

**THE IMPACT OF INTERNAL BEHAVIOURAL DECISION-MAKING BIASES ON
SOUTH AFRICAN COLLECTIVE INVESTMENT SCHEME PERFORMANCE**

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ABSTRACT

Market efficiency, based on people acting rationally, has been the dominating finance theory for most of the 20th and 21st Century's. This classical finance theory is based on assumptions that people are rational, they absorb all available information and maximise utility. This view is outdated; it has been shown that people are in fact irrational and that this could be the cause of anomalies in the market. Behavioural finance takes into account people, and their natural biases. Behavioural finance has integrated classical financial theories and psychological theories to illustrate the way in which irrational people can impact market efficiency.

This research looks at the way collective investment scheme manager decision-making can impact market efficiency. Specifically the behavioural biases: overconfidence, over optimism, loss aversion and frame dependence and whether or not collective investment scheme performance is affected by these. This research was carried out using a questionnaire distributed directly to CIS managers and risk-adjusted returns were used in order to allow for comparative results.

The results from the questionnaire show evidence that actively managing South African CIS managers do indeed suffer from overconfidence and loss aversion and they do not appear to suffer from frame dependence or over optimism in this research context. There was also evidence showing that managers who suffer from these biases also demonstrated lower investment returns.

“The investor's chief problem, and even his worst enemy, is likely to be himself.”

- Benjamin Graham

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION AND RESEARCH PROBLEM

According to Shefrin (2002:4): “People are imperfect processors of information and are frequently subject to bias, error, and perceptual illusions” this provides the basis for the research. The way in which people process information could assist to explain market imperfections that can no longer be adequately explained through classical finance theory.

Over the last century there have been various economic downturns or recessions around the world. This kind of intermittent economic disturbance raises an important question: Is classical finance theory relevant when such crisis are occurring? If the belief that people and therefore markets act rationally where true, would the world have experienced the different economic situations that unfolded?

Behavioural finance has been shown to account for the anomalies that cannot be explained by classical finance theory, for example Kahneman and Tversky’s prospect theory (1979). The scope of this research is to determine whether behavioural finance has a role to play in the decision-making of collective investment scheme managers, through investigating what behavioural biases are manager specific and determining whether collective investment scheme managers exhibit these biases in a decision-making context.

1.2 BACKGROUND

The South African unit trust or collective investment scheme industry has grown phenomenally over the last 40 years with unit trusts beginning with a single equity fund by Sage in 1965 to around 950 funds by 2011, with over two million South Africans holding investments in unit trusts (Oldert, 2012:30). People are gaining confidence in the industry and the type of investments offered, they are noticing the benefits of diversification and regulation and being able to invest without having the skills or knowledge required to do it themselves.

In South Africa there is little research about the effect that the fund manager, or more specifically their individual behavioural biases, has on the performance of these funds. That’s what this research aims to rectify, by attaining direct information from specific managers this

information can be used to assess the relationship, granting a clearer understanding.

Over the decades this research has mainly taken place in the United States of America (USA), where collective investment schemes, or more commonly known as mutual funds, are in abundance with more of a focus on private investors and their effect on the market rather than managers who invest on behalf of private investors. Initially Herbert Simon (1959) studied how psychology impacts financial decisions. Further research by Daniel Kahneman and Amos Tversky resulted in key beliefs in behavioural finance theory: that there is no assumption of rationality or perfect markets (De Bondt, Shefrin, Muradoglu and Staikouras, 2008:8).

The globally accepted classical finance theory assumes that investors and managers are rational, therefore judgement will be rational, and therefore markets act rationally. Kahneman and Tversky's (1979) prospect theory challenged the assumptions of classical theory and by doing so revealed that behaviour is subject to unique interpretations and that people are a big influencer of the market. Therefore prospect theory found a way to answer questions that the limitations of classical finance theory could not.

Through the understanding of the prospect theories subsequent findings of emotional or cognitive limitations that affect managers in decision-making capacities, classical theories and finance models may be able to find improvements to the way in which decisions are made.

1.3 CONTEXT OF RESEARCH

1.3.1 Behavioural Finance

Behavioural finance emerged as a field in the 1980's after research regarding the disproportion between fundamental values and actual stock prices indicated anomalies unaccounted for by classical finance theory. Behavioural finance directly conflicts with the classical finance notion that the rationality in decision makers is realistic and proposed an alternative account of choice under risk (Tversky and Kahneman, 1986:1). Behavioural finance studies the nature and quality of financial judgements and choices made by investors, and examines what the consequences are for financial markets and the organisations involved (De Bondt *et al.* 2008:7).

Many studies have been done on the influence of behavioural biases on individuals, this dates back to the work done by Simon in 1959 on bounded rationality and was then expanded on through the pioneering heuristic's and biases research conducted by Tversky and Kahneman

from the late 1960's. This resulted in a Nobel Prize for their prospect theory about irrational investors. This research was then furthered by Hersh Shefrin to merge behavioural finance and corporate finance: corporate behavioural finance, for an internal understanding of managers and corporate finance, this is explored further below.

1.3.2 Corporate Behavioural Finance

Hersh Shefrin (2001) furthered behavioural finance applications to corporate finance. This field's focus is on the manager and organisation's internal behavioural obstacles to organisational value creation (Shefrin, 2001:114). These behavioural biases are what could possibly interfere with classical finance theory. There are two types of behavioural obstructions to the value maximisation sought by the organisation: external and internal. The external are those errors made by analysts or investors which explains the difference between market prices and fundamental values (Shefrin, 2001:114). The focus of this study will be the internal decision-making of the individual asset manager and how this is affected by biases, more specifically cognitive imperfections and emotional forces.

Through the heuristics and biases findings, the examination of the psychological mechanisms which describe how the human mind functions and therefore why financial judgement is imperfect was researched (Laibson and Zeckhauser, 1998:9). These behavioural biases will be explored further in the next section.

1.3.3 Behavioural Biases

Simon (1959) challenged classical economic thinking, he believed that individuals are restricted by the human mind through cognitive and emotional limits, where acceptable is more appropriate than optimal. There are a number of terms which have been used to describe certain behaviours seen within decision-making which can result in errors.

These errors occur when making decisions in specific contexts or scenarios. When these errors are made by the decision-maker not all of the available information regarding the problem is processed in a rational manner. The individuals that undertake collective investment scheme decision-making will more than likely make human errors which can lead to negative outcomes and therefore imperfect performance and markets. If these errors are identified and acknowledged fund managers may maximise their potential performance (The Economist, 2009:1).

Cognitive errors take place when a belief is formed through the decision-maker systematically overestimating or underestimating the true probability of events leading to severe and systematic errors (Laibson and Zeckhauser, 1998:9). These types of decisions take place within situations with high complexity and high uncertainty; this is amplified further when the decision maker has little or no experience with the specific problem. According to De Bondt *et al.* (2008:12) and Bailey, Kumar and Ng (2010:3-4) the typical biases related to cognitive errors are:

- Representativeness: when a project is categorised into being representative of a well-known class or typical;
- Overconfidence: the overvaluing of an individual's abilities or knowledge leading to misguided risk or probability of success;
- Anchoring: the reliance on one piece of initial information;
- Availability bias: the easily recalled and accessible information influencing decisions; and
- Optimism: the belief that positive future outcomes will occur to them above the average.

Emotional forces refer to the errors that are made by people when assigning values to future outcomes or from improper combinations of values and probabilities. Kahneman and Tversky (1979), the proponents of the prospect theory, directly challenge the assumption of rational decision-making entailing accurate and unbiased information. These theorists indicate that behaviour is subject to unique interpretation that is situational dependent (Weick, 1970; Wiseman and Gomez-Mejia, 1998:143). Each individual has a preference which influences decision-making. According to De Bondt *et al.* (2008:12-13) and Shefrin (2001:117) the most important preferences are:

- Loss aversion: the process of weighing a loss twice as much as gains of a similar amount;
- Mental accounting: how financial outcomes are categorised and evaluated;

- Regret aversion: finding a bad outcome after a decision had been made;
- Self-control: the degree to which impulses can be controlled – holding on to losing investments; and
- Frame dependence: not being able to see a package of dependent decisions problems but separate entities.

The combination of cognitive errors and emotional forces and the complexity of the industry can yield unsatisfactory performance. The focus of this study is to establish whether there is a relationship between the collective investment scheme manager's biases and the fund's performance. This study will focus on over optimism, overconfidence, loss aversion and framing dependence.

1.3.4 Collective Investment Schemes

Collective investment schemes (CIS) are actively managed funds that combine investments from various investors. These investment funds are regulated and available to the general public with their performance publicly available.

Collective investment schemes have the advantage to the public such as increased diversification, active professional investment management as well as government regulation. Collective investment schemes have gained in popularity for private investors due to their convenience and the fact that investors are apprehensive to invest directly in the markets due to their lack of knowledge of financial markets. Private investors would therefore rather compensate a professional to invest their money (Pettit, 2007:495).

Collective investment scheme studies have been conducted regarding the performance of collective investment schemes and the impact that the fund managers have on this performance. These studies covered various influences on mutual funds' performance. Modigliani and Pogue (1975), Starks (1987) and Grinblatt and Titman (1989) considered the effect of incentive performance contracts between a mutual fund company (and manager) and mutual fund investors. Smith and Goudzwaard (1970) studied the relevance of education on graduates in their jobs as fund managers while Chevalier and Ellison (1999) analysed the relationship

between age and education on fund performance. Fama (1980) studied career concerns effect on fund performance and Golec (1996) studied the influence of MBA status, tenure and age on the performance of a fund. Prather and Middleton (2002) found that mutual funds persistent and differential performance could be accredited to the influence of managerial decision-making.

These studies did not necessarily test the unique capabilities or traits of the individual fund manager but rather approached their studies through outside, freely available information. The approach of this study will be to assess the behavioural biases of individual CIS managers and then link these biases to the performance CIS's.

This study is similar to those conducted by Masood and Sergi (2009) and Drachter, Kempf and Wagner (2007) which explored unique capabilities of mutual fund managers. Masood and Sergi (2009) collected original survey data from Turkish fund managers and correlated this to specific performance criteria, through three ordered choice models: number of clients, number of funds and portfolio size. All three measures of performance were found to systematically vary with fund manager characteristics; indicating that some managers are better than others.

