationship between behavioural biases and portfolio performance. A mediating variable explains how two variables are related. The process is that the predictor variable causes a mediation variable which then influences the dependent variable (Mackinon, 2011). In this study, when behavioural biases affect investors, this causes them to apply different investment strategies in decision making. The type of investment strategy selected influences the portfolio returns. To ascertain the mediating effect, the following regression model which was suggested by Baron and Kenny (1986) was used. Each of the investment strategies was tested separately so as ascertain the intervening effect of the individual strategy. The model was used to test hypothesis three and it has four steps as follows:

Step 1: $P = \beta_0 + \beta_1 B + \varepsilon_i$ ……..(3.7)

Step 2: $IS = \beta_0 + \beta_2 B + \varepsilon_i$..... (3.8)

Step 3: $P = \beta_0 + \beta_3 IS + \varepsilon_i$..... (3.9)

Step 4: $P = \beta_0 + \beta_4 B + \beta_5 IS + \varepsilon_i$..... (3.10)

Where P is the portfolio performance (dependent variable), B is behavioural biases (independent variable), IS is the investment strategy (intervening variable), ε_i is error term, β_0 is the regression constant, and β_1, β_2, β_3, β_4, and β_5 are regression coefficients.

In the first step, regression analysis was done to ascertain the relationship between behavioural biases and portfolio returns. In the second step, investment strategy (dependent variable) and behavioural biases were considered in the regression model. This aids to ascertain whether the predictor variable is a significant predictor of the mediator. If the mediator is not associated with the predictor variable then it cannot intervene anything. In the third step, investment strategy was regressed against portfolio performance to ascertain whether there was a significant relationship. In the fourth step, a regression was conducted to establish the relationship between behavioural biases, investment strategy and portfolio performance.

Mediation is exhibited when a significant relationship exists between portfolio performance and behavioural biases ($\beta_1 < 0.05$); investment strategy and behavioural biases ($\beta_2 < 0.05$); portfolio performance and investment strategy significant ($\beta_3 < 0.05$); and behavioural biases, investment strategy and portfolio performance (β_4 and $\beta_5 < 0.05$). Mediation effect also exists when the slope for behavioural biases in step 4 is lower than that of step 1.

3.10.5 Behavioural Biases, Demographics, Investment Strategy and Portfolio Performance

To determine the relationship among behavioural biases, demographics, Investment behaviour and portfolio performance, multiple regression analysis was used. The model was as follows:

$$P = \beta_0 + \beta_1 B + \beta_2 A + \beta_3 G + \beta_4 ED + \beta_5 EX + \beta_6 S1 + \beta_7 S2 + \beta_8 S3 + \beta_9 S4 + \varepsilon_i \quad \text{.... (3.11)}$$

Where:

β_0 is the regression constant, β_1-β_8 are the regression coefficients, P, B, ε_i is as defined in 3.5, A is the number of years of an investor, G is gender of the investor, ED is education level of the investor, EX is experience level of the investor, S1 is under diversification strategy, S2 is volatile stocks, S3 is contrarian strategy, and S4 is excessive trading.

CHAPTER FOUR: DESCRIPTIVE DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents reliability and validity tests, response rate, and descriptive statistics for behavioural biases, demographics and investment strategy. It also covers the regression diagnostics, analysis of variance and correlation analysis.

4.2 Test of Reliability and Validity

To improve validity, the questionnaire underwent a thorough review to ascertain its suitability. This resulted in adding more indicators and eliminating those which were considered unsuitable. A pilot test was then conducted among 20 equity investors as used by Sharma (2016).The feedback received necessitated a review of the questions. As such, questions which were considered to be too sensitive by the investors were eliminated for example a question which required investors to indicate the number of shares they held.

Reliability test which measures the consistency of a research instrument was done using Cronbach's alpha for all the questions on the likert scale. An instrument is considered to be reliable when the alpha coefficient is at least 0.70 (Nosic, Weber, & Glaser, 2011). Table 4.1 shows the reliability test results for behavioural biases and investment strategy. The results depict high reliability as the Cronbach alpha coefficients were more than 0.70. The alpha coefficient for behavioural biases was 0.714 and for investment strategy was 0.73.

Table 4.1: Reliability Analysis

Variable	Number of measures	Cronbach's Alpha(α)
Behavioural biases	25	0.714
Investment strategy	5	0.730

Source: Author, 2016

Table 4.2 shows the reliability results for the individual items comprising the behavioural biases: status quo bias, representativeness bias, availability bias and anchoring bias. The values are appropriate as they are above the benchmark of 0.70.

Table 4.2: Reliability Analysis for Individual Investors

Variable	Number of measures	Cronbach's Alpha(α)
Status quo bias	6	0.797
Representativeness bias	8	0.729
Availability bias	7	0.804
Anchoring bias	4	0.768

Source: Author, 2016

4.3 Response Rate of the Study

The study targeted a sample of 400 equity investors at the NSE for the year 2015. A total of 400 questionnaires were personally administered to the investors but in some cases agents at the securities firms were used. Some questionnaires were incomplete and were therefore discarded. Only 279 questionnaires were received with no errors. This constituted a proportion of 69.7% of the targeted sample. A similar proportion of 69.7% was used in previous studies for example Babajide and Adetiloye (2012). Also

Fares and Khamis (2011) had a response rate of 66.67% while investigating investors trading behaviour at Amman Stock Exchange.

4.4 Descriptive Statistics

Descriptive statistics comprise of measures of central tendency, measures of dispersion, measures of asymmetry and measures of relationship (Kothari & Garg, 2014). This section presents the arithmetic mean, standard deviation, and measures of asymmetry (skewness and kurtosis) of the study variables.

4.4.1 Demographics of the Investors

The demographics of the respondents are presented in Table 4.3 (gender), Table 4.4 (age), Table 4.5 (education) and Table 4.6 (experience). Table 4.3 below shows that the male respondents were more than the female respondents at a percentage of 54.1% and 45.9% respectively.

Table 4.3: Gender Profile of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FEMALE	128	45.9	45.9	45.9
	MALE	151	54.1	54.1	100.0
	Total	279	100.0	100.0	

Source: Author, 2016

The age demographic was divided into five categories as shown in Table 4.4 below. The classification was adopted from Obamuyi (2013). A majority of the respondents were in the 26-35 age bracket with a percentage of 35.5%, followed by 36-45 years, 18-25 years, 46-55 years and lastly more than 55 years at 27.6%, 16.8%, 13.3% and 6.8% respectively.

Table 4.4: Age Profile of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25 years	47	16.8	16.8	16.8
	26-35 years	99	35.5	35.5	52.3
	36-45 years	77	27.6	27.6	79.9
	46-55 years	37	13.3	13.3	93.2
	more than 55 years	19	6.8	6.8	100.0
	Total	279	100.0	100.0	

Source: Author, 2016

The respondents were asked to indicate their academic qualification; Certificate, diploma, graduate, post graduate and "any other" which represented the respondents that did not qualify to be in the preceding classes. A large percentage of the respondents were graduates at 50.5%. Diploma holders constituted 18.3% of the respondents while certificate holders and post graduates had 9% and 18.3% respectively as shown in Table 4.5 below.

Table 4.5: Education Profile of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CERTIFICATE	25	9.0	9.0	9.0
	DIPLOMA	51	18.3	18.3	27.2
	GRADUATE	141	50.5	50.5	77.8
	POST GRADUATE	51	18.3	18.3	96.1
	ANY OTHER	11	3.9	3.9	100.0
	Total	279	100.0	100.0	

Source: Author, 2016

In terms of experience, the respondents were asked to indicate how many times they had traded in the year of the study (2015). The results shown in Table 4.6 below depict that majority of the respondents had traded 5 times or less (50.9%) with 39 respondents having not traded at all. The frequencies show that 16.5% had traded 6-10 times, 4.3% had traded 11-15 times and 16-20 times. Those who had traded more than 20 times comprised of 24% of the respondents.

Table 4.6: Experience Profile of the Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5 OR LESS	142	50.9	50.9	50.9
	6-10	46	16.5	16.5	67.4
	11-15	12	4.3	4.3	71.7
	16-20	12	4.3	4.3	76.0
	M0RE THAN 20	67	24.0	24.0	100.0
	Total	279	100.0	100.0	

Source: Author, 2016

4.4.2 Behavioural biases

The study considered four biases which were status quo, representativeness bias, availability bias and anchoring bias. To test status quo bias, the respondents were asked six questions where they were to rate themselves on a 5 item Likert-type scale ranging from “strongly disagree” to “strongly agree”. The descriptive statistics are presented in Table 4.7 below. The average score was considered as the proxy for each factor. Similar interpretation was applied in Alrabadi and Al-Gharaibeh (2011) and also Dorn and Huberman (2005). The mean for all the questions was more than 2.5 indicating that the respondents were affected by status quo. The distribution was positively skewed and flatter as the kurtosis value is negative, thus platykurtic.

Table 4.7: Status Quo Bias

Item	N	Mean	SD	SK	K
I have not changed the composition of my portfolio in the last one year.	279	2.98	1.326	0.182	-1.045
If I were to buy a stock, I will buy more of the stock I already own	279	2.98	1.34	0.212	-1.033
I will demand a higher price to sell an item I own than I am prepared to pay for the same object.	279	2.92	1.36	0.249	-1.070
I do not compare returns of my stock with other stocks in the market.	279	2.88	1.38	0.291	-1.068
I associate purchase of new stocks with increase in level of risk	279	2.70	1.27	0.482	-0.729
A decision to buy a new stock is time consuming and costly.	279	2.88	1.34	0.225	-1.022

N is the number of observations, SD is the standard deviation, SK is skewness and K is kurtosis

Source: Author, 2016

To measure representativeness bias, the respondents were asked 8 questions whose results are shown in Table 4.8 below. The overall mean for 8 items is more than 2.5 implying that the investors were affected by representativeness bias. Three of the items had negative skewness (I consider the performance of a stock in the recent past before buying, I buy stocks from a sector where a company or companies reflect good performance and I invest in companies with perceived competent management) depicting that the distribution was more to the left. Five of the items were positively skewed indicating that the distribution has a long tail to the right. The distribution was flatter than normal distribution as the kurtosis value was negative.

Table 4.8: Representativeness Bias

Item	N	MEAN	SD	SK	K
I consider the performance of a stock in the recent past before buying	279	3.82	1.35	-.554	-1.425
I buy stocks from a sector where a company or companies reflect good performance	279	3.84	1.38	-.571	-1.423

I rebalance my portfolio based on past returns of stocks. If my stock performs poorly in a week, it will do better the following week	279	3.04	1.31	.328	-1.339
If my stock/s performs excellently in a week, it will also perform well the following week.	279	2.83	1.21	.534	-.918
I invest in popular companies	279	3.29	1.36	.049	-1.570
I invest in companies with perceived competent management	279	3.67	1.33	-.344	-1.565
I put off an investment decision expecting new and favourable (positive) information release regarding a stock	279	3.23	1.34	.191	-1.592
After I manage to realize a profit on my stock portfolio, I increase the sum of my stock market holdings.	279	3.25	1.35	.074	-1.512

Source: Author, 2016

To test for availability bias, the respondents were asked 7 questions whose results are presented in Table 4.9. The mean for each of the indicators was more than 2.5 depicting that the investors were affected by availability bias. Four of the items had negative skewness indicating that the distribution had a long tail to the left while three of the items had positive skewness. The value for kurtosis was negative for all the questions. This indicates that the distribution was flatter and therefore platykurtic.

Table 4.9: Availability Bias

Item	N	MEAN	SD	SK	K
I prefer to buy stocks on the days when the value of NSE Index increases	279	3.33	1.24	-.264	-1.032
I buy stocks:					
Always in the news,	279	3.04	1.25	.095	-1.227

Experiencing high abnormal trading volume,	279	3.13	1.21	.002	-1.180
Stocks with extreme one day returns	279	2.90	1.26	.317	-1.117
Stocks with large price moves in the past	279	3.41	1.21	-.290	-1.189
where aggressive advertisement campaigns are done	279	3.18	1.26	-.004	-1.293
I buy stocks of companies with names I can easily recall.	279	3.20	1.32	-.148	-1.294

Source: Author, 2016

To test for anchoring bias, the respondents were asked four questions whose results are shown in Table 4.10 below. The mean was 3.18 indicating that investors were affected by anchoring bias. The kurtosis value was negative depicting less peaked distribution. The skewness was negative for item 1 and 4 and positive for item 2 and 3.

Table 4.10: Anchoring bias

Item	N	MEAN	SD	SK	K
I consider the purchase price when selling a stock	279	3.61	1.48	-.574	-1.203
I do not consider prevailing inflation rates when making a decision to sell a stock.	279	2.97	1.43	.260	-1.404
I do not consider the time value of money when making a decision to sell a stock.	279	2.84	1.41	.373	-1.279
I use past returns achieved on the market, as the benchmark in estimating return on my future investment.	279	3.30	1.43	-.253	-1.371

Source: Author, 2016

4.4.3 Investment Strategy

Investors engage in various strategies in their investment decisions which include buying high volatile stocks, apply contrarian strategy, excessive trading and under

diversifying their portfolios. To measure investment strategy primary data and secondary data was used. In measuring contrarian strategy and excessive trading, the respondents were asked 5 questions whose results are presented in Table 4.11. The findings show that majority of the investors prefer contrarian strategy as the mean is 3.22 with a standard deviation of 1.24, skewness of 0.017 and kurtosis of -1.26. This implies that the distribution is slightly positively skewed and less peaked.

Questions 2 to 5 were measuring excessive trading among the investors. These questions were derived from Dorn and Sengmueller (2009) where it was argued that investors who trade as a form of entertainment tend to trade excessively. The average mean was 3.14 implying that the investors were prone to excessive trading. To measure the degree of diversification, normalized portfolio variance was used as suggested in Goetzmann and Kumar (2008). The normalized portfolio variance is determined by dividing the portfolio variance by the average variance of the stocks in the portfolio. Volatility of stocks was measured using standard deviation.

Increased diversification is expected to reduce the normalized portfolio variance. The mean for stocks held by the investors was 5 while the mode was 3. The mean for normalized portfolio variance was 1.147 which evidences diversification as the normal variance reduces when diversification is increased. The normalized variance exhibited positive skewness (4.276) and leptokurtic (23.53). In terms of volatility, the mean is 1.03 implying that majority of the respondents hold less volatile stocks. The distribution is positively skewed (11.3) and highly peaked (143.19).