Drachter, Kempf and Wagner (2007) conducted a telephone survey on German fund managers to shed light on their investment decision-making processes and link this data with information regarding mutual funds and fund management companies. The main finding in this study was that managers' behaviour does depend on characteristics of the fund and of the fund company.

The above literature highlights the relevance of other non-behavioural aspects that may influence the performance of funds and that should be kept in mind when conducting research of this nature.

1.4 RESEARCH AIM

The primary aim of this research is to study the influence of internal behavioural biases of South African collective investment scheme managers in a decision-making context and how these biases affect collective investment schemes.

1.5 RESEARCH OBJECTIVES

The primary question that this research aims to answer is: “Do internal behavioural biases have a role to play in the performance in collective investment schemes?”

To achieve the aim of the research, the objectives are to:

- Determine the behavioural biases of South African collective investment scheme managers in a decision-making context;
- Determine the performance of the corresponding South African collective investment scheme; and
- Investigate the relationship between behavioural biases and the performance of collective investment schemes.

1.6 DELIMITATION

This research is limited to registered domestic collective investment funds as at 09 February 2012 in South Africa with active individual CIS managers. No index, multi-managed or global funds were used in this study.

1.7 DEFINITIONS

Behavioural Finance	A merging of classical economic theory with psychology to explain the anomalies that classical finance cannot (Shiller, 2003:83).
Collective Investment Scheme	A pooling of a group of investors’ money in order to get a spread of professionally managed investments, the risks and the profits are then shared (Oldert, 2012: 42). Common collective investment schemes mentioned in this study are mutual funds or unit trust funds (portfolio of collective investment schemes).

1.8 OUTLINE

The structure of this thesis is as follows:

- Chapter 2 Consists of the principal theories underlying the research and the central concepts of behavioural finance and collective investment schemes applicable to this thesis. This also consists of previous studies in the area and most recent concepts in the area.
- Chapter 3 Presents the general approach and research methodology used in this thesis. It describes the working process and data sources, as well as criticisms of the chosen sources.
- Chapter 4 Describes the empirical research conducted, including the results obtained and a subsequent analysis of these results with statistical based findings.
- Chapter 5 A summary consisting of conclusions and recommendations.

Relevant appendices are included after the references of the thesis.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This study has certain similarities to previous research conducted by behavioural finance pioneers but has two very distinct differences: the focus here is on managers' decision-making instead of individual investors and the data has been directly collected from the population. This study has used data collected directly from 42 CIS managers in order to assess the performance of the CIS.

According to Shefrin (2002:4) "People are imperfect processors of information and are frequently subject to bias, error, and perceptual illusions." This formed the basis for this research, it aims to ascertain whether or not behavioural biases are present in South African CIS managers and that there is indeed a relationship between the managers' decision-making and their funds' performance.

The most commonly accepted theory of financial markets in the 20th century is that of the efficient market hypothesis (EMH). This theory went beyond utility maximisation to assume that the average population's rational expectations are correct. This theory relied on the assumptions that all investors are rational and that all available information is incorporated into asset prices resulting in efficient markets (Fama, 1965:76). Therefore, the average person would revise their expectations when new information presented itself.

However, towards the end of the 20th century this theory began to be challenged in various ways. People began to tire of the theory not providing all the answers they needed. Research began to show that research results differed from the expected results of classical theory (Shefrin, 2009:5). From these conclusions behavioural finance grew throughout the last two decades because researchers desired a way in which to explain empirical patterns or events which did not follow EMH theory.

Behavioural finance is a relatively new field where there is still disagreement between the discipline of classical finance and the newer behavioural finance. This should rather be viewed as an opportunity to collaborate and advance the research with regard to decision-making and market inefficiency.

2.2 CLASSICAL FINANCE THEORY

2.2.1 Efficient Market Hypothesis

As mentioned above EMH was, and to a certain degree still is, the most commonly believed theory of financial markets since the 1950's. Eugene Fama (1965:76) defines an efficient market as one where a large number of profit-maximising, rational individuals actively compete and try to predict future market values of individual securities. Important current information is also freely available to all the participants and the competition, on the average, will result in the instantaneous reflection of this information into the intrinsic values of the securities and therefore their actual prices. Furthermore it is expected that the investors' reactions would be random and follow a normal distribution, making arbitrage impossible (Malkiel, 2003:64).

This theory has three forms or levels of market efficiency which are: weak efficiency, semi-strong efficiency and strong efficiency. Weak efficiency is when prices fully reflect any information from past price data, semi-strong efficiency is when prices fully reflect all readily-available public information; past price data, earnings data, and economic news. Strong efficiency is when prices fully reflect all public and privileged information; economic news, earnings data, past price data etc. and commissioned internal research, market maker information and insider information (Fama, 1970:383).

The majority of testing performed on this theory concentrated on the latter two of the forms because weak efficiency overlaps with the random walk hypothesis (Holton, 1992:4). Random walk hypothesis is the theory that short-run changes in stock process cannot be predicted on the basis of past action (Malkiel, 1999:24). Through the testing of these theories a few researchers found violations in either the semi-strong or strong market efficiency. These violations were used as opportunities by people or organisations which had the knowledge and experience to profit from it. This did not mean that EMH theory is invalid (Holton, 1992:42). However, this did show that markets are not always efficient.

Eugene Fama even came to acknowledge that strong market efficiency was not entirely realistic because some non-public information presented an arbitrage opportunity for those in the know (Holton, 1992:4). Yes, the theory has provided great value to the industry but is it perhaps time to bring reality into the picture?

With this said, the evidence against classical theory is mounting. Classical financial theorists, especially the pioneering contributors: Eugene Fama and Paul Samuelson believe that their theory is a simplification of the finance world that does not always hold true but is efficient for most individual investment purposes (Desai, 2011:1).

2.2.2 Support and criticism

In the 1990's EMH theory began to be questioned more widely due to the mainstreaming of the fringe element, behavioural finance. The anomalies found in the analysis of the markets brought forward the concept of human intervention playing a role in efficiency. Some critics believe that events such as the various stock market bubbles and crashes worldwide over the last few decades and the current global financial crisis can be accredited in some ways to classical finance. The former USA Federal Reserve chairman, Paul Volcker is among the critics; he said that it was "clear that among the causes of the recent financial crisis was an unjustified faith in rational expectations and market efficiencies" (Volcker, 2011:1).

There are others who agree with this view, some who criticise EMH in its entirety and then others who believe that it simply does not account for human nature, but it is not irrelevant. There was evidence in Fama's 1970's paper on efficient capital markets, where certain anomalies were picked up yet declared insignificant in the realm of the theory. These findings that contradicted the theory were played down and therefore ignored (Shiller, 2003:84). Yet Eugene Fama accepted that uninformed investors could theoretically lead the market astray and therefore prices may be somewhat irrational as an outcome (Hilsenrath, 2004:1).

The behavioural finance pioneers may be the most outspoken of all critics due to their belief that human nature has a role to play in the efficiency of markets. Kahneman, Tversky, De Bondt, Thaler are all names that are now associated with behavioural finance. The combinations of psychology and economics lead to the findings. The theory and papers by these authors are discussed throughout this research.

While evidence against EMH is mounting, behavioural theorists are offering an explanation: it is believed that the imperfections in the market can be attributed to a combination of human errors in information processing and reasoning (Ricciardi and Simon, 2000:27). There are various anomalies that classical finance simply cannot account for, this leaves a gap for theories

that can provide an explanation. Investors, professional or average, are searching for answers to explain the market scenarios which keep unfolding.

2.2.3 Classical Corporate Finance Theory

Traditional corporate finance theory teaches managers about rational decision-making with regard to capital budgeting and capital structure under the premise that investors and analysts also behave in a rational manner (Shefrin, 2008:10). This deals with the everyday, small, medium and large decision-making that managers have to undertake in order for a company to operate.

From the discussion above regarding classical finance theory the assumption of people acting rationally has been found to not be completely accurate. Furthermore Shefrin (2008:10) has also found that in a situational context there is strong evidence that managers, investors and analysts are not always rational. Therefore, if managers are not rational, the ability of managers, analysts and investors to make capital budgeting and structure decisions without being affected by human nature is not possible. This then affects the process in which managers can make decisions as well as how managers make decisions. Being aware of behavioural biases and what can influence decision-making is the first step to finding a way to overcome them.

Classical corporate finance theory has its basics set in the capital asset pricing model (CAPM) (Sharpe, 1964). The premise of the EMH theory relies on the idea that prices are efficient. This misconceived efficiency is where mispricing can occur. This in turn can cause conflict for corporate finance efficiency. Therefore, with EMH's assumptions being contested within the last few decades this brings about queries into the CAPM model too.

Research has been undertaken looking into the ways in which managers can overcome these errors. The first is if managers are rational but investors or analysts are not and this has recreated a mispricing of the stock price. According to Shefrin (2008:14) when analysts and investors are excessively optimistic about the future prospects of a specific firm, the prices of the firm's stock are bid up and the stock price is overvalued.

This resultant mispricing leads to the firm's future expected returns to be abnormally low. This leads to managers needing to consider a new equity issue or new project funding in order to revalue the price for shareholders even at the expense of the firm's long term value (Shefrin,

2008:14). However, if investors are irrational for any other reason and decide to hold onto the stock then the manager would not take on a new opportunity in order to preserve long term value. This reaction is the probably the most typical (Shefrin, 2008:14).

Behavioural finance puts forward prescriptive guidelines for value-maximising managers in the event of mispriced stocks, these guidelines provide circumstances in which the discount rate can or should be adjusted and other circumstances where they should not. Therefore it can be said that capital budgeting policy can be more complex when mispricing inefficiencies have occurred (Shefrin, 2008:14-15).

The guidelines are as follows:

- When project selection decisions do not indirectly affect capital structure and long-term value-maximisation is sought, then the CAPM based discount rate should be used. This rate should only be adjusted to reflect project risk.
- When project selection decisions do have an indirect effect on capital structure the discount rate will need to be adjusted in order to continue value-maximisation of the firm. This adjustment will reflect the degree to which the firm's equity is mispriced in the market.

(Shefrin, 2008:14-15).

This demonstrates that managers in any industry making various decisions which are susceptible to market mispricing (due to individual and analyst irrationality and therefore stock mispricing) are susceptible themselves to irrational decision-making. Therefore, CIS managers can also be susceptible to irrational decision-making. However, when managers are aware of this error then they can start to implement methods to overcome this.

2.3 BEHAVIOURAL FINANCE

The alternative, behavioural financial theories and their impact on the research, will now be considered.