Table 4.11: Investment Strategy

Item	N	MEAN	SD	SK	K
I prefer buying low priced stocks	279	3.22	1.24	.017	-1.26
I enjoy investing	279	3.62	1.32	-.487	-1.21
I enjoy risky propositions	279	2.92	1.14	.360	-.93
Games are only fun when money is involved	279	2.87	1.21	.429	-.980
In gambling, the fascination increases with the size of the bet.	279	3.14	1.26	.078	-1.24
Under diversification-normalized variance	279	1.15	0.47	4.276	23.534
Volatility	279	1.03	0.29	11.3	143.19

Source: Author, 2016

4.4.4 Portfolio Performance

Portfolio performance was measured using the Sharpe ratio as it does not assume full diversification of risk. Daily portfolio returns were obtained for all the 279 investors which were compared with a risk free rate (Treasury bill rate) to determine the excess returns which were then divided by standard deviation to obtain the Sharpe ratio. The mean return was 3.64 with a standard deviation of 11.75. This implies that the investor returns exhibited high level of variability. The distribution was positively skewed (1.974) and more peaked with a kurtosis value of 4.360 as shown in Table 4.12. This implies that more investors earned below average returns and few investors experienced high returns.

Table 4.12: Descriptive Statistics for Portfolio Performance

PORTFOLIO PERFORMANCE	N	Min.	Max.	Mean	Std. Deviation	Skewness	Kurtosis
	Stat.	Stat.	Stat.	Stat.	Stat.	Stat.	Stat.
	279	-22.09	56.64	3.64	11.75	1.974	4.360

Where Min. is minimum, Max. is maximum, Std. is standard and stat. is statistic

Source: Author, 2016

4.5 Regression Diagnostics

The assumptions that were relevant for this study were linearity, multicollinearity, and homoscedasticity. To test for linearity between the variables, a scatter graph was plotted. Figure 4.1 shows that the relationship is approximately linear.

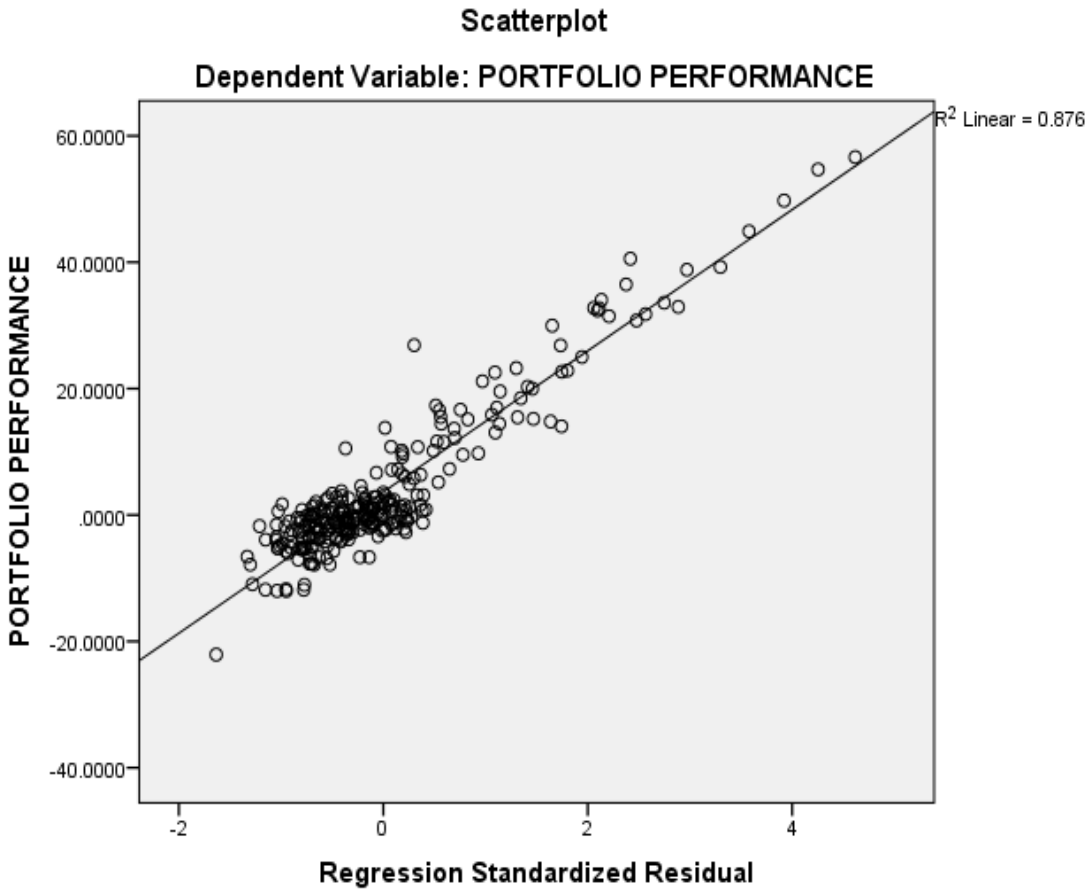

Figure 2.1: Scatter Graph

Source: Author, 2016

Regression analysis is based on the assumption of lack of multicollinearity between the independent variables (Saunders et al., 2013). To test for multicollinearity, the variance inflation factor (VIF). VIF is the inverse of the tolerance value. O'Brien (2007) suggests a rule of 10 for the VIF value. The results are shown in Table 4.13.

There was high multicollinearity between under diversification and excessive trading and were therefore eliminated from the multiple regression.

Table 4.13: Test for Multicollinearity

Variable	Variance inflation factor
Behavioural Biases	1.083
Age	1.045
Gender	1.063
Experience	1.028
Education	1.026
Under diversification	45.111
Contrarian strategy	1.166
Excessive trading	44.283
Volatile stocks	1.469

Homoscedasticity is also one of the assumptions which measure the extent to which the data values have equal variances (Saunders et al., 2013). The Breush – Pagan Koenker test was used to test the following hypothesis:

H_0: There is no heteroscedasticity in the data.

H_1: There is heteroscedasticity in the data.

The SPSS output was as follows:

```
Run MATRIX procedure:

 BP&K TESTS

 ==========

Regression SS
  80.0890

Residual SS
 1703.687

Total SS
 1783.776

R-squared
    .0449

Sample size (N)
  279

Number of predictors (P)
    9

Breusch-Pagan test for Heteroscedasticity (CHI-SQUARE df=P)
   40.044

Significance level of Chi-square df=P (H0: homoscedasticity)
    .0000

Koenker test for Heteroscedasticity (CHI-SQUARE df=P)
   12.527

Significance level of Chi-square df=P (H0: homoscedasticity)
    .1852
```

The Koenker test results are applied because the data is approximately normal. Breusch – Pagan test is highly sensitive to deviation from normality. The p-value from the Koenker test is 0.1292 which is above the significance level of 5%. This implies that the null hypothesis is not rejected which implies homogeneity of variance.

4.6 Correlation Analysis

Correlation measures the linear relationship between two variables. Variables can have a negative correlation when they change in different directions or positive correlation when they change in the same direction.

4.6.1 Correlation between Behavioural Biases and Portfolio Performance

Table 4.14 shows that the relationship between the individual biases and portfolio performance was positive and significant (p-value < 0.05).

Table 4.14: Correlation between Behavioural Biases and Portfolio Performance

	Portfolio performance	Status quo	Rep. bias	Availability bias	Anchoring bias
Portfolio performance	1	0.213 (p=0.000)	0.136 (p=0.023)	0.126 (p=0.035)	0.133 p=(0.027)
Status quo		1	0.015 (p=0.806)	0.048 (0.421)	0.003 (p=0.961)
Representativeness bias			1	0.133 (p=0.026)	0.062 (p=0.303)
Availability bias				1	-0.066 (p=0.274)
Anchoring bias					1

Where Rep. is the representativeness bias

Source: Author, 2016

4.6.2 Correlation between Behavioural Biases and Investment Strategy

The relationship between behavioural biases and investment strategy (excessive trading, contrarian style, volatile stocks and under diversification) was obtained as shown in Table 4.15. A composite score was obtained for the behavioural biases by obtaining an average of the individual biases' scores. A positive and significant correlation was obtained between behavioural biases and contrarian strategy ($r=0.121$, $p<0.05$). Similar results were obtained for the relationship between behavioural biases and excessive trading ($r=0.159$, $p<0.05$). An insignificant relationship was obtained between behavioural biases and under diversification. The same relationship was replicated for the relationship between behavioural biases and volatile stocks. This implies that contrarian style and excessive trading are appropriate mediators because if a mediator is not associated with the independent variable, then it cannot mediate anything (Baron & Kenny, 1986).

Table 4.15: Correlation between Behavioural Biases and Investment Strategy

	Behavioural biases	S1	S2	S3	S4
Behavioural biases	1	-0.043 (P=0.475)	-0.047 (p=0.433)	0.121 (p=0.043)	0.159 (p=0.008)
S1		1	0.556 (p=0.000)	0.115 (p=0.055)	0.099 (p=0.099)
S2			1	0.016 (p=0.788)	0.050 (p=404)
S3				1	0.349 (p=0.000)
S4					1

Where S1 is under diversification, S2 is volatile stocks, S3 is contrarian strategy and S4 is excessive trading

Source: Author, 2016

4.6.3 Correlation between Investment Strategy and Portfolio performance

The relationship between investment strategy and portfolio performance was ascertained as shown in Table 4.16. An insignificant relationship was established between under diversification (S1), volatile stocks (S2) and excessive trading (S4) and portfolio performance. However, a significant relationship was obtained between contrarian strategy (S3) and portfolio performance (r=0.149, p=0.013).

Table 4.16: Correlation between Investment Strategy and Portfolio Performance

	Portfolio performance	S1	S2	S3	S4
Portfolio performance	1	0.19 (p=0.746)	-0.006 (p=0.918)	0.149 (p=0.013)	0.060 (p=0.316)
S1		1	0.556 (p=0.000)	0.115 (p=0.055)	0.099 (p=0.099)
S2			1	0.016 (p=0.788)	0.050 (p=0.404)
S3				1	0.349 (p=0.000)
S4					1

Where S1 is under diversification, S2 is volatile stocks, S3 is contrarian strategy and S4 is excessive trading

Source: Author, 2016

4.7 Summary of the Chapter

A pilot study was carried among 20 investors to check the validity of the research instrument before the data collection was carried out. Reliability analysis was also carried out using the cronbach alpha. When all the questions measuring behavioural biases (25 items) were tested, the cronbach alpha of 0.714 which is above the

benchmark of 0.70 was obtained. Investment strategies also had a value of 0.730. When the individual biases were considered, the cronbach alpha was 0.797, 0.729, 0.804 and 0.768 for status quo, representativeness bias, availability bias and anchoring bias respectively.

The study targeted 400 investors at the Nairobi Securities exchange for the year 2015. A total of 279 were received error free from the 400 questionnaires administered. This comprised a proportion of 69.7% of the targeted sample. In terms of gender, male respondents were more than the female respondents with a proportion of 54.1% and 45.9% respectively. The age demographic was dominated by respondents in the 26-35 years age bracket while the least age group was those respondents with more than 55 years. A large percentage (96.1%) of the respondents were educated with either a certificate, diploma, graduate or post graduate. A majority of the educated respondents were graduates at a percentage of 50.5%. The experience profile indicated that majority of the respondents had less experience as the largest proportion (50.9%) had traded 5 times or less.

The findings depict that majority of the respondents were affected by status quo bias, representativeness bias, availability bias and anchoring bias as the overall mean was more than 2.5. The investment strategies applied by the investors included contrarian strategy (MEAN = 3.22), excessive trading (MEAN=3.14) and purchased low value stocks (MEAN = 1.03. They also diversified their portfolio which is depicted by the normalized portfolio variance that has a mean of 1.147. The investors held a mean of 5 stocks with a mode of 3 stocks which evidences diversification. The portfolio

performance had a mean of 3.64 with the maximum returns being 56.64 and minimum returns of – 22.09.

Regression diagnostics were carried out to test for homoscedasticity, linearity and multicollinearity. Linearity assumption was tested using the scatter plot, the upward sloping plot depicted linearity between the variables. To test for multicollinearity, the variance inflation factor was used. The benchmark value for multicollinearity is 10. The study variables had VIF of less than 10 depicting lack of multicollinearity. Homoscedasticity was tested using the Koenker test and study failed to reject the hypothesis on lack of heteroscedasticity. The findings depicted lack of heteroscedasticity (p-value >0.05).

Correlation analysis showed that the relationship between status quo bias, availability bias, anchoring bias, representativeness bias and portfolio performance was positive and significant ($p < 0.05$). The relationship between behavioural biases and strategy was positive and significant (p-value < 0.05) for contrarian strategy and excessive trading. The relationship between investment strategy and portfolio performance depicted a positive and significant relationship for contrarian strategy only.

CHAPTER FIVE: HYPOTHESIS TESTING AND DISCUSSION OF FINDINGS

5.1 Introduction

The findings from regression analysis are presented and include: regression model, F test, adjusted R^2, and ANOVA. The findings are discussed and a summary of hypotheses testing is presented. The regression model depicted the relationship between behavioural biases, demographics, investment strategy and portfolio performance. ANOVA was used to establish the predictive ability of the regression model and the adjusted R^2 determined the proportion of the variation in the dependent variable which is attributed to the independent variable.

5.2 Relationship between Behavioural Biases and Portfolio Performance

A simple regression was used where the composite score for behavioural biases was regressed against portfolio performance so as to test the first hypothesis which was stated as:

Hypothesis 1: The relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange is not significant.

The regression equation was of the form:

$P = \beta_0 + \beta_1 B + \varepsilon_i$

Where:

P is the portfolio performance

β_0, β_1 and B is as defined in 3.5.

Table 5.1 shows that portfolio performance and behavioural biases are positively related and it is significant ($\mathcal{F}$ = 7.109, p-value < 0.05).The adjusted R squared is 0.081 implying that 8.1% variation in portfolio performance is attributed to behavioural biases. There exists a statistically significant relationship between behavioural biases and portfolio performance (F= 25.636, p-value < 0.05). From these findings the study rejects the null hypothesis that there is no significant relationship between behavioural biases and portfolio performance.

Table 5.1: Regression model on the Relationship between Behavioural Biases and Portfolio Performance

	Model	p-value
Constant	3.639	0.000
Behavioural biases (B)	7.109	0.000
F	25.636	0.000
Adjusted R^2	8.1%	

Source: Author, 2016

5.3 The Relationship between Behavioural Biases, Demographics and Investment Strategy

A model proposed by Fairchild and Mackinnon (2009) was applied to ascertain the moderating effect of demographics on the relationship between behavioural biases and investment strategy. The model was as follows:

$$IS= \beta_0 + \beta_1 B+\beta_2 D+ \beta_3 BD + \varepsilon_i$$

Where β_0, β_1, β_2 and β_3 are as defined in 3.6.

The study considered the moderating effect of each of the variables which were gender, age, education, and experience. The variables were first centred so as to alleviate the effect of multicollinearity among the regression coefficients. The interaction term (B*D) was determined by obtaining the product of the centered predictor variable (behavioural biases) and each of the centered moderating variables (B*D). Hierarchical multiple regression was then carried out as applied by Savas, Dos and Demirkol (2013) where the predictor variables are entered in some order and the effect evaluated.

5.3.1 The Moderating Effect of Age on the Relationship between Behavioural Biases Investment Strategy

Model 1 depicts the relationship between behavioural biases and investment strategy. The results shows a positive and significant relationship between behavioural biases and investment strategy (β=0.144, p-value < 0.05). The adjusted R^2 is 0.014 indicating that 1.4% variation in investment strategy was due to behavioural biases. Model 1 has adequate predictive ability (F=4.949, p < 0.05). In model 2 where behavioural biases and age are considered, the adjusted R^2 is 0.011 implying that 1.1% of the variation in investment strategy is due to behavioural biases and age. It depicts a reduction in variation of 0.3% from model 1. However, model 2 lacks predictive ability (F= 2.587, p > 0.05). The regression coefficient shows a positive and significant relationship between behavioural biases and investment strategy (β=0.146, p < 0.05) while the relationship between age and investment strategy is also positive but insignificant (β =0.014, p > 0.05).

In model 3, the moderating effect of the demographics (age) on the relationship between behavioral biases and investment strategy is tested through the inclusion of the interaction term (behavioral biases*age). The adjusted R^2 is 0.008 which is a decline of 0.3% from model 2. This shows that the variation in investment strategy which is caused by behavioral biases, age and the interaction term is 0.8%. The model has F =1.733 with a p-value > 0.05 depicting that there exists a statistically insignificant relationship among behavioral biases, age, interaction term and investment strategy.

The regression coefficient in model 3 indicates that the relationship between behavioural biases and investment strategy is positive and significant (β=0.147, p < 0.05). The β value for age was 0.014 with a p-value > 0.05 while the interaction term has a β value of -0.012 with a p-value >0.05.This shows an insignificant relationship between age, interaction term and investment strategy.Therefore, age is not a significant moderator in the relationship between behavioural biases and investment strategy. The study failed to reject the null sub hypothesis that there is no significant moderating effect of age on the relationship between behavioural biases investment strategy.

Table 5.2: Regression Results on the Moderating Effect of Age on the Relationship between Behavioural Biases and Investment Strategy

Model	1	2	3
Constant	2.113 (0.000)	2.113	2.114
Behavioral biases	0.144(0.027)	0.146(0.025)	0.147(0.025)
Age		0.014 (0.625)	0.014 (0.618)
Behavioural Biases*Age			0.012(0.840)
Adjusted R^2	0.014	0.011	0.008
F	4.949 (0.027)	2.587(0.077)	1.733(0.161)

a. Dependent Variable: Investment Strategy
b. Predictors: (Constant), Behavioural Biases
c. Predictors: (Constant), Behavioural Biases, Age
*d. Predictors: (Constant), Behavioral Biases, Age, Behavioral Biases*Age*

Source: Author,2016

5.3.2 The Moderating Effect of Education on the Relationship between Behavioural Biases and Investment Strategy

Model 1 has an adjusted R^2 of 0.014 which depicts that 1.4% of the variation in investment strategy is due to behavioural biases. The regression coefficients shows that relationship between behavioural biases and investment strategy is positive and significant (β=0.144, $p<0.05$). The adjusted R^2 in model 2 is 0.013 implying that behavioural biases and education accounts for 1.3% of the variation in investment strategy. In model 3, adjusted R^2 is 0.033 which shows that 3.3% of the variation in investment strategy is due to behavioural biases, education and the interaction term

(behavioral biases*education). The regression coefficient for model 2 shows that behavioral biases are positively related with investment strategy (β =0.140) and the relationship is significant ($p < 0.05$). Education depicts a positive but insignificant relationship with investment strategy (β=0.029, $p > 0.05$). Model 2 is not statistically significant (F=2.846, $p > 0.05$). The results for Model 3 depicts that the relationship between behavioural biases and investment strategy is positive aand significant (β=0.160, $p < 0.05$). Education has a positive but insignificant relationship with investment strategy (β=0.021, $p>0.05$). The interaction term (behavioural biases*education) shows a positive and significant relationship with investment strategy (β=0.183, $p < 0.05$). Model 3 has predictive ability with F=4.191 and p-value < 0.05. The findings depict that education significantly moderates in the relationship between behavioral biases and investment strategy. The study rejects the null sub hypothesis that education does not moderate in the relationship between behavioural biases and investment strategy.

Table 5.3: Regression Results on the Moderating Effect of Education on the Relationship between Behavioural Biases and Investment strategy

Model	1	2	3
Constant	2.113 (0.000)	2.113 (0.000)	2.108 (0.000)
Behavioral biases	0.144(0.027)	0.140(0.031)	0.160(0.014)
Education		0.029(0.388)	0.021(0.517)
Behavioral Biases*Education			0.183(0.010)
Adjusted R^2	0.014	0.013	0.033
F	4.949(0.027)	2.846(0.060)	4.191 (0.006)

Dependent Variable: Investment Strategy
Predictors: (Constant), Behavioral Biases
Predictors: (Constant), Behavioural Biases, Education
*Predictors: (Constant), Behavioral Biases, Education, behavioral biases*education*
Source: Author, 2016

5.3.3 The Moderating Effect of Gender on the Relationship between Behavioural Biases and Investment Strategy

Table 5.4 below shows that the adjusted R^2 in model 1 is 0.014 indicating that 1.4% of the variation in investment strategy is due to behavioural biases. The model has predictive ability ($F=4.949$, $p < 0.05$). In model 2 where behavioral biases and gender are considered, the adjusted R^2 is 0.011 which shows that 1.1% of the variation in investment strategy is explained by behavioural biases and gender. The regression

coefficients for behavioral biases and gender in model 2 are 0.145 ($p < 0.05$) and -0.011 ($p > 0.05$) respectively. This implies that the relationship between behavioral biases and investment strategy is positive and significant while the relationship between gender and investment strategy is negative and insignificant. The results also show that that there is a statistically insignificant relationship between behavioral biases, gender and portfolio performance ($F = 2.480$, $p > 0.05$).

In model 3 where the interaction term (behavioral biases*gender) is included, the adjusted R^2 is 0.009. This implies that 0.9% of the variation in investment strategy is accounted for by behavioral biases, gender and the interaction term. However, the model has a statistically insignificant predictability ($F=1.820$, $p > 0.05$). The regression coefficients show that behavioral biases are positively and significantly related with investment strategy ($\beta=0.142$, $p<0.05$). Gender has a negative and insignificant relationship with investment strategy ($\beta=-0.009$, $p > 0.05$). The interaction term has $\beta=0.095$ and is insignificantly related. As such, gender has no significant moderating effect on the relationship between behavioural biases and investment strategy. The study failed to reject the null sub hypothesis that gender does not moderate in the relationship between behavioural biases and investment strategy.

Table 5.4: Regression Results on the Moderating Effect of Gender on the Relationship between Behavioural Biases and Investment Strategy

Model	1	2	3
Constant	2.113(0.000)	2.113(0.000)	2.11(0.000)
Behavioral biases	0.144(0.027)	0.145(0.027)	0.142(0.031)
Gender		-0.011(0.866)	-0.009(0.887)
Behavioral Biases*Gender			0.095(0.476)
Adjusted R^2	0.014	0.011	0.009
F	4.949(0.027)	2.480(0.086)	1.820(0.144)

a. Dependent Variable: Investment Strategy

b. Predictors: (Constant), Behavioral Biases

c. Predictors: (Constant), Behavioral biases, Gender

*d. Predictors: (Constant), Behavioral Biases, Gender, Behavioral biases*gender*

Source: Author, 2016

5.3.4 The Moderating Effect of Experience on the Relationship between Behavioural Biases and Investment Strategy

The findings in Table 5.5 below shows that in Model 1, behavioural biases and investment strategy have a statistically significant relationship with F=4.949 and p-value < 0.05. The adjusted R^2 in model 2 is 0.013 which represents a variation of 1.3% in the investment strategy due to behavioral biases and experience. The results shows that there is a statistically insignificant relationship between behavioral biases,

experience and investment strategy (F = 87465, p > 0.05). In model 3, the adjusted R^2 is 0.010 depicting that 1% variation in investment strategy is due to behavioral biases, experience and the interaction term. The model lacks predictive ability (F= 1.937, p > 0.05).

Regression coefficients in model 2 show that behavioral biases are positively and significantly related with investment strategy (β=0.141, p < 0.05 while experience is positively and insignificantly related with investment strategy (β=0.017, p > 0.05). In model 3, there is a positive and significant relationship between behavioral biases and investment strategy (β=0. 144, p < 0.05). Experience is positively but insignificantly related with investment strategy (β=0.017, p > 0.05). Lastly, the interaction term (behavioural biases*experience) has a negative and insignificant relationship with investment strategy (β= -0.011, p > 0.05). This shows that experience has no significant moderation effect on the relationship between behavioural biases and investment strategy. The study failed to reject the null sub hypothesis that experience has no significant moderating effect on the relationship between behavioural biases and investment strategy.

Table 5.5: Regression Results on the Moderating Effect of Experience on the Relationship between Behavioural Biases and Investment Strategy

Model	1	2	3
Constant	2.113 (0.000)	2.113(0.000)	2.114(0.000)
Behavioral biases	0.144(0.027)	0.141(0.03)	0.144(0.029)
Experience		0.017(0.371)	0.017(0.368)
Behavioral biases*experience			-0.011(0.777)
Adjusted R^2	0.014	0.013	0.010
F	4.949 (0.027)	2.874 (0.058)	1.937 (0.124)

a. Dependent Variable: Investment Strategy
b. Predictors: (Constant), Behavioral Biases
c. Predictors: (Constant), Behavioral Biases, Experience
*d. Predictors: (Constant), behavioral biases, experience, Behavioral Biases*experience*

Source:Author,2016

5.4 Relationship between Behavioural Biases, Investment Strategy and Portfolio Performance

Regression analysis was carried to determine whether investment strategy intervenes in the relationship between behavioural biases and portfolio performance. Investment strategy comprised of under diversification (S1), buying volatile stocks (S2), contrarian strategy (S3), and excessive trading (S4). A model proposed by Baron and Kenny (1986) was used to test hypothesis three which was:

H_3: The intervening effect of investment strategy on the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange is not significant.

The model has four steps which were undertaken to ascertain the mediating effect of investment strategy. In the first step, behavioural biases were regressed against portfolio performance. In the second step, regression analysis was carried out to determine the relationship between behavioural biases (independent variable) and investment strategy (intervening variable). In the third step, investment strategy was regressed against portfolio performance. In the fourth step, regression analysis was done to establish the relationship between behavioural biases, investment strategy and portfolio performance.

Results for step 1 in Table 5.6 show a positive and significant relationship between behavioural biases and portfolio performance (β=7.109, $p < 0.05$). Behavioural biases account for 8.1% of the variation in portfolio performance and the model is statistically significant (F=25.636, $p < 0.05$).

Table 5.6: Regression Results of Behavioural Biases and Portfolio Performance

Step	constant	β	Adjusted R2	F
1 (P & B)	3.639 (0.000)	7.109 (0.000)	0.081	25.636 (0.000)

Where P is portfolio performance and B is behavioural bias

Source: Author, 2016

The second step entailed establishing the relationship between investment strategy and behavioural biases. Each strategy was tested separately. Results in Table 5.7 shows a negative and an insignificant relationship between behavioural biases and under diversification (S1) (β= -0.493, p > 0.05).The model is statistically insignificant (F=0.511, p-value > 0.05). The results for the effect of purchase of volatile stocks (S2), show that there is also a negative and insignificant relationship between volatile stocks and behavioural biases (β= -0.031, p-value > 0.05). The model is also not statistically significant (F=0.616, p-value > 0.05). Results for contrarian strategy (S3) depict a positive and significant relationship between behavioural biases and contrarian style (β=0.364, p-value < 0.05). The model is statistically significant (F=4.114, p-value < 0.05). The results in S4 show a positive and significant relationship between behavioural biases and excessive trading (β=0.297, p < 0.05). The relationship is also statistically significant (F=7.186, p-value < 0.05).

Table 5.7: Regression Results of Investment Strategy and Behavioural Biases (step 2)

Step	2 (IS & B)			
	S1	S2	S3	S4
Constant	6.714 (0.003)	0.302 (0.016)	1.971 (0.001)	2.213 (0.000)
Behavioural biases	-0.493 (0.475)	-0.031 (0.433)	0.364 (0.043)	0.297 (0.008)
Adjusted R^2	-0.002	-0.001	0.011	0.022
F	0.511 (0.475)	0.616 (0.433)	4.114 (0.043)	7.186 (0.008)

Where S1 is under diversification, S2 is volatile stocks, S3 is contrarian strategy and S4 is excessive trading

Dependent variable: investment strategy

Source: Author, 2016

Step 3 in the mediation process involves determining the relationship between the intervening variable (investment strategy) and the dependent variable (portfolio performance). Table 5.8 shows an insignificant relationship between under diversification and portfolio performance (β=0.041, p-value > 0.05). The model is not a good fit (F=0.105, p-value > 0.05). There is also a negative and insignificant relationship between volatile stocks and portfolio performance (β=-0.231, p-value > 0.05). The model is not statistically significant (F=0.011, p-value > 0.05). Contrarian strategy (S3) predicts portfolio performance with a slope of 1.213 and p-value < 0.05. Contrarian strategy explains 1.9% of the variation in portfolio performance (adj. R^2= 0.019) and the model is also statistically significant (F= 6.320, p-value < 0.05). Excessive trading is (S4) not significantly related with portfolio performance (β=0.787, p > 0.05). The model is also not a good fit (F=1.010, p-value > 0.05).