2.3.1 Introduction

The field of behavioural finance offers a different vantage point on economics, finance and

investing. Behavioural finance's foundations began in the 1960s and 1970s, with research done by various theorists combining key principles in investment and finance with specific psychology principles.

According to Ricciardi and Simon (2000:27) behavioural finance attempts to explain the what, why, and how of finance and investing, from a human nature perspective. According to Sewell (2007:1) "Behavioural finance is the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets" This field of research is certainly more in-depth than this statement, however this is the foundation of the theory as a whole. Behavioural finance attempts to improve understanding of investors reasoning, emotional processes and how these influence decision-making processes or investors' judgement processes.

Shefrin (2002:29) defines the cognitive limits or emotional forces that people face as the way people organise their information and the way people feel as they register information. Behavioural finance was therefore a field in which theories could be tested. This field wanted to use research and experiments to understand the markets and investors. This approach clashed with classical finance theory that has always been problematical to test.

Various research has shown that people are in fact irrational, this irrationality is what can result in unpredictable decision-making (Simon, 1959:253). These unpredictable actions are what cause the market anomalies which have not been explained by classical finance. Behavioural finance aims at explaining the irrationality aspects of people and why this has caused the unexplained events in the markets. This theory also goes further into how to account for these human errors which will be explained later on in this chapter.

2.3.2 Behavioural Finance Background and Progression

Cognitive psychology began to gain more ground in the 1960s, this allowed for the concept of the brain as an information processor. This in turn allowed psychologists such as Daniel Kahneman and Amos Tversky to compare their models of decision-making to the economic theories of the time. This being the utility maximisation theory or EMH.

In 1959 Nobel Prize winner Herbert Simon forged the path of classical economic thinking doubt. Simon pioneered bounded rationality theory where the belief is that people are restricted by the human mind through cognitive limits (Simon, 1959:253). This illustrated that people are

susceptible to situational and personal limitations, often where acceptable is more appropriate than optimal (Simon, 1959:253).

Between the 1960s and the 1980s EMH was still the one common belief which had not been widely questioned yet. People believed that markets were efficient and any deviations from this were labelled anomalies. This was when an event that was difficult to rationalise or if unlikely assumptions were necessary to explain it occurred (De Bondt and Thaler, 1989:189).

An example of this is when Fama and French (1996:55) found that average common stock returns are related to certain firm characteristics such as size, long-term past returns, past sales growth, earnings, price etc. CAPM cannot explain these patterns in average returns and therefore these patterns are labelled anomalies. They then found these anomalies disappear in their three-factor model but they also consider irrational pricing and data problems as explanations (Fama and French, 1996:55).

These anomalies directly conflict with the assumptions of classical finance in that they assume rational and logical behaviour in market participants. Classical theory does not account for all situations that happen in the real world, with behavioural finance there could be a possibility of including the real world into economic theory.

These anomalies in the market gave rise to behavioural finance and its answers to the questions that could not be answered by classical finance. The field comes from a collaboration between finance, economics and psychology. This originated with the works of Daniel Kahneman and Amos Tversky. Richard Thaler was also an important component of this field; he brought the economic side which gave way to the discovery of new biases which aided in cementing behavioural finance as a field. This culminated in Kahneman receiving the Nobel Memorial Prize in Economic Sciences in 2002 for his contributions to the study of rationality in economics. These three have contributed major theoretical and empirical findings.

Anomalies began to be discovered in the 1980s, but this was at a time where if found, they were down played and ignored (Shiller, 2003:84). They were labelled as small departures from the classical theory and there was nothing that could be done. The anomaly which gained ground in this area was the excessive volatility that could not be explained by EMH. This called into question the assumptions of the theory (Shiller, 2003:84).

Kahneman and Tversky have psychology backgrounds and published over 200 works, most of which had a focus on psychology concepts with implications for behavioural finance. This mostly consisted of biases and heuristics work which related to human cognition. These were approaches to problem solving or decision-making which caused people to engage in irrational behaviour. Kahneman and Tversky were able to describe and classify the 'short cuts' people use to simplify their lives when it comes to making a decision or solving a problem. These became known as judgemental heuristics or rules of thumb (Belsky and Gilovich, 2009:13).

Kahneman and Tversky's most notable work was that of prospect theory (1979) which directly conflicted with classical finance's assumptions. This paper used cognitive psychology to explain anomalies in the market through divergent decision-making. This will be elaborated upon later.

There are many more researchers who added greatly to the field and their research is discussed throughout the paper. The main contributors were: Robert Shiller, Hersh Shefrin, Maier Statman, Werner De Bondt, Richard Thaler, Daniel Kahneman and Amos Tversky.

Behavioural finance emerged as a notable field in the 1980's. Behavioural Finance is a theory which relaxes the traditional classical theory assumptions by incorporating observable, systematic and obvious human deviations from rationality into standard models of financial markets (Barber and Odean, 2001:288). The field studies the nature and quality of financial judgments and choices made by individuals, and examines what the consequences are for financial markets and institutions. The key beliefs in this theory are that there is no assumption of rational people or perfect markets (De Bondt *et al.* 2008:8).

The human deviations were explored and labelled throughout the research conducted. This was the identification of certain behaviours that are present when people make decisions, these are commonly referred to as behavioural biases. There are a number of these that have been given different terms and are of notable consequence.

These have become known as predictable mistakes or errors in judgement or cognition that people make. Research carried out examined the psychological mechanisms which explain how the human mind functions. This led to answers to the question: why is financial judgement imperfect? These mechanisms do however also depend on context and there are

other mitigating circumstances which also need to be considered, but these are not the focus of this study. This imperfect judgement directly relates to how decision processes shape decision outcomes, depending on the inputs (Brockner and Wiesenfeld, 1996:189).

In real life people tend to do things which don't fit the rationality mould, they don't always act in their own self-interest by giving to charity or taking someone out for a meal. People also don't think about the petrol used in a trip to a discount store 20 minutes away (Belsky and Gilovich, 2009:7). In the study by Belsky and Gilovich (2009) they explored the tipping phenomenon and how this relates to social heuristics, indicating people do what is the norm or rule of thumb in most situations. This behaviour is inconsistent with rationality assumptions, in the goal of self-interest why do people tip when there is bad service? This can be applied to the way in which people invest their money in the stock exchange, why some stocks are dumped or bought up without any rationality behind it, simply because it's what others investors are doing (Belsky and Gilovich, 2009:8).

Belsky and Gilovich (2009:1) believe that people can enhance their life's enjoyment by understanding and modifying the way they deal with money. This means that when investors or people dealing with household money are aware of their biases they can overcome them. They are of the opinion that this would probably take some time but would be worth it.

One of the other main findings of behavioural finance research was that of errors made by average investors which resulted in creating an opportunity for experts who recognised the error. This causes a pricing error in the market of either an overvalued or undervalued stock which can cause price bubbles, large or small. This is commonly referred to as arbitrage (De Bondt *et al.* 2008:9).

Therefore there are two building blocks of behavioural finance: that arbitrage is in fact possible and the psychological categorisation of the deviation taken from rationality or behavioural biases (Barberis and Thaler, 2003). Barberis and Thaler (2003) believe that since the 1980s there has been substantial progress in the behavioural finance field and that EMH has various holes in its theory (Barberis and Thaler, 2003:1112). There are, however various facts still in dispute between the assumptions of both theories. However, EMH has had too many gaps in its theory and behavioural finance has essentially filled in those gaps. Without the constant battle between who is right and who is wrong, which is irrational in its own right, the

researchers should be focusing on the possibilities of human error and how these can be overcome in order for positive outcomes to occur.

2.3.3 Proponents of Behavioural Finance Theories

Some of the proponents' research which contributed to the progression of the field will now be explored.

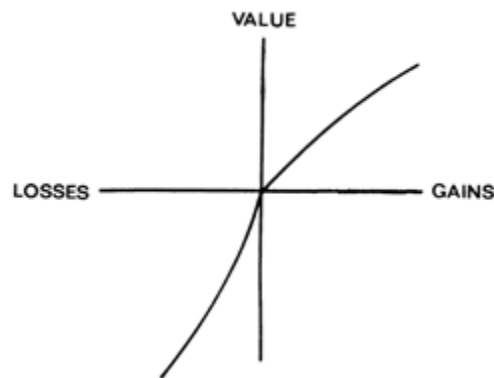
2.3.3.1 *Prospect Theory – Tversky and Kahneman (1979)*

The prospect theory directly challenged the assumptions of classical finance theory; namely the rational decision-making which also assumes that all relevant information is accurate, unbiased, and freely available as well as consumed before a decision is made (Kahneman and Tversky, 1979:263). Behavioural finance theorists believe that behaviour is subject to unique and individual interpretation that is context dependent (Wiseman and Gomez-Mejia, 1998:143).

Prospect theory found that people do not process information as laid out in the utility maximisation theory. This utility theory assumed that people combined gains and losses to a net effect when a choice is involved. The conflicting idea is that people value gains and losses differently and therefore make decisions on perceived gains rather than perceived losses. The prospect theory therefore proposed a value function which is defined on gains and losses and generally convex for losses and concave for gains and steeper for losses than for gains (Tversky and Kahneman, 1986:258).

Through a series of studies conducted by Kahneman and Tversky subjects had to answer questions which involved making judgements between two monetary decisions that involved prospective losses and gains. This led to the conclusion that people weigh losses as much as twice as heavily as an equal gain. This led to the below asymmetric value function:

Figure 2.1: A hypothetical value function



(Kahneman and Tversky, 1979:279)

The function (figure 2.1) is representative of what a gain or a loss is perceived as, or the difference in utility that is attained as a product of a certain amount of loss or gain (Kahneman and Tversky, 1979:281). It demonstrates the idea that a loss is perceived as worse. This is in line with Prospect theory which demonstrates that people are more concerned with changes in wealth rather than degree of wealth. People also tend to undervalue changes in middle range probabilities or overvalue changes in small probabilities, therefore weighing probabilities in a non-linear manner (Wu and Gonzalez, 1999:76). Therefore people are inclined to weigh up outcomes in terms of gains and losses in relation to a specific reference point instead of overall wealth.

2.3.3.2 *Heuristics – Tversky & Kahneman (1974)*

The Heuristics theory was developed by Tversky and Kahneman (1974) and involved the study of how people make decisions regarding uncertain outcomes based on beliefs. The belief of these outcomes can be represented as odds or numerical probabilities. Tversky and Kahneman aim to show that these decisions usually entail complex tasks which are in fact simple judgemental operations which are referred to as heuristic principles (Tversky and Kahneman, 1974:1124).