Table 5.8: Regression Results of Investment Strategy and Portfolio Performance (step 3)

Step 3	(P & IS)			
	S1	S2	S3	S4
Constant	3.426 (0.000)	3.686 (0.000)	-0.145 (0.931)	1.157 (0.652)
Investment Strategy	0.041 (0.746)	-0.231 (0.918)	1.213 (0.013)	0.787 (0.316)
Adjusted R^2	-0.003	-0.004	0.019	0.000
F	0.105 (0.746)	0.011 (0.918)	6.320 (0.013)	1.010 (0.316)

Where S1 is under diversification, S2 is volatile stocks, S3 is contrarian strategy and S4 is excessive trading
Dependent variable: portfolio performance

Source: Author, 2016

In the fourth step, regression analysis was conducted to ascertain the relationship between behavioural biases (independent variable), investment strategy (intervening and portfolio performance (dependent variable). Table 5.9 depicts that the model is statistically significant with F= 6.002 and p-value < 0.05. The relationship between behavioural biases and portfolio performance is positive and significant with β=6.878 and p-value < 0.05. Under diversification (S1), is positively and insignificantly related with portfolio performance while volatile stocks (S2) and excessive trading (S4) are negatively and insignificantly related with portfolio performance.

Contrarian strategy (S3) depicts a significant relationship with portfolio performance (β=0.998, p-value < 0.05). According to Baron and Kenny (1986), for there to be intervention, the relationship between behavioural biases (independent variable, investment strategy (intervening variable) and portfolio performance must be significant and the slope for behavioural biases must be lower as compared to step 1. This is confirmed for only one intervening variable; contrarian strategy. The slope for behavioural biases (6.878) in model four is lower than the slope in model 1 (7.109). As such sub hypothesis three is rejected.

Table 5.9: Regression Results of Behavioural Biases, Investment Strategy and Portfolio Performance (step 4)

	(P & B & IS)
Constant	-20.173(0.000)
Behavioural biases	6.878 (0.000)
S1	0.051 (730)
S2	-0.257(0.921)
S3	0.998(0.048)
S4	-0.383(0.636)
F	6.002(0.000)
Adjusted R^2	0.083

Where S1 is under diversification, S2 is volatile stocks, S3 is contrarian strategy and S4 is excessive trading
a. Dependent variable: Portfolio Performance
b.Predictors1: Behavioural Biases, S1, S2, S3, and S4
c. Predictors2: Behavioural Biases, S2 and S3

Source: Author, 2016

5.5 Behavioural Biases, Demographics, Investment Strategy and Portfolio Performance

A multiple regression analysis was conducted to ascertain the joint effect of behavioural biases, demographics and investment strategy on portfolio performance. This was done to test hypothesis four which was stated as:

H_4: The joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange is not significant.

The following regression model was used:

$$P = \beta_0 + \beta_1 B + \beta_2 S2 + \beta_3 S3 + \beta_4 A + \beta_5 G + \beta_6 ED + \beta_7 EX + \varepsilon_i$$

Where: P is the portfolio performance, B is the behavioural biases, S2 is volatile stocks, S3 is contrarian strategy, A is age, G is gender, ED is education, and EX is experience

S1 (under diversification) and S4 (excessive trading) were eliminated from the regression as they exhibited high levels of multicollinearity. Table 5.10 shows that the regression coefficients were as follows: behavioural biases (*β=6.599, p=0.000),* volatile stocks (*β=-0.178, p=0.933),* contrarian strategy (*β=0.951, p=0.043),* age (*β=-0.310, p=0.607),* gender (*β=-1.293, p=0.347),* education (*β=-0.118, p=0.870),* and experience *(β=0.065, p=0.010).*The results show that behavioural biases, contrarian strategy and experience were significantly related with portfolio performance. The other variables (age, education, gender and volatile stocks) had an insignificant relationship with portfolio performance ($p > 0.05$).

The adjusted R^2 is 0.101 which shows that behavioural biases, demographics and investment strategy account for 10.1% variation in portfolio performance. There also exists a statistically significant relationship among behavioural biases, demographics, investment strategy and portfolio performance ($F=5.450$, $p < 0.05$). This implies that the joint effect of behavioural biases, demographics and investment strategy on portfolio returns at the NSE is significant. The study rejects hypothesis four.

Table 5.10: Regression Results of Behavioural Biases, Demographics, Investment Strategy and Portfolio Performance

	Model
Constant	3.639(0.000)
Behavioural biases	6.599 (0.000)
Volatile stocks	0.178 (0.933)
Contrarian strategy	0.951 (0.043)
Age	-0.310 (0.607)
Gender	-1.293 (0.347)
Education	-0.118(0.870)
Experience	0.065 (0.010)
Adjusted R^2	0.101
F	5.450 (0.000)

Dependent variable: portfolio performance

Predictors: (constant), experience, contrarian strategy, volatile stocks, gender, age, education, and behavioural biases.

5.6 Discussion of Findings

The study tested four hypotheses so as to achieve the overall objective of determining the effect of demographics and investment strategy on the relationship between behavioural biases and portfolio performance. The results are discussed below:

5.6.1Relationship between Behavioural Biases and Portfolio Performance

The first hypothesis was that the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange was not significant. The study objective was to determine the relationship between behavioural biases and portfolio performance. To achieve the objective, behavioural biases were regressed against portfolio performance. The regression equation was of the form:

$$P=3.639+7.109B$$

The slope was significant (p-value<0.05). The first hypothesis was therefore rejected. The findings depicted that investors were positively and significantly affected by status quo, availability bias, and anchoring and representativeness bias. This evidences investors' reluctance in changing the composition of their portfolio irrespective of the movements in the market place (status quo). The effect by availability bias means that investors are attracted to stocks from popular companies, those which experience high abnormal trading volume and those companies which are always in the news. Also representativeness bias implies that investors make generalizations based on a small sample. Lastly, anchoring bias depicts that investors base their decisions based on irrelevant benchmarks. For instance if an investor wants to dispose a stock, he/she will consider the initial price the stock was bought. There is lack of consideration of time value of money or prices of similar stocks in the market. The implication of this finding is that when investors are affected by behavioural biases the portfolio performance increases. This may be associated with superior stock selection skills which enabled selection of stocks with high returns and low risk. Individual investors should buy stocks when they have prior knowledge as this will minimize the negative effect of biases and increase portfolio performance.

These results were consistent with findings by other studies for example Chen et al. (2007) where a study was conducted on the investment decisions among Chinese investors. The investors were found to be affected by biases which positively affected their portfolio performance. Also Vijaya (2016) on the behavioural patterns of Indian individual investors found that overconfidence bias positively affected performance. Contrary findings were obtained by studies for example Brown and Kagel (2009)

where an experiment was carried out to test behavioural biases in the U.S market. The findings depicted that investors' failure to observe the market adversely affected their returns. A study carried out by Barber, Lee, Liu and Odean (2009) among Taiwanese investors also observed poor performance among individual investors which was attributed to behavioural biases.

5.6.2 Relationship between Behavioural Biases, Demographics and Investment Strategy

The second hypothesis was that the effect of demographics on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange was not significant. The specific objective was to determine the effect of demographics on the relationship between behavioural biases and investment strategy. The study considered four moderating variables; age, gender, education and experience. Results in Table 5.2, 5.4 and 5.5 shows that age, gender and experience respectively do not moderate in the relationship between behavioural biases and investment strategy. As such, the study failed to reject sub hypothesis one, three and four. However, education was found significantly moderate in the relationship between behavioural biases and investment strategy (Table 5.3). This finding depicts that the study rejected sub hypothesis two.

The implication of this finding is that the more educated an investor is, the greater the behavioural bias effect and this influences the investment strategy they apply in their decision making. The moderating effect of age, gender and experience was found to be insignificant. In terms of age where a positive but insignificant relationship was

obtained it means that the older investors are more affected by the behavioural biases as compared to the young investors which affects the investment strategy selected. In terms of gender, men were affected by the behavioural biases more than the women and this influenced the investment strategy used although the effect was insignificant. Experience had a negative slope implying that the higher the experience, the lower the behavioural bias effect and the lower the experience, the higher the effect of the behavioural biases. However, the effect was insignificant.

The implication of these findings to financial advisors is that they need not to consider age, gender and experience of the individual investors when advising them on their investment decisions. However, education levels of the investors should be considered. The researcher was not able to compare with previous studies as there were no related studies.

5.6.3 Relationship between Behavioural Biases, Investment Strategy and Portfolio Performance

The hypothesis tested was that the relationship between behavioural biases and portfolio returns was not intervened by investment strategy. The results in Table 5.6, 5.7, 5.8, and 5.9 show that under diversification, buying volatile stocks and excessive trading do not mediate in the relationship between behavioural biases and portfolio returns. As such the study failed to reject sub hypothesis one, two and four. However, contrarian strategy significantly intervenes in the relationship between behavioural biases and portfolio performance. The sub hypothesis three was therefore rejected.

The implication of these findings is that when investors are affected by behavioural biases, it causes them to apply contrarian strategy which causes portfolio performance to increase. Brokers and dealers should advise investors to apply contrarian strategy as it positively intervenes in the relationship between behavioural biases and portfolio performance.

This is consistent with findings by other studies for example Kaniel et al. (2008) who investigated the behaviour of investors after earnings announcement at the NYSE and found that contrarian behaviour was exhibited among investors which resulted in abnormal returns. Contrary results were found in Park et al. (2010) where a study conducted in South Korea found that the investors traded excessively and earned lower returns. Also Barber and Odean (2000) investigated trading behaviour of individuals in the U.S and found that the investors traded excessively.

5.6.4 Relationship between Behavioural Biases, Demographics, Investment Strategy and Portfolio Performance

The fourth hypothesis was that the joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange was not significant. The specific objective was to determine the joint effect of behavioural biases, demographics and investment strategy on portfolio performance. Results in Table 5.10 show that the adjusted R^2 was 10.1% indicating the variation in portfolio performance attributed to behavioural biases, demographics, and investment strategy.

The regression model is statistically significant (F=5.450, p-value < 0.05). This implies that the joint effect of behavioural biases, demographics and investment strategy on portfolio performance was significant. The fourth null hypothesis was therefore rejected. The implication is that when investors are affected by behavioural biases the effect differs from one investor to another and this influences the type of investment strategy applied which affects the portfolio performance. The positive relationship may be associated with the level of education of the investors. A large proportion of the investors were highly educated and this may have resulted in superior stock selection skills whereby the returns obtained were higher than the transaction costs. As such, a positive effect on portfolio performance was obtained. The implication is that brokers and dealers should have knowledge of the demographics of the investors and their investment strategy as it affects the relationship between behavioural biases and portfolio performance.

This is contrary to findings obtained by Talpsepp (2010) where investors at the Estonian market were affected by disposition effect (behavioural bias) which resulted in excessive trading and this affected the portfolio performance negatively. The performance was found to differ in terms of gender and age. Contrary results were also obtained by Goetzmann and Kumar (2008) where investors were found to under diversify their portfolio which affected the portfolio performance negatively. The summary of hypotheses testing is indicated in Table 5.11.

Table 5.11: Summary of Hypothesis Testing

Objective of the Study	Hypothesis	Results
i)To determine the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange.	Hypothesis 1: The relationship between behavioural biases and portfolio performance is not significant.	H_1 is rejected implying that there is a statistically significant relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange.
ii)To determine the effect of demographics on the relationship between behavioural biases and investment strategy	Hypothesis 2: The effect of demographics on the relationship between behavioural biases and investment strategy is not significant. The sub hypotheses were: H_{21}: The effect of age on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant. H_{22}: The effect of education on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant. H_{23}: The effect of experience on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange is not significant. H_{24}: The effect of gender on the relationship between behavioural biases and investment strategy at	**Age** -adjusted R^2 = 0.008, F=1.733, p-value > 0.05. -0.8% of the variation in investment strategy is due to behavioural biases, age and the interaction term. -The model is not statistically significant. - The study failed to reject H_{21} implying that age does not moderate in the relationship between behavioural biases and investment strategy. **Education** -adjusted R^2 = 0.033, F=4.191, p-value < 0.05. -3.3% of the variation in investment strategy is due to behavioural biases, education and the interaction term. -The model is statistically significant. - H_{22} is rejected implying that education moderates in the relationship between behavioural biases and investment strategy. **Gender** -adjusted R^2 = 0.009, F=1.820, p-value > 0.05. -0.9% of the variation in investment strategy is due to behavioural biases, gender and the interaction term. -The model is not statistically significant. - The study failed to reject H_{23}

Objective of the Study	Hypothesis	Results
	the Nairobi Securities Exchange is not significant.	implying that gender does not moderate in the relationship between behavioural biases and investment strategy. **Experience** -adjusted R^2 = 0.01, F=1.937, p-value >0.05. -1% of the variation in investment strategy is due to behavioural biases, experience and the interaction term. - The model is not statistically significant. - The study failed to reject H_{24} implying that experience does not moderate in the relationship between behavioural biases and investment strategy.

Objective of the Study	Hypothesis	Results
iii)To determine the intervening effect of investment strategy on the relationship between behavioural biases and portfolio performance	Hypothesis 3: There is no significant effect of investment strategy on the relationship between behavioural biases and portfolio performance.	F= 6.002, p-value <0.05,Adjusted R^2 = 0.083 - 8.3% of the variation in portfolio performance is due to behavioural biases and investment strategy. -There is a statistically significant relationship among behavioural biases, investment strategy and portfolio performance. - H_3 is rejected implying that investment strategy has a significant intervening effect in the relationship between behavioural biases and portfolio performance.

Objective of the Study	Hypothesis	Results
iv) To determine the combined effects of behavioural biases, demographics and investment strategy on portfolio performance.	Hypothesis 4: The combined effect of behavioural biases, demographics and investment strategy on portfolio performance is not significant.	- R^2 =0.101, F=4.237, p-value < 0.05 -10.1% variation of the variation in portfolio performance is due to behavioural biases, demographics, investment strategy and portfolio performance. -There is a statistically significant relationship between behavioural biases, demographics, investment strategy and portfolio performance at the Nairobi Securities Exchange. -H_4 is rejected which implies that there is a statistically significant joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange

Source: Author, 2016

CHAPTER SIX: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The objective of the study was to establish the relationship among behavioural biases, demographics, investment strategy and portfolio performance. This was achieved by testing four hypotheses. This chapter presents summary of findings, conclusion, contributions of the study, limitations of the study and suggestions for further study.

6.2 Summary of Findings

The first hypothesis (H_1) examined the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange. The regression results depicted that there is a significant relationship between behavioural biases and portfolio performance. The study rejects the hypothesis that the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange is not significant.