Heuristics are the manner in which cognitive biases influence decision-making; these biases develop from judgemental heuristics. These judgemental errors guide the way in which outcomes are predicted and therefore the decisions which are made regarding the content (Tversky and Kahneman, 1974:1124). These Heuristics are simple in nature, however when

they are ignored they can lead to serious and repeated errors in the decision-making process. People tend to rely on decisions made previously and not reassess the available information and new information. These heuristics are commonly referred to as rules of thumb which people use to make decisions in situations of uncertainty (Brabazon, 2000:2). They frame the decisions on similar events or outcomes which leads to errors occurring, revealing this as an irrational approach (Tversky and Kahneman, 1974:1124).

However, according to Hersh Shefrin (2002:i) in traditional finance theories these heuristics are not taken into account when decision-making occurs, yet the classical theory still assumes that all decisions are rational. Whereas the heuristics studies are based on the premise that decision-making is in fact not rational and that people tend to take 'short cuts' for various reasons (Brabazon, 2000:2).

Shefrin (2002) examined the behavioural finance literature at the time and found that the theory of heuristics was a key element in influencing the decision-making process. People are usually unaware that the bias is affecting their decision-making unless they used statistical analysis to see what outcomes in the past were in fact correct (Tversky and Kahneman, 1974:1124). The particular scenarios are usually regarding future events; whether this be the future value of the Rand or the outcome of an election (Tversky and Kahneman, 1974:1124).

2.3.4 Behavioural Finance Studies

A study conducted by Richard Thaler and Werner du Bondt (1985) explored the relationship between people's tendency to overreact to news and whether this affected stock prices. Experimental Psychology at the time had found that people are not as rational as the Bayes' rule had indicated. This led to De Bondt and Thaler exploring the idea of how this could impact market efficiency.

They found that investors tended to attach disproportionate amounts of importance on short-run economic developments (De Bondt and Thaler, 1985:794). The study also accounted for some investors acting rationally with the majority not taking all the available information into account before making decisions, therefore acting irrationally (De Bondt and Thaler, 1985:795). They then used this study to gather whether overreaction was predictable and whether the anomaly can be explained more accurately than the current financial theories (De Bondt and Thaler, 1985:795).

The overreaction findings for the study realised different periods of overreacting, as well as when a shorter period is chosen the performance difference between extreme portfolios was minimal or non-existent and when the period was extended it showed much more pronounced anomalies and periods of overreaction (De Bondt and Thaler, 1985:800).

This research allowed for the idea of psychological behaviour having an impact on stock prices and therefore the markets. This irrationality of investors showed that the market may not be as efficient as thought and that people may have other behaviours which could perhaps influence the stock market. This allowed for a rise in behavioural finance in conjunction with Daniel Kahneman and Amos Tversky.

A study conducted by Ackert and Deaves (2010: 265) came to the following two reasons as to why behavioural biases are relevant;

- Due to people's cognitive limitations or emotional forces financial market participants sometimes act in a less than fully rational fashion: overconfidence is a good indicator of this.
- The errors or valuation mistakes made by the irrational investor can be taken advantage of by the rational managers. This is dependent on assumptions that:
 - Due to arbitrage being limited irrational investors impact prices; and
 - Managers are able to detect when valuations are incorrect and this is when they act on these mispricing errors.

Due to information irregularity, shown above, between investors and managers; managers have insider information as well as fewer limitations.

According to Ackert and Deaves (2010:265) managers tend to maximise price rather than value. Therefore, there is a constant battle between what interests are most important and what should be pursued when considering a decision; such as looking out for themselves, the interests of their shareholders as well as between satisfying irrational investors and maximising intrinsic value. The price can be maximised by catering to investor desires or perceptions.

Shiller's research pointed out that in this era classical economic theory is no longer proven beyond doubt and that behavioural finance is now one of the most important research initiatives. This field of behavioural finance is a vastly different field in comparison to many of classical finance's assumptions (Shiller, 2003:83). Shiller examined the progression of the field and found that various anomalies were found by the supporters of classical finance theories (Shiller, 2003:84). These were however labelled as insignificant and did not need to raise concern regarding EMH theory (Shiller, 2003:84).

He also explored research done by as far back as 1840's where human behaviour in a market context was being examined. This was labelled feedback theory. Charles MacKay (1841) explored the 1630's 'tulipmania' in Holland; the idea is that word spreads of a commodity which is increasing in price. This then creates more and more price mania inevitably ending in a speculative bubble.

What happened was that many people began to prosper beyond what their normal wealth was. Word of mouth was the largest reason for this spread of a 'good investment opportunity' however once everyone had found this, everyone was growing tulips to sell and when the price got sky high the crash came and the prices never recovered again.

Shefrin's research (2008:1) describes Behavioural finance as "the study of how psychological phenomena impact financial behaviour". Shefrin used this knowledge and applied it to what was already known about asset pricing in order to incorporate behavioural assumptions into asset pricing theories.

Shefrin examined the behavioural biases from research done by others in the fields and drew the conclusion that investors do have natural biases and these in turn influence their decision-making (Shefrin, 2008:59-93). Shefrin then found that errors in judgement, or what Shefrin refers to as sentiment, afflict investors and are one of the main contributors to asset pricing behaviour (Shefrin, 2008:553).

He explored the idea of sentiment being a factor in the analysis of assets prices. He used analysts' forecasts variance from the actual price as a theoretical base for the sentiment risk premium (Shefrin, 2008:515).

This behaviour then leads to pricing errors in the market and therefore opportunities for experienced, knowledgeable and rational investors to take advantage of this arbitrage opportunity (Antia, 2006:1). However this does not account for if these opportunities are random, because if they are, then it would be hard to find these. Therefore rendering these opportunities impossible (Antia, 2006:1).

Lovullo and Kahneman (2003) explored the delusions of success that people or companies face with the prospect of a new venture in business. They found that people tend to overestimate the success of the project and therefore end up with excessive expenses and time frames becoming extended (Lovullo and Kahneman, 2003:57-58).

An example of this is that 70% of new manufacturing plants in North America close within the first decade of operating. These failures are explained as rational risks being taken in uncertain situations, according the classical finance theories (Lovullo and Kahneman, 2003:58).

Lovullo and Kahneman then took various examples of these failures and examined them from a psychological perspective and a finance scholar's perspective. They came to very different conclusions to that of the classical finance theorists. They believe that in the majority of these cases it comes down to the planning or the initial decision-making process before the project is even taken on (Lovullo and Kahneman, 2003:58).

In most cases managers fall prey to making decisions based on irrationally optimistic outcomes rather than on rationally based weighting of losses or gains probabilities (Lovullo and Kahneman, 2003:58). Managers tend to underestimate the costs involved and overestimate the possible gains. They tend to focus on the possible benefits and downplay the negatives.

Lovullo and Kahneman believe these failures in decision-making are directly related to the over optimism bias. This is a cognitive bias which impacts the way in which the mind processes information (Lovullo and Kahneman, 2003:58). These concepts, as well as how to overcome them, are explored in more details later in this chapter.

From the findings of this paper managers can become aware of the biases which influence their decision-making and overcome the problems associated with the flawed decisions.

2.3.5 Criticism of Behavioural Finance

The theorists who believe strongly in the EMH usually contend that BF is a collection of anomalies rather than a true finance theory and that they can be explained out. However, what they believe is related to the 'group' factor, where it can be accounted for through market movements and not the individual responses.

The critics believe that not all market misvaluations can be accredited to psychological biases; there are many other explanations for such an error. The most notable critic who believes this is Eugene Fama, the founder of market efficiency theory. He believes that this theory is one of the founding theories of finance theory to this day and that it cannot be discounted due to some anomalies in the theory. He believes that market efficiency should not be abandoned for behavioural finance. He also believes that the anomalies that have been recorded are short-term chance events that would correct themselves over the long-term.

According to Fama (1998) behavioural finance itself appears to be a collection of anomalies that can be explained by market efficiency. He believes that numerous findings in behavioural finance contradict each other.

One of the doubts about behavioural finance is that if only a few individuals act irrationally the majority of the rational individual's will combat the effects of assets moving too far from their correct value (Schindler, 2007:17). However, research has proven that irrespective of the number of the number of irrational individuals their behaviour can have a significant impact on prices and therefore the market, this refers to the arbitrage component of behavioural finance (Schindler, 2007:17).

The second component of behavioural finance is the already mentioned behavioural or psychological aspects of people. These have been criticised due to the experimental nature of the research that has been conducted. People rely on their beliefs and preferences, these are what influence their decision-making (Schindler, 2007:18).

2.3.6 The Future of Behavioural Finance

As an economics field of study some of the proponents and researchers believe it has the potential to replace neoclassical finance as the dominant paradigm of the discipline (De Bondt *et al.* 2008:7). The field of study has taken the form of revealing the presence of behavioural

biases in decision-making and the progress for the future would be that of learning ways in which to overcome these biases and behave optimally.

The development of improvement strategies would be a step beyond description. Errors induced by biases in judgement settings could lead to decision makers to make rash and non-optimal decisions. In business settings this can lead to costly errors. There are a number of theorists who have developed ways in which to overcome certain biases and heuristics. However, there are still very many which have not been explored. According to Hersh Shefrin (2008:1) the long-term objective of this field is to 'behaviouralise' finance. This is to incorporate the findings of human nature in a finance context in order to more definitively understand markets and investments as a whole.

To this day financial analysts and economists are in a constant debate regarding classical finance and behavioural finance. This shift from old thinking to new thinking is still being deliberated every day. Therefore, people need to consider the facts available now and digest and implement what they think is correct for their purposes and the current market situations (Shefrin, 2008:1).

2.3.7 Behavioural Corporate Finance

Corporate behavioural finance concerns the practice of value-based management which is comprised of three main concepts; the first being rational behaviour of participants, the second being the capital asset pricing model (CAPM) and the third concerns efficient markets (Shefrin, 2001:114). The focus on corporate finance is the internal workings of an organisation. The psychological biases are what interfere with these traditional theories; there are two essential behavioural obstructions to the value maximisation sought by the organisation.

These behavioural obstructions can be categorised into external and internal; internal is associated with the errors made by managers due to cognitive imperfections or emotional forces which are referred to as behavioural costs. External are those errors made by analysts or investors which create a gap between market prices and fundamental values. These external obstructions then influence managers in their decision-making through causing an uncertainty of how to factor the investor and analyst errors into the decision-making (Shefrin, 2001:114).