The second hypothesis (H_2) was to ascertain the effect of demographics on the relationship between behavioural biases and investment strategy at the Nairobi Securities Exchange. Four sub hypotheses were tested to ascertain the moderating effect of age, education, gender and experience. The findings showed that there was an insignificant relationship between age, gender, experience and investment strategy (p-value > 0.05). This implies that the effect of behavioural biases on investment strategy does not differ in terms of age, gender, and experience. However, education had a moderating relationship between behavioural biases and investment strategy. As

such the study failed to reject the sub hypothesis one, three and four but rejected sub hypothesis two.

The third hypothesis (H_3) examined the intervening effect of investment strategy on the relationship between behavioural biases and portfolio performance at the Nairobi Securities Exchange. Four sub hypotheses were considered so as to test the mediating effect of under diversification, buying volatile stocks, contrarian strategy and excessive trading. The regression results showed that under diversification, buying volatile stocks, and excessive trading do not significantly mediate in the relationship between behavioural biases and portfolio performance (p-value > 0.05). The study failed to reject hypotheses one, two, and four. Contrarian strategy was found to have a significant intervening effect between behavioural biases and portfolio performance and therefore sub hypothesis three is rejected.

The fourth hypothesis (H_4) was to investigate the joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange. A significant relationship was established between behavioural biases, experience, contrarian strategy and portfolio performance (p-value < 0.05). The model was statistically significant (p-value < 0.05). The study rejected the hypothesis that the joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange is not significant.

6.3 Conclusion

The theories underlying this study were modern portfolio theory, heuristics theory and dual process theory. The study adopted positivism philosophy as it was aimed at deriving laws which were to be generalized to the whole population. The research design was correlation descriptive survey. Primary data and secondary data were used in the study. Primary data was collected using questionnaires while the secondary data was collected from NSE. A total of 279 questionnaires were received comprising of 69.7% of the sample.

Demographic profile shows that majority of the investors are males with a percentage of 54.1%. In terms of age, most investors fall within the range of 26-45 years and hold a degree. The implication is that most of the investors are in their middle age and have knowledge. A large percentage (50.9%) traded 5 times or less in the year of the study. The number of transactions is low depicting that most of the investors may not be active traders. In terms of investment strategy, Kenyan investors trade excessively, apply contrarian strategy, do not buy volatile stocks and they diversify their portfolios. These depicts that investors do not invest randomly but are rather guided by strategy.

The first hypothesis (H_1) was rejected depicting that behavioural biases and portfolio performance were significantly related. The relationship is positive indicating that the higher the effect of behavioural biases on the investors the higher the portfolio performance. This may be attributed to the fact that most of the Kenyan investors are knowledgeable and they have also diversified their portfolios. The implication of this

finding is that investors should buy stocks when they have prior knowledge as this will minimize the negative effect of biases and increase portfolio performance.

The failure to reject the second (H_2) hypothesis for sub hypothesis one, three and four shows that age, gender and experience do not moderate in the relationship between behavioural biases and investment strategy. The implication is that age, gender and experience have no influence on the relationship between behavioural biases and investment strategy. Sub hypothesis two was rejected indicating that education does moderate in the relationship between behavioural biases and investment strategy. This implies that different education levels affected the extent to which investors were prone to behavioural biases and this influenced the type of strategy applied in investment decisions. Investors with high levels of education were affected more by the behavioural biases. Financial advisors who include brokers and dealers should consider the education level of the investors when advising them. This is because it influences the relationship between behavioural biases and investment strategy.

The third hypothesis (H_3) was rejected implying that investment strategy intervenes in the relationship between behavioural biases and portfolio performance. The intervention was significant for contrarian strategy which means that Kenyan investors purchase value stocks and dispose them when the prices appreciate. This depicts that when investors are affected by behavioural biases, they apply contrarian strategy which influences the level of portfolio performance. Brokers and dealers should advise investors to apply contrarian strategy as it positively intervenes in the relationship between investor biases and portfolio returns.

The fourth hypothesis (H_4) was also rejected depicting a significant joint effect of behavioural biases, demographics and investment strategy on portfolio performance at the Nairobi Securities Exchange. The implication of this is that the effect of behavioural biases on investors differs from one individual to another based on their demographics which influences the investment strategy undertaken and this has an effect on portfolio performance. Financial advisors should have knowledge of the demographics of the investors and their investment strategy as it affects the portfolio returns.

6.4 Contribution of the Findings of the Study

The findings from this study will contribute to finance knowledge, policy making and practice as discussed below.

6.4.1Contributions to Knowledge

The findings of this study contribute to existing knowledge in the field of behavioural biases, demographics, investment strategy and portfolio performance of individual investors by identifying the behavioural biases that influence equity investment decisions. This study considered behavioural biases which are not commonly studied: status quo bias, representativeness bias, availability bias and anchoring bias. These biases were generally found to positively affect performance. Most of the studies reviewed had focussed on overconfidence bias.

The results of this study have identified investment strategies that are applied by investors. The study had considered four strategies: contrarian strategy, excessive

trading, buying volatile stocks and under diversification. The investors were found to hold diversified portfolios, traded excessively, bought value and non volatile stocks. However, contrarian strategy was found to be dominantly used by the investors. This shows that investors apply strategies while making their investment decisions. This study has also provided a position on the conflicting view about the influence of investor biases on portfolio returns. The results depict that a positive relationship exists between investor biases and portfolio returns. This implies that an increase on the effect of behavioural biases results in an increase on portfolio performance.

This study contributes to knowledge on the moderating effect of demographics on the relationship between behavioural biases and investment strategy. The study considered age, gender, education, and experience as the moderating variables. The results showed that the only education had a moderating effect on the relationship between behavioural biases and investment strategy. In terms of theories, modern portfolio theory was found not to hold in this study. This is because investors formed their portfolio not based on the mean variance principles but rather were guided by behavioural biases. The investors were also found to be irrational in their investment choices which negate the tenets of modern portfolio theory. Heuristics theory was applicable as investors were found to be affected by availability bias, representativeness bias, and anchoring bias.

6.4.2 Contribution to Policy Making and Practice

The results of this study are of use to the regulator of capital markets (CMA), brokers and dealers and individual investors. The findings on the behavioural biases which affect investors are important so that financial literacy programs can be initiated by

CMA in order to create awareness among the investor. The findings of the study have also provided information on the extent of stock market participation. Firstly, the proportion of investors at the equity market is small as compared to the total adult population. Secondly, the stock market was dominated by men. Lastly, a large proportion of the investors were educated. This can act as a guide to CMA in their policy making so as to initiate strategies which can increase stock market participation by tapping the unreached market.

The findings of the study have indicated a positive relationship between behavioural biases and portfolio performance. This is of value to brokers and dealers who interact with investors on a regular basis. They will educate investors on the biases which they are prone and how they can take advantage of the situation so as to earn high returns. For example if they are affected by availability bias, the financial advisors can obtain more information on the companies of interest so as to advise them on the most appropriate stock(s) to purchase so as to optimize their decisions.

This study is useful to individual investors during portfolio formulation and monitoring process. This is because the decisions made may not necessarily be affected by mean-variance theorem but rather by behavioural biases. As such, they will have knowledge on the investment strategies to apply so as to make profitable investment decisions which will increase their portfolio performance. For example the use of contrarian strategy will imply that they include more value stocks in their portfolio. The investors will also be keen market observers so as to dispose stocks whose prices have appreciated.

6.5 Limitations of the Study

This study encountered a few challenges which the researcher managed effectively. The first limitation was that many questionnaires were incomplete especially on the section where they were to indicate their experience in the stock market. Probably they could not recall or were reluctant to indicate. This was solved by eliminating so many questionnaires which were not filled and this reduced the sample size drastically. However, the sample size obtained was adequate for analysis although a larger sample could have been preferred.

The respondents were reluctant to indicate the number of shares which they hold in each of the companies they had invested. This made it difficult for the researcher to ascertain the actual weights of the investors' wealth invested in the different stocks so as to compute the portfolio returns. This was managed by assuming equal distribution of wealth among the stocks.

The study relied on questionnaires to collect data. The responses may not be error free as the respondents filled the questionnaire independently. To minimise the errors, the researcher simplified the questionnaire and was also available for clarifications.

6.6 Suggestion for Further Study

This study considered the effect of behavioural biases on portfolio performance, specifically equity portfolio. A further study including the bond market may portray a bigger picture. The study should consider what influences buy/sell decisions in the

bond market, and whether the investors are affected by irrationality emanating from biases.

A further study to consider other biases like local bias which have not been considered by most researchers. Such a study will determine whether investors have preference for domestic companies over multinationals. Any such preference will imply that they are irrational in their decision making as they do not base their decisions on risk-return considerations.

This study found that buying value stocks contributes positively to portfolio returns. A further study should consider the effect of growth stocks on portfolio returns and whether the difference in returns is significantly different. This will help investors to make optimal decisions; whether to buy value or growth stocks.

A further study should consider what influences investment decisions in other areas and not necessarily in the securities market. Investors also invest in real assets like land and buildings. For example there has been a surge for buying land which has escalated land prices especially in major towns. There is need to establish whether this demand for land is based on rationality or other influences like herd behaviour.

The sample used in this study included both professional and non professional investors. This is because it considered individual investors irrespective of their knowledge background. As such, in some brokerage firms, investment advisors filled the questionnaires and because of the nature of their job, they held large portfolios as

compared to other investors. This may have tilted the average stock size to five stocks. Future studies could isolate professional investors and focus on non professional investors.

6.7 Lessons from the Study

The completion of this study has enabled the researcher to learn several lessons. Firstly, research requires patience and it is also costly. This is because moving from one stage to another during the proposal defence was not easy. There were amendments to be made in each stage and this required time. Also making the copies that were required was expensive.

Secondly, knowledge of the software required for analysis is necessary. This emanates from the fact that the analysis has to be done several times before completion. Knowledge also will also make it easy to interpret the findings.

Lastly, a researcher should be able to work with other people. Research is not done single handedly, there are respondents and supervisors. One should know how to relate well with the respondents so as to obtain the data required. Supervisors are also crucial in the research process and a researcher has to be ready to learn from them and also have a good working relationship with them.

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APPENDICES

Appendix I: Securities Firms Listed at the NSE

1	.Dyer& Blair Investment Bank Ltd
2	Francis Drummond & Company Limited
3	Suntra Investment Bank Ltd
4	Old Mutual Securities Ltd
5	SBG Securities Ltd
6	Kingdom Securities Ltd
7	Afrika Investment Bank Ltd
8	ABC Capital Ltd
9	Sterling Capital Ltd
10	Apex Africa Capital Ltd
11	Faida Investment Bank Ltd
12	NIC Securities Limited
13	Standard Investment Bank Ltd
14	Kestrel Capital (EA) Limited
15	African Alliance Kenya
16	Renaissance Capital (Kenya) Ltd
17	Genghis Capital Ltd
18	CBA Capital Limited
19	Equity Investment Bank Limited
20	KCB Capital

Appendix II: Raw Data of the Study

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
1	3.08	FEMALE	46-55 YEARS	GRADUATE	4	5	3.75	5.95	0.1422	6
2	2.7	FEMALE	46-55 YEARS	POST GRADUATE	0	5	2.25	2.13	0.0326	2
3	3.13	FEMALE	36-45 YEARS	POST GRADUATE	78	4	4.25	5.98	0.1147	6
4	3.52	MALE	26-35 YEARS	POST GRADUATE	7	5	3.25	15.02	0.6702	15
5	3.6	MALE	26-35 YEARS	GRADUATE	3	4	3.75	3.97	0.1985	4
6	3.51	MALE	36-45 YEARS	GRADUATE	1	2	2.5	2.02	0.0318	2
7	3.25	MALE	26-35 YEARS	GRADUATE	9	5	4.5	4.07	0.0968	4
8	3.69	FEMALE	26-35 YEARS	POST GRADUATE	8	5	4.25	7.98	0.1355	8
9	2.93	FEMALE	26-35 YEARS	POST GRADUATE	63	4	3.5	1.86	0.0361	2
10	3.61	FEMALE	26-35 YEARS	POST GRADUATE	1	5	4	5.11	0.6239	5
11	3.73	MALE	26-35 YEARS	GRADUATE	5	5	2.75	3	0.1849	3
12	3.56	FEMALE	26-35 YEARS	POST GRADUATE	0	4	3.25	3.03	0.1096	3
13	3.19	MALE	36-45 YEARS	DIPLOMA	24	5	4.25	3.07	0.0607	3
14	3.56	FEMALE	46-55 YEARS	GRADUATE	41	4	3	4.06	0.0831	4

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
15	3.55	FEMALE	36-45 YEARS	GRADUATE	3	5	3.5	2.93	0.3172	3
16	3.94	MALE	36-45 YEARS	POST GRADUATE	56	5	4.25	32.97	1.09855	33
17	3.95	MALE	36-45 YEARS	ANY OTHER	0	5	2.5	3	0.0648	3
18	3.14	FEMALE	26-35 YEARS	POST GRADUATE	3	3	3.5	3.98	0.0892	4
19	3.07	FEMALE	36-45 YEARS	GRADUATE	2	4	4	3	0.1135	3
20	3.1	FEMALE	26-35 YEARS	GRADUATE	7	5	2	5	0.2354	5
21	3.37	MALE	46-55 YEARS	POST GRADUATE	0	1	1	1.89	0.3069	2
22	3.09	FEMALE	46-55 YEARS	DIPLOMA	30	5	2.5	51.03	1.73805	51
23	3.91	MALE	18-25 YEARS	DIPLOMA	6	5	4.5	1	0.065	1
24	2.83	MALE	26-35 YEARS	GRADUATE	5	2	2.5	7.02	0.3239	7
25	3.07	MALE	26-35 YEARS	POST GRADUATE	5	5	3	5	0.1	5
26	3.42	FEMALE	36-45 YEARS	GRADUATE	2	4	3.5	2.03	0.0533	2
27	2.89	MALE	36-45 YEARS	ANY OTHER	6	4	3	3	0.1867	3
28	3.42	MALE	18-25 YEARS	POST GRADUATE	20	5	3.25	16.09	0.2661	16
29	3.56	FEMALE	36-45 YEARS	ANY OTHER	2	4	3.25	2.98	0.3417	3
30	2.86	MALE	36-45 YEARS	CERTIFICATE	5	4	4	2.99	0.0692	3