These internal obstructions are associated with agency costs in the essence of a difference

between the interest of the manager and the interests of the owners or stockholders or investors in this case. The mechanism found to rectify this was to align the interests of these two parties with the use of incentives; however these do not account for all behavioural costs due to their wide range. Therefore, incentives have limits as to what they can achieve, it is not always possible to have people that have the optimal view of maximisation or what can achieve value maximisation. Therefore the incentive compatibility will not be sufficient for the optimal value maximisation.

The external obstacles concern the price of risk, according to Shefrin (2008:2) the proponents of behavioural finance believe that the CAPM and market prices deviate from fundamental values. These issues have been documented by value-based management in the past and can be connected to decision-making in the corporate environment.

The assumption is that market value and fundamental values match, however when these values are different the actions of managers decision-making on this knowledge may lower the market value of the firm, even if just for a short period.

What usually occurs from this scenario is the adjusting of the discount rate using the CAPM model. However, the adjusting is also reliant on the assumptions and therefore can cause more trouble with regard to trying to rectify the mispricing from the errors of investors and analysts (Shefrin, 2001:116).

2.4 BEHAVIOURAL BIASES

According to Ton and Dao (2014:125) investors have gained more interest in considering the impact of psychology on markets and investments. Behavioural biases are the origin of this development. These are the cognitive and emotional errors that occur when making decisions in specific contexts or scenarios. These behavioural bias concepts were better researched in finance theories that were discussed earlier in this chapter; Tversky and Kahneman's (1974) Heuristics research and Kahneman and Tversky's (1979) Prospect theory.

When making a decision not all of the available information regarding the problem is processed in a rational manner which leads to these errors. Individuals that undertake fund related decision-making will most likely make these human errors; this can then lead to negative

outcomes and therefore affect performance and market efficiency.

Kahneman and Tversky (1979) and Tversky and Kahneman (1974, 1981 and 1986) were able to identify certain biases in decision-making through the use of cleverly constructed questions which were given to various participants. These studies had a focus on the individual investors and their effect on the market. Richard Thaler (1999) then developed more financial and experienced investor related biases, this was expanded by Shefrin (2001) to give a more accurate picture of what biases affect people within an organisational or corporate finance setting.

A key finding from these studies is that there are external and internal biases. External biases are those which affect investors and analysts (Shefrin, 2001:114). This creates a gap for experienced investors to take advantage of, leaving room for arbitrage opportunities. Internal biases are those associated with managers' decision-making; this involves decision-makers in a management position who are effected by behavioural biases (Shefrin, 2001:114). In the context of this research, the focus is on the internal biases which effect the CIS managers or experienced investors.

External and internal behavioural biases can be further broken down into 'errors of preference' and 'errors of judgement'. These are a development of the research done by Tversky and Kahneman and will be discussed in more detail below.

2.4.1 Errors of Judgement - Cognitive limitations

Errors of judgement were developed by Tversky and Kahneman (1974) in their Heuristics research. The concept behind this theory is that people develop their own set of rules for situations of high complexity and uncertainty. This 'set of rules' allows for systematically underestimating or overestimating the true probability of chance events (Tversky and Kahneman, 1974:1125). This can affect markets by causing market prices to deviate from their fundamental values resulting in market inefficiency (Shefrin, 2001:114).

2.4.2 Errors of Preference - Emotional forces

Errors of preference are the biases which are present when people are assigning values to future outcomes or from improper combinations of values and probabilities. Once a certain outcome

has been found this becomes a preference. The preference then remains and influences future decision-making (Tversky and Kahneman, 1986:253).

The four main biases that will be of consequence in this study are optimism, overconfidence, loss aversion and frame dependence or mental accounting. These were chosen due to research indicating that these biases are the most common ones that managers are afflicted by (Shefrin, 2001). This is in comparison to behavioural biases that inexperienced investors are more afflicted by.

2.4.3 Biases relevant in this study

2.4.3.1 Optimism

Studies conducted by Weinstein (1980) and Kunda (1987) found that people believe good things will happen to them more often than to their contemporaries. This supports the research finding that optimism is an error of judgement: it is the unrealistic view of the future. This is the belief that one is more likely than average to experience positive future life events and less likely than average to experience negative events (Baker, Ruback and Wurgler, 2007:169). In an investment perspective this relates to managers taking risks when they believe that positive outcomes will occur (Baker *et al.* 2007:169).

An example of this is a study conducted in the 1970's by the College Board where they surveyed one million students. When the students were asked questions about their talents they tended to exaggerate. When asked about their athletic abilities 60% saw themselves above average, when asked about their leadership abilities 70% saw themselves as above average (Lovallo and Kahneman, 2003:58). This demonstrates that people tend to overestimate their abilities and this is usually due to the tendency to misperceive the causes of certain events, which then leads to future beliefs this will occur again no matter the context. The typical response after the outcome has occurred is that the negative outcome is usually attributed to external factors which cannot be controlled but positive outcomes are taken credit for (Lovallo and Kahneman, 2003:59).

According to Gervais (2009) optimism frequently gets confused with overconfidence; however these two are actually very different in structure. The majority of studies have focused on optimism and overconfidence in corporate finance. Subjects tested by Weinstein (1980)

demonstrated a tendency to think that they are more likely than average to experience positive future life events such as living past 80 and owning their own home and less likely than average to experience negative events such as being retrenched or contracting a life threatening disease (Baker *et al.* 2007:169). An important finding from previous research conducted was that people do not always form beliefs logically and this may lead to irrational or inconsistent decisions (Baker *et al.* 2007:168).

In the corporate environment many new ventures fail, classical finance attributes this failure to rational risks being taken in uncertain circumstances (Lovallo and Kahneman, 2003:57). Whereas behavioural finance believes it is the decision-making process: managers have the tendency to make decisions based on ‘delusional optimism’ where they overestimate the gains and underestimate the costs rather than on rational perceptions of losses, probabilities, and gains (Lovallo and Kahneman, 2003:58). Therefore, managers tend to weight negative information more so than positive. This could lead to the passing up of investment opportunities and therefore a negative outcome due to the loss of future gains because not all the information was looked at with the same perspective (Gervais, 2009:421). In order for these bias’s to be accounted for, it is essential to use the normal research done with an outside view and a statistical analysis of the probabilities in order to get a full picture of the expected results or returns (Lovallo and Kahneman, 2003:58).

Optimism will always have a part to play in decision-making and it’s not that it should be completely abandoned but that it needs to be managed. Optimism is a valuable tool in business because it creates excitement, motivation and enthusiasm. This allows people to be resilient when negative or challenging outcomes arise (Lovallo and Kahneman, 2003:63). Ideally, there needs to be a balance between the optimism and the realism, this is where the real work starts. An option to ensure this would be to have two positions, clearly defined, where one takes the realistic approach and the other brings the optimism and somewhere in between the goal lies.

2.4.3.1.1 Advice on over optimism

Generally speaking when people are frequently open to being over optimistic this usually leads to deteriorated savings. Optimism bias can also lead to the favouring of a particular asset which can create an unbalanced portfolio. The key to this is to save regularly and invest sensibly at every opportunity – “live below your means, and save regularly” (Pompian, 2006:170). People

or fund managers need to be reminded of the benefits of diversification and make sure that asset allocations are enforced, therefore, objective advice is essential.

2.4.3.2 Loss aversion

Loss aversion is an error of preference. This concept originated from Kahneman and Tversky's 1979 prospect theory research where they observed that the majority of people feel a more persuasive impulse to avoid losses than to achieve gains (Pompian, 2006:208). This gave way to the loss aversion rule of thumb where people see a loss weighted about two and a half times the impact of a gain of the same amount (Young, Goodie, Hall and Wu, 2012:185).

When an individual is presented with a sure loss or a gamble that may result in breaking even, most individuals will decide on the gamble, even when the expected payoff is less than the sure loss (Shefrin, 2008:4). Therefore, people tend to throw profits or good money after bad in the hopes of breaking even or lowering the loss, which simply results in more losses (Shefrin, 2008:4).

Loss aversion can affect decision-making in various ways, it supports inaction over action and preferred methods over any alternatives. This is because the alternatives are viewed as losses and are weighted more than an opportunity; therefore loss aversion favours the avoidance of risk (Kahneman and Lovallo, 1993:18). In other words loss aversion is the reaction to losses being more intense than the reaction to gains, demonstrating that the displeasure of losing a sum of money is more than the pleasure of winning the same amount (Tversky and Kahneman, 1986:258).

This was evident when Tversky and Kahneman (1986) tested this by means of questions related to gains and losses of the same magnitude. They discovered that when respondents were given a choice the majority of the time they will choose the option that is portrayed in gains rather than in losses even if the result is equal. Therefore losses have more of an impact on the emotional side of someone than an equal equivalent amount of gains (Tversky and Kahneman, 1986). This avoidance of risk is what can lead to people retaining an investment even when it is no longer profitable (Pompian, 2006:208). Instead of writing it off people retain their investment in the hopes that a positive outcome will still occur instead of cutting ties and investing the money into another asset that could actually be profitable. Furthermore people

who are loss averse also prematurely cut their positive returns due to the fear of risk or negative outcomes (Pompian, 2006:209). This means that the upside potential would have been cut short. Either holding onto losing assets or selling gaining assets too early will result in underperformance.

Being afflicted by this behavioural bias is certainly a negative for investors. This behaviour undermines the goals of most investors or CIS managers: higher returns with lower risk. This is undermined by increasing risk through holding onto losing assets and the resultant unbalanced asset allocations in portfolios (Pompian, 2006:211).

2.4.3.2.1 Advice on loss aversion

Holding onto losses: when the decision is being based on the price to that asset was bought a stop-loss rule should be implemented at that time. However this stop-loss percentage or number must incorporate the investments normal volatility (Pompian, 2006:214). *Selling winners too early:* a rule of gains can also be implemented, this should incorporate fundamental and valuations associated with the asset. In-depth research would be required for this.

It is also important to keep the fundamentals of investing in consideration for these assets, allowing the asset allocation agreements, diversification and risk profiles of the fund or investment objective to be a consideration will also help eliminate these losses (Pompian, 2006:215).

2.4.3.3 Overconfidence

“Perhaps the most robust finding in the psychology of judgment is that people are overconfident”

(De Bondt and Thaler 1995:6).

Overconfidence is an error of judgement where decision makers overvalue their knowledge, abilities and therefore, their predictive skills. Overconfidence leads to the belief of being a highly accurate judgement tool. Pompian (2006:51) defines overconfidence as an “unwarranted faith in one’s intuitive reasoning, judgements, and cognitive abilities”. This essentially results in people thinking they have more information available and are more intelligent than they actually are.

Overconfidence can be defined by the tendency for people to place an irrationally unwarranted degree of confidence in one's abilities and beliefs (Weinberg, 2009:504). Therefore, most investors tend to trade too much and hold portfolios which are not adequately diversified. This results in the overestimating of a project's probability of success or occurrence (Pompian, 2006:52). In an investment context research has proven that investors overestimate their ability to predict market events and therefore often take risks without the corresponding returns. In trading situations, overconfident traders tend to trade more than average, yet they tended to receive significantly lower yields (De Bondt *et al.* 2008:12).

Overconfidence is one of the biases that are more difficult to test the presence for, however, a review done by Stein (2003) showed that managerial overconfidence is likely to lead firms to overinvest. To prove this bias's existence the measure of overconfidence must be associated with a firm's decision and the outcome of that decision. This led to research of key employees within an organisation. Research initially concentrated on the CEO's or senior management and then moved onto other managers that also had an impact. However, most of this data collected to show overconfidence was that of performance results or other data that is freely available (Gervais, 2009: 424).

In a study conducted by Svenson (1981) the subjects were asked about their driving skills in comparison to a group of drivers. It was found that the majority of drivers regarded themselves as more skilful and less risky than the average driver. Between 70-80 % of each group put themselves in the safer half of the distributions and 93% believed themselves to be more skilled than the average driver (Svenson, 1981:144). The study found that there is a strong tendency for people to believe they are more skilful and less risky than others within a group, which illustrates overconfidence (Svenson, 1981).

Barber and Odean (2001:261) explored the effect of overconfidence and frequency of trading. They found that men are more overconfident than women and that men trade more frequently than women. Thus, men's expense ratios are higher than women's, therefore their costs are higher and the returns are lower (Barber and Odean, 2001:261).

Overconfident investors essentially ignore the rationality that expected gains should outweigh costs and overestimate the precision of their information or knowledge and therefore, the actual expected gains (Barber and Odean, 2001:289).

2.4.3.3.1 Advice on Overconfidence

This bias can be one of the most detrimental to investing and therefore, it is important to be aware of its impact and how one can lower the effects. The belief that, one individual is better than average at selecting stocks or fund managers that outperform, needs to be researched. Data from as far back as possible needs to be analysed in order to show evidence to prove or dismiss this so that this can be avoided in the future (Pompian, 2006:60). The same goes for excessive trading as well as the underestimation of downside risk and the predictions that have been implemented in the past. Usually simply pointing out results or evidence is sufficient to create awareness of the bias.

2.4.3.4 Frame dependence

Frame dependence is an error of preference which is also commonly known as mental accounting or narrow framing. This is when decisions are seen as separate entities instead of one. This was first described by Thaler (1999:184) as the way that people organise, analyse and report financial events. Thaler further described frame dependence as the “people’s tendency to code, categorize, and evaluate economic outcomes by grouping their assets into any number of ‘non-interchangeable’ mental accounts” (Pompian, 2006:171).

Household wealth is assumed to be divided into three categories: current income, current assets and future income (Thaler and Shefrin, 1988:609). Therefore, households put wealth into categories and these are then compartmentalised, never looked at as a whole. A common example of this is when people separate their money into separate accounts, savings and debt, instead of using the savings to rectify the debt which is accruing at a high interest rate (Kahneman and Lovallo, 1993:19).

The source of the money also plays a role with regard to allocation or how much is spent. This shows an illogical use of money; demonstrating that people tend to view decisions that should be viewed together, separately. ‘Fungibility’ is a key component in this, this is the idea that money has no labels or that any money should be considered the exact same way. Therefore, all wealth should be considered as equal (Thaler, 1990:194). Whereas, if they were looked at concurrently the one could benefit the other or provide for future opportunities (Kahneman and Lovallo, 1993:19).

This view has the same impact on investment decisions; people tend to separate their riskier investments and safer ones, when it would have the same impact if they were in one portfolio (Kahneman and Lovallo, 1993:19). An example from the study conducted by Tversky and Kahneman (1986:255) showed that when given a choice between a risk averse and a risk taking scenario, one framed in a positive scenario and the other in a negative scenario, compiled with the exact same scenarios and figures resulted in most respondents selecting the opposite answers, i.e. one risk averse and the other risk taking.

This shows that changes in wealth, gains and losses, have the most impact on value in comparison to the rational models observation of states of wealth. This violates the expected utility theory and other normatively based models of choice. This indicates that people are highly sensitive to reference points and less sensitive to changes in wealth (Tversky and Kahneman, 1986:256).

2.4.3.4.1 Advice on frame dependence

The method with the most impact would be to prevent investors seeing things as separate entities and rather as whole. This will demonstrate how entities can actually correlate and benefit each other. This would in turn benefit portfolio performance. The majority of the time simply making people aware of or educating them on this concept will suffice (Pompian, 2006:184).

Table 2.1: Summary of behavioural biases effects and consequences

Bias	Effect on Manager	Consequence
Overconfidence	Frequent trading Aggressive Risk taking Less Diversifying	Increased costs Increased taxes Chance of higher losses
Optimism	Creates illusion of a unique insight Belief that bad investments won't happen to them	Performance denial (under performance) Portfolio damage due to adverse consequences
Loss Aversion	Holding onto losing assets Excessive risk avoidance (resulting in more risk) Premature divesting in positive assets	Multiplied losses/portfolio imbalance Lost opportunities or profits Limits the upside potential
Frame Dependence	Low or no diversification	Negative effects on returns

Source: Researcher's own construction, information adapted from Pompian (2006:163-165, 208-209).

Accounting for these errors of judgement and preference (summarised in table 2.1) may lead to a better understanding of financial markets, whether it is an investor or CIS manager. Therefore, it is essential that any type of investor is made aware that these biases exist and the impact they can have on their portfolios performance.

2.5 COLLECTIVE INVESTMENT SCHEMES

2.5.1 Collective Investment Schemes background

According to the South African Financial Services Board (FSB) CIS's are where investors pool their funds into an investment vehicle which is managed by a professional investment manager (FSB, 2013). This allows the average investor to access a diverse and leveraged amount of securities which they may not have been able to access otherwise, as well as splitting the rewards and expenses (Oldert, 2014:42).

The first ever mutual fund or unit trust was created by a Dutch merchant in 1774. This was made up of 2000 units and was made available to the public until all units were purchased (IFIC, 2014). This idea of pooling a number of people's money in order to diversify risk (in this case geographically) and form an investment trust has continued until today.

The first South African Unit trust was launched in 1965 by Sage, this was an equity fund which was designed to give the ordinary investor an opportunity to access the JSE or the Johannesburg Stock Exchange (Oldert, 2012:24). From there the benefits of diversification, liquidity and spread of costs allowed for the unit trust industry to grow somewhat quickly over the last four decades, with the exception of the 1969 crash (Oldert, 2014:33).

There are various forms of CIS's which are defined by the structure or underlying assets of the fund, these can be fund of funds, feeder funds, multi-manager funds, bond funds, equity funds, hedge funds and passive funds, the most common form of a CIS in South Africa is the Unit Trust which is referred to as Mutual Fund in the global investment environment. Each investor has a participatory interest which is equal to the amount invested in the CIS, these are commonly referred to as units and valued as Net Asset Value (NAV) per unit (FSB, 2013). The NAV will be further explained in the section on CIS performance.

The investment, asset, CIS or fund managers are those which use their knowledge, expertise, education and experience to either actively or passively manage the pooled investment (this is explained further in the next section) (Oldert, 2012:79). Management of a CIS is the responsibility of taking on decision-making regarding other people's money. Therefore, their decision-making will have an impact on their funds' performance.

2.5.2 Collective Investment Scheme Managers

According to Fama (1980:290) "management is a type of labour with a special role". Fama further described this as the coordinating of various input activities and carrying out the contracts agreed among inputs (Fama, 1980:290). These activities require decision-making.

This is a very basic view of a manager's role in a firm and this contributes to and confirms Fama's ideals of the 'rational' person in his views on classical financial theory. People are seen as entities with a task to perform and how they do this task is laid out and repetitive and leads to market efficiency, Fama does not allow for the natural behaviours of people.

As already mentioned, asset managers are those who make decisions regarding the fund they manage, which can be an active or passive approach. The management style usually differs between the kinds of funds being managed and also the managers' internal biases. The largest difference is that between a Fund of Funds (FoFs) or multi-manager and a share portfolio manager. The FoFs manager is a passive manager who chooses other actively managed funds

to invest into and share portfolio managers are active managers who 'stock pick' and actively manage the fund on a daily basis (Oldert, 2014:141, 131).

The individuals who chose not to invest their money directly into the stock market, but use the expertise of a professional to invest their money on their behalf, want more clarity, more understanding and more involvement regarding who manages their money. Various researchers have focused on this area, there is also a platform that solely dedicates itself to gathering information regarding fund managers and the funds they are responsible for, called Morningstar. Morningstar is an independent investment research organisation who saw the need for more information to be available regarding mutual funds and the managers who manager the funds (Morningstar, 2014).

This increase in research means that there is an interest from investors as to who is dealing with their money, this interest has resulted in more information about CIS managers becoming readily available to investors. Investment fund manager information can be publicly available in the form of profiles, either available to investors or the general public. In some cases the managers past records can also be available, this all depends heavily on the organisation. The pioneer in making this information available to the public is Morningstar.

Over the last two decades a number of authors have researched various characteristics of fund managers such as the relevance of education (Chevalier and Ellison, 1999), career concerns and agency conflicts (Fama, 1980). Lazear and Rosen (1981) and Golec (1996) examined a wider range of attributes including MBA, tenure, risk-taking, performance and expenses. When CIS managers are thought of as skilled professionals the relevance of previous education and years of experience should play a very high role in the performance of the fund. Being a professional involves a large amount of data gathering and analysing; and according to Chavelier and Ellison (1999:876) it is possible that one can perform better than others.