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
31	3.12	MALE	46-55 YEARS	POST GRADUATE	15	1	1	3.12	0.053	3
32	3.18	MALE	26-35 YEARS	GRADUATE	89	3	3.25	3	0.1774	3
33	3.28	MALE	36-45 YEARS	DIPLOMA	28	4	4	6.03	0.2304	6
34	3.66	FEMALE	26-35 YEARS	DIPLOMA	3	5	2.75	2.99	0.1446	3
35	1.86	FEMALE	36-45 YEARS	CERTIFICATE	20	5	3.5	3.18	0.0399	3
36	2.95	MALE	18-25 YEARS	GRADUATE	0	1	2	3	0.1597	3
37	3.53	MALE	18-25 YEARS	GRADUATE	8	4	4.25	3.01	0.1531	3
38	1.88	MALE	MORE THAN 55 YEARS	DIPLOMA	50	3	2.25	26.99	1.07985	27
39	3.26	MALE	18-25 YEARS	GRADUATE	4	3	3.5	2.87	0.0508	3
40	3.8	MALE	26-35 YEARS	GRADUATE	7	5	5	15.01	0.7553	15
41	3.53	FEMALE	36-45 YEARS	POST GRADUATE	10	5	5	9.99	0.6486	10
42	2.78	FEMALE	MORE THAN 55 YEARS	GRADUATE	20	5	2.75	18	0.5652	18
43	3.88	MALE	26-35 YEARS	GRADUATE	0	5	5	3	0.0735	3
44	2.61	MALE	18-25 YEARS	GRADUATE	5	4	3.5	3.08	0.0607	3

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
45	3.94	FEMALE	26-35 YEARS	POST GRADUATE	21	2	2.25	1.97	0.3028	2
46	4.69	MALE	18-25 YEARS	GRADUATE	15 5	4	3	4.02	0.121	4
47	3.05	FEMALE	26-35 YEARS	DIPLOMA	4	4	3.75	4.97	0.177	5
48	3.28	FEMALE	26-35 YEARS	POST GRADUATE	2	3	2.25	1.97	0.0397	2
49	3.88	FEMALE	26-35 YEARS	POST GRADUATE	90	4	3.5	7.02	0.3081	7
50	3.73	MALE	26-35 YEARS	GRADUATE	5	3	3.5	12.9 9	0.3183	13
51	2.97	MALE	36-45 YEARS	GRADUATE	12	2	2	16.9 6	0.4416	17
52	3.28	MALE	36-45 YEARS	POST GRADUATE	2	1	2.75	3.94	0.0794	4
53	2.67	FEMALE	26-35 YEARS	GRADUATE	10	3	4.5	22.0 5	0.6901	22
54	2.47	MALE	26-35 YEARS	GRADUATE	1	3	2.75	4	0.3423	4
55	3.47	MALE	26-35 YEARS	GRADUATE	1	4	4.75	6.03	0.2812	6
56	2.39	MALE	36-45 YEARS	GRADUATE	20	2	2.25	5.01	0.2238	5
57	3.52	MALE	36-45 YEARS	CERTIFICAT E	5	1	1	4.08	0.0782	4
58	3.16	FEMALE	36-45 YEARS	POST GRADUATE	6	5	2	2.97	0.096	3
59	3.52	FEMALE	26-35 YEARS	GRADUATE	84	2	2.75	4.87	0.0883	5
60	3.99	MALE	36-45 YEARS	DIPLOMA	20	5	4	6.94	0.1666	7

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
61	2.87	FEMALE	36-45 YEARS	POST GRADUATE	5	4	3.5	4	0.229	4
62	2.94	MALE	26-35 YEARS	GRADUATE	9	2	3.5	4	0.08	4
63	2.83	MALE	46-55 YEARS	CERTIFICATE	4	5	3	4.09	0.3422	4
64	2.95	FEMALE	46-55 YEARS	DIPLOMA	45	2	2	2	0.1619	2
65	3.57	FEMALE	36-45 YEARS	POST GRADUATE	3	4	2.25	6.15	0.1109	6
66	2.52	MALE	36-45 YEARS	DIPLOMA	1	4	4	21.96	0.6357	22
67	2.43	FEMALE	26-35 YEARS	GRADUATE	0	5	3	7.96	0.1519	8
68	2.93	FEMALE	26-35 YEARS	GRADUATE	25	4	3	7.11	0.1279	7
69	3.48	FEMALE	18-25 YEARS	GRADUATE	0	4	3.25	14.02	0.5147	14
70	2.75	MALE	MORE THAN 55 YEARS	GRADUATE	4	2	2.5	1.86	0.0361	2
71	2.98	FEMALE	26-35 YEARS	POST GRADUATE	85	4	4	3.04	0.0523	3
72	4.04	MALE	36-45 YEARS	GRADUATE	6	2	3.5	3.99	0.0979	4
73	2.98	FEMALE	26-35 YEARS	GRADUATE	63	4	3.5	4.94	0.26335	5
74	3.81	MALE	46-55 YEARS	GRADUATE	4	4	2.75	2.07	0.0288	2
75	4.11	FEMALE	36-45 YEARS	CERTIFICATE	5	5	4	4	0.1166	4

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
76	4	MALE	26-35 YEARS	POST GRADUATE	25	4	3.5	3.04	0.0697	3
77	3.93	MALE	36-45 YEARS	DIPLOMA	0	4	4	2.95	0.0841	3
78	4.3	MALE	26-35 YEARS	GRADUATE	4	5	3.25	2.04	0.0495	2
79	3.69	FEMALE	26-35 YEARS	GRADUATE	10	4	4	4.94	0.1257	5
80	3.05	FEMALE	36-45 YEARS	GRADUATE	4	5	4.25	2	0.1939	2
81	3.46	FEMALE	26-35 YEARS	POST GRADUATE	2	1	4.75	2	0.1939	2
82	3.39	MALE	26-35 YEARS	POST GRADUATE	17	1	4.5	3.02	0.092	3
83	3.31	MALE	MORE THAN 55 YEARS	POST GRADUATE	0	2	2	3.01	0.0885	3
84	3.08	MALE	36-45 YEARS	DIPLOMA	0	4	3.5	3.02	0.092	3
85	3	MALE	26-35 YEARS	GRADUATE	55	5	3.5	6.98	0.2759	7
86	3.08	MALE	26-35 YEARS	GRADUATE	15	4	4.5	2.98	0.105	3
87	4	MALE	26-35 YEARS	POST GRADUATE	21	5	4.5	6.96	0.1918	7
88	3.11	FEMALE	36-45 YEARS	GRADUATE	0	5	5	4.09	0.0927	4
89	3.28	MALE	26-35 YEARS	DIPLOMA	75	2	3.5	2.06	0.0537	2
90	2.79	MALE	36-45 YEARS	GRADUATE	3	4	4.75	12.98	0.4919	13

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
91	1.98	FEMALE	26-35 YEARS	GRADUATE	15	4	3.75	6.09	0.1282	6
92	3.18	MALE	46-55 YEARS	DIPLOMA	5	4	3.5	15	0.4382	15
93	3.25	FEMALE	26-35 YEARS	DIPLOMA	2	1	4	3.11	0.0558	3
94	3.88	MALE	26-35 YEARS	GRADUATE	8	1	3	7.01	0.2661	7
95	2.21	FEMALE	26-35 YEARS	GRADUATE	5	2	2.25	3.93	0.0739	4
96	3.76	MALE	26-35 YEARS	DIPLOMA	10	4	3	4.01	0.3959	4
97	3.46	FEMALE	18-25 YEARS	GRADUATE	2	1	3.75	1.99	0.0508	2
98	3.21	MALE	18-25 YEARS	CERTIFICATE	36	3	4.25	2.07	0.0407	2
99	3.13	MALE	MORE THAN 55 YEARS	GRADUATE	2	1	3.25	17.01	0.6376	17
100	3.03	MALE	46-55 YEARS	GRADUATE	12	5	3.75	4.01	0.2138	4
101	2.91	MALE	MORE THAN 55 YEARS	CERTIFICATE	0	4	3.75	1	0.0131	1
102	3.16	FEMALE	26-35 YEARS	CERTIFICATE	3	3	3.5	3.06	0.0553	3
103	3.06	FEMALE	26-35 YEARS	POST GRADUATE	88	3	2.5	1.81	0.0269	2
104	3.77	MALE	46-55 YEARS	ANY OTHER	53	4	3.75	6.99	0.2747	7

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
105	2.33	MALE	26-35 YEARS	DIPLOMA	2	3	3.75	7.01	0.2262	7
106	3.13	FEMALE	36-45 YEARS	DIPLOMA	2	4	4	1.95	0.0312	2
107	2.9	FEMALE	46-55 YEARS	DIPLOMA	40	4	4	5.98	0.4251	6
108	3.2	MALE	MORE THAN 55 YEARS	CERTIFICATE	0	5	3.5	4	0.1357	4
109	3.5	FEMALE	26-35 YEARS	DIPLOMA	1	2	3.25	1.99	0.0489	2
110	3.45	MALE	MORE THAN 55 YEARS	ANY OTHER	2	5	4.25	3.13	0.0531	3
111	2.41	FEMALE	26-35 YEARS	GRADUATE	5	5	2.5	4	0.0872	4
112	3.21	MALE	26-35 YEARS	GRADUATE	20	3	3.5	26	0.9818	26
113	3.09	MALE	MORE THAN 55 YEARS	DIPLOMA	8	5	3.5	6.99	0.4223	7
114	2.99	FEMALE	MORE THAN 55 YEARS	ANY OTHER	5	4	3.25	4.98	0.2151	5
115	2.68	FEMALE	MORE THAN 55 YEARS	POST GRADUATE	0	3	3.25	2	0.2302	2
116	2.42	MALE	26-35 YEARS	DIPLOMA	10	1	1.25	2	0.0854	2

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
117	3.51	MALE	26-35 YEARS	DIPLOMA	100	1	1	16.96	0.0533	17
118	2.72	FEMALE	26-35 YEARS	POST GRADUATE	6	3	3	9.98	0.397	10
119	3.35	FEMALE	26-35 YEARS	DIPLOMA	1	4	4	2.95	0.0486	3
120	3.33	FEMALE	36-45 YEARS	GRADUATE	0	1	4.75	1.95	0.0312	2
121	3.09	MALE	26-35 YEARS	GRADUATE	4	4	4	1.99	0.0892	2
122	2.95	MALE	26-35 YEARS	CERTIFICATE	3	2	2	3.06	0.0678	3
123	3.42	MALE	MORE THAN 55 YEARS	CERTIFICATE	77	2	4	2.03	0.0533	2
124	3.39	FEMALE	26-35 YEARS	GRADUATE	2	5	3.25	3.03	0.0871	3
125	2.9	FEMALE	18-25 YEARS	GRADUATE	20	1	4.25	6.04	0.1788	6
126	3.09	MALE	36-45 YEARS	DIPLOMA	1	2	2	2.97	0.1092	3
127	2.91	MALE	26-35 YEARS	ANY OTHER	2	5	4.5	3	0.2094	3
128	2.66	MALE	46-55 YEARS	POST GRADUATE	64	1	3.5	11.95	0.3508	12
129	3.08	MALE	46-55 YEARS	POST GRADUATE	12	4	4	16.02	0.3839	16
130	2.96	MALE	36-45 YEARS	GRADUATE	1	2	3	7.96	0.4276	8
131	2	MALE	36-45 YEARS	DIPLOMA	44	1	4	15.98	0.3122	16

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
132	3.11	FEMALE	36-45 YEARS	GRADUATE	3	2	2	5.91	0.1114	6
133	2.18	FEMALE	26-35 YEARS	GRADUATE	16	5	3.25	15.07	0.3823	15
134	2.95	MALE	18-25 YEARS	CERTIFICATE	34	4	2.5	3.99	0.1549	4
135	3.01	MALE	18-25 YEARS	GRADUATE	7	5	3.25	16.96	0.7221	17
136	2.82	FEMALE	18-25 YEARS	GRADUATE	5	4	4.75	10	0.4242	10
137	3.09	MALE	36-45 YEARS	GRADUATE	3	4	3.25	4.04	0.373	4
138	2.61	MALE	26-35 YEARS	GRADUATE	52	1	3.75	2.96	0.0544	3
139	2.87	FEMALE	26-35 YEARS	POST GRADUATE	7	4	3	5.05	0.1029	5
140	3.06	MALE	18-25 YEARS	GRADUATE	0	5	4	6.97	0.1813	7
141	3.53	MALE	26-35 YEARS	DIPLOMA	2	4	4.75	2.06	0.0321	2
142	3.4	MALE	26-35 YEARS	GRADUATE	15	4	3.25	14	0.4363	14
143	2.77	FEMALE	26-35 YEARS	POST GRADUATE	2	1	4	3.01	0.1786	3
144	2.64	FEMALE	46-55 YEARS	CERTIFICATE	0	5	3.5	1.95	0.0395	2
145	3.78	FEMALE	46-55 YEARS	DIPLOMA	8	2	3	9.03	0.4532	9
146	3.4	FEMALE	MORE THAN 55 YEARS	DIPLOMA	12	5	5	9.02	0.3207	9

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
147	3.78	FEMALE	26-35 YEARS	GRADUATE	3	4	3	3.07	0.3286	3
148	2.95	FEMALE	46-55 YEARS	GRADUATE	5	2	2	6.02	0.2561	6
149	2.07	FEMALE	36-45 YEARS	GRADUATE	0	2	3.25	4.01	0.2099	4
150	3.87	MALE	26-35 YEARS	GRADUATE	13	2	2.75	7.98	0.3367	8
151	3.79	FEMALE	36-45 YEARS	GRADUATE	4	5	4.25	3.98	0.2035	4
152	3.49	MALE	36-45 YEARS	GRADUATE	8	2	3.25	1.99	0.0399	2
153	3.21	MALE	26-35 YEARS	DIPLOMA	42	4	3	4.96	0.1477	5
154	2.47	FEMALE	36-45 YEARS	DIPLOMA	65	1	1	1.99	0.0399	2
155	3.58	MALE	26-35 YEARS	CERTIFICATE	0	2	2.25	2.07	0.0288	2
156	3.38	MALE	46-55 YEARS	DIPLOMA	72	5	2.75	8.02	0.479	8
157	2.8	FEMALE	26-35 YEARS	DIPLOMA	24	4	2.75	1.94	0.3027	2
158	3.55	FEMALE	MORE THAN 55 YEARS	ANY OTHER	3	4	2.75	2.96	0.0688	3
159	3.04	MALE	36-45 YEARS	GRADUATE	6	5	3	5.02	0.2392	5
160	3.89	MALE	36-45 YEARS	CERTIFICATE	9	4	4	1.69	0.0646	2
161	3.98	MALE	26-35 YEARS	GRADUATE	65	5	3.25	4.99	0.2558	5