There are various hypotheses that have been explored or deduced through assumptions, for example, one could imagine that a younger manager may either be better due to the incentive to advance their career or are riskier and careless due to inexperience. Better educated individuals will have more success or better networking contacts in order to gather more information or have added support services. Previous studies conducted regarding managers have added to the world where investments are no longer simply managed by unnamed or

unseen entities.

The CIS investment return literature and previous findings from other research regarding mutual funds, unit trusts or what is referred to as collective investment schemes is looked at below.

2.5.3 Collective Investment Scheme Investment Returns

Typically there are two types of returns an individual can be concerned with; first is the income portion achieved through interest and dividends, the second is the capital loss or gain of the asset (Oldert, 2014:51). Certain assets hold either one of these return capabilities or perhaps both.

Some stocks return is based solely on capital appreciation, these do not pay dividends. Pension plans or retirement annuities only provide an income return, whereas stocks that appreciate and pay dividends can have both. Stock indices such as on the Johannesburg Stock Exchange (JSE) are also reported in such ways; the JSE All Share only captures price movements while the JSE All Share Total Return series includes cash, dividends and interest income.

Collective investment schemes can be set up in the same way, some can be only capital gains, and some can be both. Capital growth or loss will result in an increase or decrease in the price of units when the underlying investments rise or fall (Oldert, 2014:51). The income portion comes from interest and dividends, interest is earned on the cash held in the portfolio and dividends are paid by shares or funds held within the portfolio (Oldert, 2014:51).

2.5.3.1 Fees

Fees are collected by the manager of the collective investment scheme for services rendered, the administration of the CIS, switching costs and other portfolio charges (Oldert, 2014:50). The manager of the fund can collect various fees: an initial fee, an annual management fee and a performance fee once a certain target has been met (this is optional and depends on the manager) (Oldert, 2014:51).

The initial fee is a once off fee at the buy into the fund, this is usually a percentage of the NAV and is deducted from the investment amount (Oldert, 2014:50). Annual management fees are

the fees charged for the administration and management of the CIS, these are typically anywhere in between 0.75% and 1.5% per annum, collected monthly (Oldert,2014:51).

2.5.3.2 NAV and Why?

The Net asset value or NAV of a fund is the total net asset value (assets minus liabilities) of the fund divided by the number of units in issue (Oldert, 2014:51). This is the most commonly used pricing of collective investment schemes, globally. These types of funds issue units which are given to each new investor and absorbed back into the fund when an investor withdraws their money. The NAV is calculated each day. The assets in this case refer to the last trading prices of that day and the liabilities are referring to the fees charged on a collective investment scheme: lending banks, investment managers, service providers and any other fees specified by each fund.

Because CIS's distribute realised gains and income to the funds unit holders, the NAV is relatively unimportant. The total return is a more accurate representation. Yet the NAV is the most commonly used and published information of all CIS's. These are also what are published to the public. Therefore, the NAV is the basic indicator that needs to be adjusted in order for this to be a reliable indicator of a fund's performance.

2.5.3.3 Time frequency

The frequency in which prices are collected for research is an important factor. In order to get accurate returns, a short term is preferable. Therefore a daily frequency is ideal, but monthly is acceptable (Sharpe, 1994:51). However this also depends on the research and the data available.

Most investment return calculations are not independent of the time period that it is calculated over. Therefore, a longer time period and varied periods allow for various points of reflection and comparison. Any periods over one year are usually annualised in order to get a clear view of the return per year for a certain period. This allows for the meaningful comparisons to be made between different strategies (Sharpe, 1994:51).

2.5.3.4 Risk-adjusted returns

The premise behind risk-adjusted returns is that it allows for funds to be compared on a

comparative level. Investment returns can be a good indicator for a successful fund, but when an investor wants to accurately compare funds, risk-adjusted returns are a better indicator. Essentially, the returns are adjusted for what an investor would achieve in a risk-free asset and the amount of risk that is undertaken in the fund.

The risk-adjusted return is shown as the standard deviation or the Sharpe ratio of the performance in order to account for volatility. The important aspect is to have a consistent measure for performance in order to be able to make accurate comparisons (Sharpe, 1966).

Standard deviation has always been one of the acceptable risk-adjusted measures, but a more in-depth measure is that of the Sharpe ratio. Standard deviation shows how far from the average or mean the data is dispersed (Bland and Altman, 1996:1). A low standard deviation indicates that the data is closely dispersed around the mean and a high standard deviation indicates that that data is spread out over a large range. Therefore, in finance, the standard deviation measures the volatility of an investment; whereas the Sharpe ratio uses the standard deviation to incorporate volatility or a measure of risk into the measurement of an investment.

William Sharpe was a pioneer in the field of investment measurements and added greatly to the field of evaluating mutual fund performance. However, the Sharpe ratio is actually a successor to Treynor's (1965) paper on the use of volatility in the evaluation of a fund's return (Sharpe, 1966:119). Sharpe then took this concept, as well as other new findings at the time, and tested this empirically. Sharpe (1966:137) found that performance could be evaluated with a simple and meaningful measure that incorporates the average investment return and risk.

This ratio integrates the investment return, minus the return of a risk free asset and the volatility of markets. From this the Sharpe ratio came to be (Sharpe, 1966:119). Sharpe originally called this the 'reward-to-variability' ratio. When Sharpe developed Treynor's theory into practice it gained ground quickly and became a household name as the Sharpe ratio, which Sharpe also improved on in 1994 (Sharpe, 1994:49).

Before 1966 or the work that Treynor (1965) and thereafter Sharpe (1966) did on mutual fund performance, there were various types of methods attributed to fund returns or portfolio analysis. The most notable of these are: annual rate of return, holding period return, mean return, internal rate of return and portfolio return. These were however simple measures of

return using historic data which did not account for one important element: risk.

The evaluation of CIS performance has always been heavily influenced by studies done in the United States of America (USA) on Mutual Fund performance. A fund's annual rate of return comprises of dividend payments, changes in NAV, capital gains and expenses. It is therefore a net performance figure (Oldert, 2014:51). This is the most common way to show non risk-adjusted performance. However, in this study the main focus is on risk-adjusted performance.

The limitations of this return classification is that it can allow for bias, but in comparison to an un-adjusted risk return it is promising. The other downfall is that it is not expressed as a return figure but as a ratio, this leaves room for interpretation from inexperienced investors who understand a percentage performance return and not the ratio. Also fund fees differ and this can impact their excess returns and can lead to skewed results. Also the NAV is not the best measuring unit, as indicated above. The Sharpe ratio also does not take correlation into account and other measures should be used for this, or in conjunction with the Sharpe ratio.

However, if this ratio is used in the proper manner it can add greatly to choices or comparisons between funds and investment decisions.

2.5.4 Previous CIS Studies and Findings

Fama (1980:292) found that the success or failure of a manager's team is believed to be their only concern and therefore any other short term failings would not directly affect them. However, if the team fails and therefore the business fails, this directly effects them. This approach ensures the manager has a stake in the success of the business. This encourages the manager to become market maximising so that it reflects well on the management of the firm. This market maximising then leads to the correct pricing of securities available in the market (Fama, 1980:292). This emphasises Fama's classical view on managers and efficiency in the market. However, this led to more research on the topic, even if to simply disprove Fama's views.

Holmstrom was one researcher who conflicted with Fama's ideals. He believed that classical economic theory has little input into the way in which organisations function (Holmstrom, 1982:324). The theory omits the importance of information in such a setting. The members of these organisations are the ones who provide two very important services: the supply of inputs

for production and to process information for decision-making (Holmstrom, 1982:324). This service provided by members can be instrumental or detrimental to managers of an organisation, or investment managers of an organisation.

These roles do not differ in simple service providing. Therefore classical theory does not consider the role of a manager and therefore the resultant decision-making does not involve all available information (Holmstrom, 1982:324).

Smith and Goudzwaard (1970:330) explored the relevancy of education in the investment management environment versus non related education and practice. This was because, at that time, there were not many business schools or institutions which adequately provided a related education. Obviously this has drastically changed over the last few decades and now there are many qualifications one can study to be in the investment management environment.

However, the findings from their study are still relevant. They specifically compared the investment related courses at the time to the requirements that portfolio managers at institutions look for in candidates. Smith and Goudzwaard (1970:344) found a definitive gap between these two areas. They even went so far as to reveal that the gap between the two areas may be widening. They attributed this gap to the rapid evolution of the field at the time, and that the younger people in the industry have the knowledge but are not yet at the place where they are involved in decision-making (Smith and Goudzwaard, 1970:345-346).

They also found that there was much interest in this research and people wanted to know more, therefore one can conclude that education, and the type of education is very relevant to a fund manager's expertise in a field. Therefore after this type of research began there was much research into what the education of a fund manager related to the fund they were managing. The education level of managers is freely available information and has been tested in various research studies.

A study conducted by Chevalier and Ellison (1999:875) examined the relationship between mutual fund performance and the characteristics of fund managers. This study examined the prospect of some mutual fund managers being better than others.

In order to obtain whether or not one fund manager was better than another, demographics and

education levels achieved were used. They then examined how these characteristics correlated to the performance of the managers' funds (Chevalier and Ellison, 1999:875). The approach for this is to observe how performance is related to observable characteristics of the fund manager.

The study examined the effects of better rated institutions, higher average scores over undergraduate degrees, the highest levels of education achieved, the amount of experience in years and how long they have held their current position, as well as their age and gender. The results of this study indicated that the managers who attended better institutions have systematically higher risk-adjusted excess returns.

This study found that fund managers had more success with a MBA qualification and managers from higher Scholastic Aptitude Test (SAT) undergraduate institutions have higher risk-adjusted excess returns; therefore, proving that some managers are better than others (Chevalier and Ellison, 1999:896). However most of the differences could be accounted for by behavioural differences and by selection biases (Chevalier and Ellison, 1999:875). The other downfall of this study was that it used information freely available and did not approach the individual fund managers themselves for personal information pertaining to them. This left room for biases that were unaccounted for.

Scharfstein and Stein (1990) examined herd behaviour and investment by the use of a theoretical model. They believed that managers tend to mimic the decisions of other managers and therefore ignore their own information about other opportunities. From a behavioural point of view, this is inefficient. Therefore they examined whether or not this can be applied to an investment point of view (Scharfstein and Stein, 1990:465).

This was a test between rational market efficiency and the incorporation of human behaviour into the decision-making of the investment environment. The strongest conviction is that this herd behaviour is a result of peer assessment within the industry. That if the managers do not make similar decision then perhaps their ability will be questioned (Scharfstein and Stein, 1990:465).