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
162	3.29	MALE	26-35 YEARS	GRADUATE	12	2	2.5	1.94	0.0539	2
163	3.66	MALE	MORE THAN 55 YEARS	CERTIFICATE	40	1	2	11.98	0.4268	12
164	4.07	MALE	36-45 YEARS	GRADUATE	6	5	3	3.02	0.0797	3
165	2.9	FEMALE	26-35 YEARS	GRADUATE	79	3	2.75	3.18	0.3229	3
166	2.82	FEMALE	26-35 YEARS	GRADUATE	8	3	2.5	3	0.0774	3
167	3.69	MALE	18-25 YEARS	GRADUATE	0	2	3.25	3.99	0.2311	4
168	2.31	FEMALE	18-25 YEARS	DIPLOMA	5	2	2.75	2	0.049	2
169	3.09	FEMALE	26-35 YEARS	GRADUATE	41	4	2.75	2	0.0466	2
170	2.29	FEMALE	18-25 YEARS	GRADUATE	0	3	3.75	5.99	0.1341	6
171	2.79	FEMALE	36-45 YEARS	DIPLOMA	0	2	2.5	2.99	0.0754	3
172	3.21	MALE	26-35 YEARS	GRADUATE	52	2	3	1	0.0636	1
173	2.86	MALE	36-45 YEARS	POST GRADUATE	8	1	3	1	0.0204	1
174	2.83	FEMALE	46-55 YEARS	GRADUATE	3	2	2.75	1	0.0155	1
175	3.07	FEMALE	36-45 YEARS	GRADUATE	0	5	4	1	0.0308	1

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
176	3.71	MALE	MORE THAN 55 YEARS	POST GRADUATE	20	1	4.25	14.99	0.4415	15
177	3.14	FEMALE	18-25 YEARS	GRADUATE	1	1	1	2.05	0.0608	2
178	2.89	MALE	26-35 YEARS	POST GRADUATE	98	5	5	6.01	0.1123	6
179	2.73	FEMALE	26-35 YEARS	GRADUATE	0	2	2	1.94	0.054	2
180	3.68	FEMALE	26-35 YEARS	POST GRADUATE	5	5	3.75	2.11	0.0411	2
181	2.12	FEMALE	36-45 YEARS	DIPLOMA	2	2	2.75	11.02	0.3727	11
182	2.73	MALE	46-55 YEARS	ANY OTHER	36	3	2.25	17.98	0.8111	18
183	3.45	FEMALE	46-55 YEARS	GRADUATE	0	2	2.5	2.02	0.0681	2
184	3.46	MALE	36-45 YEARS	GRADUATE	75	5	3.5	5.02	0.1691	5
185	3.06	FEMALE	36-45 YEARS	DIPLOMA	0	4	5	5	0.1467	5
186	2.96	MALE	36-45 YEARS	CERTIFICATE	12	2	3.25	1	0.0308	1
187	3.14	MALE	36-45 YEARS	CERTIFICATE	7	1	3	1	0.0131	1
188	2.41	MALE	46-55 YEARS	GRADUATE	0	2	4	1	0.0242	1
189	2.63	FEMALE	36-45 YEARS	DIPLOMA	2	2	2	1	0.0118	1
190	2.59	MALE	26-35 YEARS	GRADUATE	83	1	1	1	0.0308	1

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
191	2.18	MALE	36-45 YEARS	GRADUATE	1	2	2	1	0.0308	1
192	2.63	MALE	36-45 YEARS	GRADUATE	3	2	2.75	1	0.0157	1
193	3.34	MALE	26-35 YEARS	DIPLOMA	0	2	2	1	0.0308	1
194	2.68	FEMALE	46-55 YEARS	GRADUATE	17	2	1.75	1	0.0308	1
195	2.96	FEMALE	46-55 YEARS	POST GRADUATE	1	2	2.5	1	0.0131	1
196	2.06	FEMALE	36-45 YEARS	DIPLOMA	42	4	2	1	0.0204	1
197	2.79	MALE	46-55 YEARS	POST GRADUATE	5	1	3.25	1	0.0161	1
198	2.66	FEMALE	36-45 YEARS	GRADUATE	1	2	3	1	0.0155	1
199	3.43	FEMALE	36-45 YEARS	GRADUATE	91	2	2.25	1	0.0308	1
200	3.05	MALE	18-25 YEARS	GRADUATE	3	5	3.5	1	0.2837	1
201	2.05	FEMALE	18-25 YEARS	GRADUATE	6	2	2	1	0.0242	1
202	2.8	MALE	26-35 YEARS	GRADUATE	2	1	3	1	0.0308	1
203	3.27	MALE	MORE THAN 55 YEARS	DIPLOMA	68	4	2.75	1	0.065	1
204	2.19	MALE	46-55 YEARS	DIPLOMA	2	4	2.5	1	0.0112	1
205	3.34	MALE	36-45 YEARS	GRADUATE	7	5	4	1	0.0292	1

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
206	3.82	MALE	36-45 YEARS	GRADUATE	0	1	3	1	0.0292	1
207	3.37	MALE	36-45 YEARS	GRADUATE	28	5	4.25	1	0.0292	1
208	2.23	FEMALE	36-45 YEARS	ANY OTHER	6	2	2	1	0.1289	1
209	2.7	MALE	36-45 YEARS	CERTIFICATE	5	5	3	1	0.0161	1
210	3.07	FEMALE	36-45 YEARS	DIPLOMA	4	2	1.5	2.07	0.0477	2
211	2.91	FEMALE	18-25 YEARS	GRADUATE	55	3	4.5	5.08	0.1171	5
212	2.82	FEMALE	46-55 YEARS	POST GRADUATE	5	1	4	5.04	0.1366	5
213	3	MALE	36-45 YEARS	GRADUATE	7	3	3.25	1.93	0.0439	2
214	2.93	MALE	MORE THAN 55 YEARS	POST GRADUATE	0	3	2.5	2	0.3041	2
215	2.94	MALE	MORE THAN 55 YEARS	CERTIFICATE	20	1	2.5	4.99	0.3831	5
216	2.63	FEMALE	18-25 YEARS	GRADUATE	0	5	3.25	2.99	0.1973	3
217	2.87	FEMALE	36-45 YEARS	DIPLOMA	96	4	3.25	3.94	0.0931	4
218	3.32	FEMALE	26-35 YEARS	POST GRADUATE	10	4	3.25	7.02	0.2778	7
219	2.67	FEMALE	18-25 YEARS	GRADUATE	0	1	2.75	3	4.14325	3

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
220	2.82	MALE	46-55 YEARS	GRADUATE	65	2	3.5	7.99	0.2978	8
221	3.67	MALE	26-35 YEARS	CERTIFICATE	8	4	2	4.01	0.2109	4
222	2.55	MALE	46-55 YEARS	POST GRADUATE	10	1	1	4.09	0.0904	4
223	3.2	FEMALE	26-35 YEARS	GRADUATE	9	2	3.5	5	0.3801	5
224	2.99	FEMALE	18-25 YEARS	GRADUATE	44	2	2.25	5	0.4616	5
225	3	FEMALE	26-35 YEARS	GRADUATE	0	5	2	2.97	0.0667	3
226	3.22	FEMALE	26-35 YEARS	GRADUATE	26	1	2.75	1	0.0169	1
227	3.49	FEMALE	18-25 YEARS	DIPLOMA	0	1	3.75	3.02	0.0797	3
228	3.54	MALE	36-45 YEARS	ANY OTHER	3	2	5	3.01	0.1769	3
229	2.94	MALE	26-35 YEARS	GRADUATE	2	4	3	1.93	0.0439	2
230	2.8	FEMALE	36-45 YEARS	GRADUATE	0	2	2.75	14.96	0.4324	15
231	3.8	MALE	26-35 YEARS	GRADUATE	53	3	5	3.08	0.0608	3
232	2.54	MALE	26-35 YEARS	GRADUATE	8	5	2.75	3	0.0883	3
233	3.21	FEMALE	18-25 YEARS	GRADUATE	95	2	2.75	2.97	0.1143	3
234	3.51	FEMALE	18-25 YEARS	GRADUATE	4	1	1	2.92	0.0745	3
235	3.59	FEMALE	18-25 YEARS	GRADUATE	2	3	2.75	1	0.0204	1

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
236	2.98	FEMALE	18-25 YEARS	GRADUATE	9	3	2.5	2.01	0.053	2
237	2.77	FEMALE	36-45 YEARS	POST GRADUATE	8	4	2.5	12.03	0.3141	12
238	3.48	MALE	26-35 YEARS	CERTIFICATE	10	1	3.25	11	0.6389	11
239	3.85	FEMALE	36-45 YEARS	GRADUATE	2	2	2.5	11.92	0.2889	12
240	3.22	MALE	18-25 YEARS	GRADUATE	1	2	2.75	4.02	0.1913	4
241	2.83	MALE	18-25 YEARS	GRADUATE	21	1	3.5	12	0.2569	12
242	3.11	MALE	26-35 YEARS	GRADUATE	5	1	3.25	6.99	0.3038	7
243	2.65	MALE	18-25 YEARS	GRADUATE	2	2	4.25	2.12	0.0357	2
244	2.98	MALE	18-25 YEARS	GRADUATE	1	4	3	1.98	0.0527	2
245	2.82	MALE	18-25 YEARS	GRADUATE	4	3	3	4.95	0.1219	5
256	3.26	MALE	26-35 YEARS	GRADUATE	89	4	3.75	9.99	0.3603	10
247	3.49	MALE	18-25 YEARS	CERTIFICATE	5	3	2.5	2	0.1593	2
248	4.6	MALE	18-25 YEARS	DIPLOMA	34	2	2	2.01	0.0885	2
249	3.34	FEMALE	26-35 YEARS	GRADUATE	4	3	2.5	3.01	0.0795	3
250	2.94	MALE	26-35 YEARS	POST GRADUATE	65	5	3.75	2.14	0.0387	2
251	2.81	FEMALE	18-25 YEARS	GRADUATE	3	5	2.75	2.94	0.0618	3

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
252	3.32	MALE	18-25 YEARS	GRADUATE	6	1	1	1.93	0.0439	2
253	3.23	FEMALE	26-35 YEARS	GRADUATE	5	2	3.5	6.97	0.1627	7
254	3.87	MALE	46-55 YEARS	POST GRADUATE	95	3	3	4.95	0.1297	5
255	3.39	FEMALE	18-25 YEARS	GRADUATE	1	2	3.25	3	0.175	3
256	3.27	FEMALE	18-25 YEARS	CERTIFICATE	12	2	3.5	2.02	0.055	2
257	2.67	FEMALE	26-35 YEARS	DIPLOMA	0	3	2.75	3.03	0.0759	3
258	3.28	MALE	18-25 YEARS	GRADUATE	43	2	2.75	1.85	0.0333	2
259	3.39	FEMALE	26-35 YEARS	GRADUATE	85	2	4.25	3	0.3161	3
260	3.53	FEMALE	18-25 YEARS	GRADUATE	2	2	2.5	3.02	0.1629	3
261	3.4	FEMALE	18-25 YEARS	GRADUATE	3	2	4.25	3.01	0.1859	3
262	3.25	MALE	18-25 YEARS	POST GRADUATE	2	1	2.75	1.99	0.1597	2
263	3.6	MALE	36-45 YEARS	GRADUATE	61	2	3	3	0.1273	3
264	3.43	MALE	46-55 YEARS	GRADUATE	8	1	3.25	3	0.351	3
265	3.56	MALE	36-45 YEARS	POST GRADUATE	5	2	2.5	7.02	0.2854	7
266	3.18	MALE	46-55 YEARS	CERTIFICATE	4	4	2.25	2.02	0.055	2
267	3.96	MALE	46-55 YEARS	DIPLOMA	2	2	1	2.92	0.0616	3

INVESTOR	BEHAVIOURAL BIASES	GENDER	AGE	EDUCATION	EXPERIENCE	CONTRARIAN STRATEGY	EXCESSIVE TRADING	NORMALIZED VARIANCE	VOLATILITY	No. OF STOCKS
268	3.46	FEMALE	46-55 YEARS	DIPLOMA	0	1	3.5	1	0.0308	1
269	3.78	FEMALE	18-25 YEARS	GRADUATE	73	2	2.5	3.01	0.1752	3
270	3.57	FEMALE	36-45 YEARS	GRADUATE	10	5	2.75	7.03	0.2356	7
271	2.71	MALE	18-25 YEARS	GRADUATE	2	2	2.75	4.99	0.2518	5
272	2.73	FEMALE	26-35 YEARS	GRADUATE	55	1	2.75	10.02	0.4841	10
273	3.12	MALE	36-45 YEARS	POST GRADUATE	10	1	4.25	3.94	0.0992	4
274	2.72	MALE	36-45 YEARS	GRADUATE	85	5	2	3.08	0.0744	3
275	3.28	FEMALE	36-45 YEARS	GRADUATE	1	4	2.5	1	0.0308	1
276	3.19	MALE	36-45 YEARS	DIPLOMA	6	5	3	4.01	0.2157	4
277	3.03	FEMALE	46-55 YEARS	DIPLOMA	0	2	2	2.92	0.0705	3
278	3.28	FEMALE	26-35 YEARS	POST GRADUATE	67	1	4.25	3.93	0.1068	4
279	2.69	MALE	46-55 YEARS	GRADUATE	1	1	2.75	9.01	0.4442	9

Appendix IV: Inputs for Shape Ratio

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
1	-0.3983	0.1422	0.1078	-3.5591
2	-0.0074	0.0326	0.1078	-3.5337
3	0.0904	0.1147	0.1078	-0.1517
4	3.1701	0.6702	0.1078	4.5692
5	3.1103	0.1985	0.1078	15.1259
6	-0.0128	0.0318	0.1078	-3.7925
7	1.0913	0.0968	0.1078	10.1601
8	-0.4207	0.1355	0.1078	-3.9004
9	0.0172	0.0361	0.1078	-2.5097
10	1.8813	0.6239	0.1078	2.8426
11	3.1890	0.1849	0.1078	16.6641
12	3.5560	0.1096	0.1078	31.4617
13	-0.1185	0.0607	0.1078	-3.7282
14	2.7958	0.0831	0.1078	32.3466
15	1.0711	0.3172	0.1078	3.0369
16	1.9905	1.09855	0.1078	1.7138
17	0.0784	0.0648	0.1078	-0.4537
18	2.8529	0.0892	0.1078	30.7747
19	3.7153	0.1135	0.1078	31.7841
20	2.8464	0.2354	0.1078	11.6338
21	0.8475	0.3069	0.1078	2.4102
22	0.5067	1.73805	0.1078	0.2295
23	1.1171	0.065	0.1078	15.5277
24	3.2734	0.3239	0.1078	9.7734
25	-0.1393	0.1	0.1078	-2.471
26	0.0170	0.0533	0.1078	-1.7036
27	-0.0433	0.1867	0.1078	-0.8093
28	2.6985	0.2661	0.1078	9.7358
29	1.0144	0.3417	0.1078	2.6532
30	1.0115	0.0692	0.1078	13.0592
31	0.0294	0.053	0.1078	-1.4792
32	0.0848	0.1774	0.1078	-0.1297
33	0.1695	0.2304	0.1078	0.2678
34	0.2880	0.1446	0.1078	1.2462
35	0.0160	0.0399	0.1078	-2.3008
36	0.0397	0.1597	0.1078	-0.4264
37	0.1642	0.1531	0.1078	0.3684
38	-0.2385	1.07985	0.1078	-0.3207
39	-0.1638	0.0508	0.1078	-5.3465

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
40	2.9533	0.7553	0.1078	3.7674
41	4.4390	0.6486	0.1078	6.6778
42	-0.1657	0.5652	0.1078	-0.4839
43	1.1691	0.0735	0.1078	14.4395
44	0.1490	0.0607	0.1078	0.6787
45	1.1238	0.3028	0.1078	3.3554
46	3.3592	0.121	0.1078	26.8711
47	3.6476	0.177	0.1078	19.9989
48	-0.1324	0.0397	0.1078	-6.0504
49	3.3576	0.3081	0.1078	10.5479
50	2.3822	0.3183	0.1078	7.1455
51	-1.1817	0.4416	0.1078	-2.9201
52	-0.2068	0.0794	0.1078	-3.9622
53	1.2073	0.6901	0.1078	1.5932
54	0.6540	0.3423	0.1078	1.5957
55	0.8004	0.2812	0.1078	2.463
56	-0.0045	0.2238	0.1078	-0.5018
57	-0.3192	0.0782	0.1078	-5.4604
58	3.8326	0.096	0.1078	38.8
59	3.1120	0.0883	0.1078	34.0227
60	3.8652	0.1666	0.1078	22.5534
61	0.3376	0.229	0.1078	1.0035
62	-0.2011	0.08	0.1078	-3.8613
63	0.9060	0.3422	0.1078	2.3326
64	0.0342	0.1619	0.1078	-0.4546
65	-0.2242	0.1109	0.1078	-2.9937
66	2.0945	0.6357	0.1078	3.1252
67	-0.3037	0.1519	0.1078	-2.709
68	0.9399	0.1279	0.1078	6.5059
69	0.3963	0.5147	0.1078	0.5605
70	0.0172	0.0361	0.1078	-2.5097
71	0.1111	0.0523	0.1078	0.0631
72	0.2078	0.0979	0.1078	1.0215
73	2.9385	0.26335	0.1078	10.7488
74	0.0766	0.0288	0.1078	-1.0833
75	3.6013	0.1166	0.1078	29.9614
76	0.8598	0.0697	0.1078	10.7891
77	-0.0966	0.0841	0.1078	-2.4304
78	0.0211	0.0495	0.1078	-1.7515
79	-0.3363	0.1257	0.1078	-3.533
80	3.1823	0.1939	0.1078	15.8561

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
81	0.2880	0.1939	0.1078	0.9293
82	0.3300	0.092	0.1078	2.4152
83	0.0668	0.0885	0.1078	-0.4633
84	0.5563	0.092	0.1078	4.875
85	0.1370	0.2759	0.1078	0.1058
86	3.6347	0.105	0.1078	33.5895
87	3.2879	0.1918	0.1078	16.5803
88	0.0597	0.0927	0.1078	-0.5189
89	-0.1356	0.0537	0.1078	-4.5326
90	0.0079	0.4919	0.1078	-0.2031
91	-0.3257	0.1282	0.1078	-3.3814
92	-0.4000	0.4382	0.1078	-1.1588
93	-0.0173	0.0558	0.1078	-2.2419
94	-0.2067	0.2661	0.1078	-1.1819
95	0.0502	0.0739	0.1078	-0.7794
96	0.4673	0.3959	0.1078	0.9081
97	-0.1545	0.0508	0.1078	-5.1634
98	0.0180	0.0407	0.1078	-2.2064
99	3.4100	0.6376	0.1078	5.1791
100	0.7843	0.2138	0.1078	3.1642
101	0.0067	0.0131	0.1078	-7.7176
102	-0.1942	0.0553	0.1078	-5.4611
103	-0.0697	0.0269	0.1078	-6.5985
104	0.6741	0.2747	0.1078	2.0615
105	3.4542	0.2262	0.1078	14.794
106	-0.0086	0.0312	0.1078	-3.7308
107	0.6281	0.4251	0.1078	1.2239
108	3.5002	0.1357	0.1078	24.9993
109	-0.0612	0.0489	0.1078	-3.456
110	-0.0885	0.0531	0.1078	-3.6968
111	-0.1660	0.0872	0.1078	-3.1399
112	2.0897	0.9818	0.1078	2.0186
113	0.6036	0.4223	0.1078	1.174
114	-0.0228	0.2151	0.1078	-0.6072
115	3.6099	0.2302	0.1078	15.2133
116	0.0170	0.0854	0.1078	-1.0632
117	2.0526	0.0533	0.1078	36.4878
118	3.8891	0.397	0.1078	9.5247
119	0.0029	0.0486	0.1078	-2.1584
120	-0.0086	0.0312	0.1078	-3.7308
121	3.6087	0.0892	0.1078	39.2478

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
122	-0.3467	0.0678	0.1078	-6.7035
123	0.0170	0.0533	0.1078	-1.7036
124	-0.0318	0.0871	0.1078	-1.6028
125	2.8710	0.1788	0.1078	15.4541
126	3.7039	0.1092	0.1078	32.9313
127	3.1294	0.2094	0.1078	14.4298
128	-0.3113	0.3508	0.1078	-1.1947
129	2.3354	0.3839	0.1078	5.8026
130	0.6902	0.4276	0.1078	1.362
131	-0.7461	0.3122	0.1078	-2.7351
132	-0.3019	0.1114	0.1078	-3.6777
133	2.8942	0.3823	0.1078	7.2885
134	3.2516	0.1549	0.1078	20.2957
135	1.1853	0.7221	0.1078	1.4922
136	2.8024	0.4242	0.1078	6.3522
137	0.5136	0.373	0.1078	1.0879
138	-0.2645	0.0544	0.1078	-6.8438
139	-0.4174	0.1029	0.1078	-5.104
140	3.4583	0.1813	0.1078	18.4804
141	1.9258	0.0321	0.1078	56.6355
142	1.6361	0.4363	0.1078	3.5029
143	0.3222	0.1786	0.1078	1.2004
144	0.0034	0.0395	0.1078	-2.643
145	0.3337	0.4532	0.1078	0.4985
146	-0.6567	0.3207	0.1078	-2.3838
147	0.8834	0.3286	0.1078	2.3603
148	0.2075	0.2561	0.1078	0.3893
149	3.0557	0.2099	0.1078	14.0443
150	6.6925	0.3367	0.1078	19.5566
151	0.4044	0.2035	0.1078	1.4575
152	-0.0400	0.0399	0.1078	-3.7043
153	0.0160	0.1477	0.1078	-0.6215
154	-0.0865	0.0399	0.1078	-4.8697
155	0.0766	0.0288	0.1078	-1.0833
156	0.4910	0.479	0.1078	0.8
157	0.9629	0.3027	0.1078	2.8249
158	3.5312	0.0688	0.1078	49.7587
159	-0.1000	0.2392	0.1078	-0.8687
160	0.0397	0.0646	0.1078	-1.0542
161	3.6355	0.2558	0.1078	13.7909
162	-0.1575	0.0539	0.1078	-4.9221

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
163	3.1898	0.4268	0.1078	7.2212
164	-0.0153	0.0797	0.1078	-1.5445
165	0.8000	0.3229	0.1078	2.1437
166	-0.0697	0.0774	0.1078	-2.2933
167	0.1863	0.2311	0.1078	0.3397
168	-0.0046	0.049	0.1078	-2.2939
169	-0.0199	0.0466	0.1078	-2.7403
170	-0.0877	0.1341	0.1078	-1.4579
171	-0.0367	0.0754	0.1078	-1.9164
172	1.1870	0.0636	0.1078	16.9686
173	-0.0527	0.0204	0.1078	-7.8676
174	-0.0785	0.0155	0.1078	-12.0194
175	0.0699	0.0308	0.1078	-1.2305
176	2.7803	0.4415	0.1078	6.0532
177	-0.3225	0.0608	0.1078	-7.0773
178	-0.3391	0.1123	0.1078	-3.9795
179	-0.1997	0.054	0.1078	-5.6944
180	1.0632	0.0411	0.1078	23.2457
181	-0.7163	0.3727	0.1078	-2.2112
182	-0.0447	0.8111	0.1078	-0.188
183	0.0227	0.0681	0.1078	-1.2496
184	3.6871	0.1691	0.1078	21.1668
185	3.4605	0.1467	0.1078	22.8541
186	0.0699	0.0308	0.1078	-1.2305
187	0.0067	0.0131	0.1078	-7.7176
188	-0.0539	0.0242	0.1078	-6.6818
189	-0.0306	0.0118	0.1078	-11.7288
190	0.0699	0.0308	0.1078	-1.2305
191	0.0699	0.0308	0.1078	-1.2305
192	0.0912	0.0157	0.1078	-1.0573
193	0.0699	0.0308	0.1078	-1.2305
194	0.0699	0.0308	0.1078	-1.2305
195	0.0067	0.0131	0.1078	-7.7176
196	-0.0527	0.0204	0.1078	-7.8676
197	-0.0827	0.0161	0.1078	-11.8323
198	-0.0785	0.0155	0.1078	-12.0194
199	1.1171	0.0308	0.1078	32.7695
200	1.1171	0.2837	0.1078	3.5576
201	-0.0539	0.0242	0.1078	-6.6818
202	0.0699	0.0308	0.1078	-1.2305
203	3.6626	0.065	0.1078	54.6892

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
204	-0.1396	0.0112	0.1078	-22.0893
205	-0.0440	0.0292	0.1078	-5.1986
206	-0.0440	0.0292	0.1078	-5.1986
207	-0.0440	0.0292	0.1078	-5.1986
208	0.2181	0.1289	0.1078	0.8557
209	-0.0827	0.0161	0.1078	-11.8323
210	-0.0074	0.0477	0.1078	-2.4151
211	0.1875	0.1171	0.1078	0.6806
212	0.2031	0.1366	0.1078	0.6977
213	0.0766	0.0439	0.1078	-0.7107
214	1.0644	0.3041	0.1078	3.1457
215	0.6812	0.3831	0.1078	1.4967
216	0.2351	0.1973	0.1078	0.6452
217	1.0556	0.0931	0.1078	10.1805
218	3.9052	0.2778	0.1078	13.6695
219	-0.0357	4.14325	0.1078	-0.0346
220	0.0955	0.2978	0.1078	-0.0413
221	0.0569	0.2109	0.1078	-0.2413
222	-0.0840	0.0904	0.1078	-2.1217
223	0.7999	0.3801	0.1078	1.8208
224	1.3306	0.4616	0.1078	2.649
225	-0.0613	0.0667	0.1078	-2.5352
226	-0.0773	0.0169	0.1078	-10.9527
227	-0.0745	0.0797	0.1078	-2.2873
228	0.4884	0.1769	0.1078	2.1515
229	-0.1717	0.0439	0.1078	-6.3667
230	0.1010	0.4324	0.1078	-0.0157
231	-0.0007	0.0608	0.1078	-1.7845
232	-0.2644	0.0883	0.1078	-4.2152
233	3.8452	0.1143	0.1078	32.6982
234	3.4536	0.0745	0.1078	44.9101
235	-0.0527	0.0204	0.1078	-7.8676
236	1.3092	0.053	0.1078	22.6679
237	-0.5243	0.3141	0.1078	-2.0124
238	0.9749	0.6389	0.1078	1.3572
239	2.7674	0.2889	0.1078	9.206
240	0.2742	0.1913	0.1078	0.8698
241	-0.3037	0.2569	0.1078	-1.6018
242	-0.2753	0.3038	0.1078	-1.261
243	-0.2870	0.0357	0.1078	-11.0588
244	-0.1120	0.0527	0.1078	-4.1708

INVESTOR No.	PORTFOLIO RETURNS	STANDARD DEVIATION	RISK FREE RATE	SHARPE RATIO
245	0.1164	0.1219	0.1078	0.0705
246	-0.2522	0.3603	0.1078	-0.9992
247	0.2093	0.1593	0.1078	0.6372
248	3.6971	0.0885	0.1078	40.5571
249	1.0256	0.0795	0.1078	11.5447
250	-0.0958	0.0387	0.1078	-5.261
251	-0.2029	0.0618	0.1078	-5.0275
252	0.0766	0.0439	0.1078	-0.7107
253	0.0790	0.1627	0.1078	-0.177
254	0.1820	0.1297	0.1078	0.5721
255	0.3453	0.175	0.1078	1.3571
256	0.0160	0.055	0.1078	-1.6691
257	-0.0680	0.0759	0.1078	-2.3162
258	-0.0833	0.0333	0.1078	-5.7387
259	0.9613	0.3161	0.1078	2.7001
260	0.2523	0.1629	0.1078	0.887
261	0.3308	0.1859	0.1078	1.1996
262	0.2880	0.1597	0.1078	1.1284
263	3.5245	0.1273	0.1078	26.8397
264	0.8083	0.351	0.1078	1.9957
265	0.9179	0.2854	0.1078	2.8385
266	0.0160	0.055	0.1078	-1.6691
267	0.0487	0.0616	0.1078	-0.9594
268	0.0699	0.0308	0.1078	-1.2305
269	3.1441	0.1752	0.1078	17.3305
270	-0.0051	0.2356	0.1078	-0.4792
271	0.2733	0.2518	0.1078	0.6573
272	0.1030	0.4841	0.1078	-0.0099
273	-0.0891	0.0992	0.1078	-1.9849
274	-0.2524	0.0744	0.1078	-4.8414
275	0.0699	0.0308	0.1078	-1.2305
276	2.7368	0.2157	0.1078	12.1882
277	-0.0625	0.0705	0.1078	-2.4156
278	-0.348	0.1068	0.1078	-4.2678
279	0.4382	0.4442	0.1078	0.7438