This experimental research at the time found that there can be various reasons for managers to participate in herding behaviour and that their model concluded that there can be various

outcomes from one set of information. Therefore herd behaviour in investment managers is prevalent, but not all managers do the exact same thing (Scharfstein and Stein, 1990:492).

Banerjee (1992) also examined herd behaviour, he used a model where decision-makers looked at decisions that people had made before them and then chose. All information pertaining to the decision was also presented (Banerjee, 1992:797). This behaviour has been found to be true in social situations, but Banerjee wanted to see if this was true in investment situations too.

Banerjee used a number of different models to assess this idea and found that people abandon their own signals and follow others decisions or behaviour, even when they are not sure that the other person is right (Banerjee, 1992:808). However, there are always some cases where someone may not follow the decisions of others, but this probability is small.

Therefore, Banerjee did find that herding behaviour did exist in decision-making and that investment professionals are also subject to this behaviour. However, this research was experimental and the models conceptualised were also experimental and there is much room for further research. In this research, involving people's behaviour, it is always hard to emulate a real life situation in order to get accurate results.

Masood and Sergi (2009) conducted a study which collected direct information from investment managers via either a face-to-face or telephonic survey. They then used this in conjunction with the fund manager's performance to assess whether the fund manager characteristics had an impact on their related fund performance (Masood and Sergi, 2009:301).

This study has the most similarities to the research being conducted. In that it collected information regarding the managers directly from the managers. This study was also conducted in a developing economy unlike the majority of the other studies which were conducted in developed economies and markets such as the USA (Masood and Sergi, 2009:302).

Where Masood and Sergi (2009) differ from most research and the current research is with the use of ordered choice models to analyse the performance data. Most studies usually use published annual performance data (Masood and Sergi, 2009:302). This demonstrates that this study was unique in comparison to other studies. While using the ordered choice model, the study used a number of funds, number of clients and portfolio size as the performance

indicators (Masood and Sergi, 2009:310). These performance factors on the most part correlated positively to the characteristics such as experience, training and education except for a business degree, where there was a negative correlation.

Where the research being conducted differs from Masood and Sergi (2009) is that annual performance data is used and the survey will also collect some characteristic data but the main focus is on the decision-making related behavioural biases.

The study conducted by Abhijeet Chandra (2008) was conducted in an emerging market, India, and explored the decision-making by individual investors with the impact of behavioural factors and investor's psychology. This study also went further to explore the relationship between those investor's attitudes towards risk and behavioural decision-making (Chandra, 2008:1).

Chandra conducted the study with the use of literature relevant to the topic, therefore using secondary data to provide an understanding in an Indian context. Chandra found through this study that individuals do not act rationally which is in direct contrast to classical financial theory. He also found that individual investors suffer from a number of emotional and psychological biases found in the prospect theory and heuristics (Chandra, 2008:25).

The study concluded that these biases need to be taken into account when making investment decisions, otherwise the performance of investments could suffer (Chandra, 2008:25). This indicates a need for more research on the topic because the majority have not taken these behavioural factors into account leaving the markets inefficient and irrational.

These studies all contributed greatly to the clarity we, as investors, now have as to who is managing money yet there is a certain element missing from this previous research and that is of direct information from the manager regarding their characteristics and especially behaviours. The majority of the previous research has used freely available information that can be gathered from various resources such as Morningstar, Money Web and other resources.

Various researchers have found different patterns in investment returns, however, most of the historical research relates to stock pricing and not mutual fund pricing. Fama and French are two of these researchers.

Fama and French (1993:3) researched stock returns and found very little connection between some of the major asset pricing models in the market. They examined what was related to returns and found patterns that could not be explained by classical theories such as CAPM. These are called anomalies. They then developed a three-factor model that when applied, the anomalies were no longer present. However, they do also concede that irrational pricing and data problems could also be sources of the anomalies in the asset pricing (Fama and French, 1996:55).

Bialkowski and Otten (2011:119) used NAV as the basis for their returns. They also stated that emerging market data is scarce and that most studies, as already stated, are either US based or European based. There is little research that has been conducted in an emerging market environment. There is however some research on emerging market funds in a developed market context, such as out of the US.

Their focus was on the performance of funds in comparison to the market, in particular whether or not they could beat the market. However, this study did also focus on the efficiency of the market in emerging markets. Bialkowski and Otten found that, on average, Polish fund manager could not add value (beat the market), however domestic funds did outperform international ones. This points to a local advantage. Also the funds which did perform admirably and beat the market were able to significantly beat the market (Bialkowski and Otten, 2011:119).

2.7 RELEVANCE OF THIS STUDY

The majority of research which relates to this study has taken a developed market focus; these countries have highly developed financial systems, especially in Europe and the USA. With that being said, there have been recent developments in emerging markets with regards to their financial systems and fund management in particular. Therefore the characteristics of fund managers are a relevant concern in these markets as well (Masood and Sergi, 2009:302).

Another relevant concern in emerging markets is the influence of the political state of the country, the potential for corruption as well as insider trading; the character and behaviour of the fund manager may be influenced by such endeavours (Masood and Sergi, 2009:302). But this is not the basis for this study, rather perhaps an interesting factor for further research.

Previous research over the past few decades took a wide approach with regard to the individual fund manager, the information used was indirect and not a direct enquiry of a specific fund manager. In this study the fund manager's themselves will reveal certain personal and work related factors, perspectives on their risk and confidence levels as well as gathering information which tests whether or not they are susceptible to behavioural biases.

This study is also important as it focuses on local funds, managed locally. South Africa is the most developed of the markets in Africa and therefore a good area to study in an African context. Not much research has been done on this in the past, or at this level of research. This research is experimental in nature in that it has explored the depths of behavioural finance in South Africa and it aims to bring the idea of behavioural finance and investments into context.

2.8 SUMMARY

This chapter examined the classical finance theory which has dominated the market for centuries, outlined the field of behavioural finance and its most impacting studies that have been conducted, discussed behavioural biases with specific reference to ones affecting people in managerial positions and considered collective investment schemes, their functions and previous studies conducted. The chapter concluded with the relevance of this research. The research method used to conduct this research will now be explored in the following chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In the previous chapters, the research was outlined and examined through literature review. Chapter one introduced the research and what was proposed, chapter two examined classical financial theory, behavioural finance and previous CIS research. This chapter explores the methodology that was used to gain knowledge through research.

Research can be defined as a search for new and useful information using a logical and systematic approach, allowing findings, ideas and results to develop (Singh, 2006:1). Research can lead to contributions to existing knowledge about the topic that one is researching through the collection, analysis and interpretation of data. Through research our society can advance and progress with the times as well as push boundaries to expand people's perceptions and world views (Singh, 2006:1).

One of the founding reasons for research is the discovery of irregularities which cannot be explained by current theories or rulings regarding a certain area of study (Singh, 2006:1). This offers a researcher a way to find an area which interests them and can therefore give way to current or proposed research. In this research the researcher's desire to explain errors which have not been accounted for by classical finance theory are the most important aspects.

Once the researcher has found the area of interest and the proposed research, the methodology used to find this explanation must be explored. Therefore in this chapter the research methodology relevant to the research will be elaborated upon. The chapter will examine the quantitative method of this research within the positivistic paradigm. The data collection of the population will also be explored through the use of convenience sampling, within parameters, and how the survey data collected was found to be reliable through statistical analysis with face validity and external validity, as well as how the ethical considerations of anonymity were considered and overcome.

3.2 THE IMPORTANCE OF THIS RESEARCH

Previous studies which have researched behavioural finance proved the field of research to be

a viable theory in the Finance field. The field has been able to account for the anomalies in the market that classical finance theory could never explain. Some of these anomalies have been explained through behavioural biases as discussed in chapter two.

The majority of research that has been conducted in the field has taken place in first world countries such as the USA. The proponents of the field conducted their studies in the USA and these studies focused on mutual funds, average investors and the majority of the data collected was freely available information from databases such as Morningstar as discussed in chapter two.

An example of previous research conducted that is the most similar to the research in this study is that of Chevalier and Ellison (1999) and Golec (1996). The similarities between these studies and the research being conducted are: the studies focused on the manager of a fund, not the average investor; and the studies also used the information about the manager to assess the impact on fund specifics such as performance, risk measures and fund size.

The main differences between the research in this study and their research was that Chevalier and Ellison (1999) and Golec (1996) collected indirect data regarding the fund managers from Morningstar, Inc. The information collected was characteristics focused: age, education, SAT scores, start dates, performance, assets under management and the expense ratios of funds. Therefore they did not collect direct information from the fund managers and therefore could not collect behavioural bias information from them. This data formed the data set for their research. With regards to the performance data collected, their studies used a monthly performance interval whereas this study has used a daily interval. This is discussed further later in this chapter.

Without the collection of data directly from fund managers regarding their decision-making, it is difficult to study how or if a fund manager has an impact on the investment returns of a fund from a behavioural bias perspective. By doing so, these studies have excluded key behavioural finance drivers of performance and how the managers, individually, affect's performance. Therefore in this research the use of a survey where the fund managers completed questions regarding decision-making scenarios allowed for a more complex data set to be compiled.

This method allowed for in-depth knowledge to be gained regarding professionals in this area

of research. Therefore, this research has taken behavioural biases which managers have been found to suffer from in previous research and used this to find out whether managers in a South African context have the same biases and whether these affect their fund investment returns.

The previous research done on Behavioural Finance in a South African context has not been as in-depth. The majority of research has been focused on the average investor and how behavioural biases affect their decision-making (see for instance: De Bondt and Thaler (1985), Shefrin and Statman (1985), Ackert and Deaves (2010) and Shefrin (2008). Small amounts of studies, South African and worldwide, actually look into the fund manager and their decision-making. Even rarer are studies which collect data directly from asset managers and use this to assess the impact on the corresponding fund performance. The majority of the information regarding these managers has been freely available or indirect information.

The research being conducted could give South African fund managers an understanding into their own biases. Through this understanding, awareness and identification, asset managers would be able to control their biases and therefore find ways to improve performance through bias control. This research was therefore conducted in order to go beyond the known experiences and opinions in a South African context.

3.3 RESEARCH METHOD

The research method is one of the most important elements of research as it involves the procedures and processes which guide the researcher from the very beginning to the final conclusions and recommendations (Singh, 2006:3). This guiding method then offers insights into the tools and the processes that were used in order to achieve the research outcomes proposed (Singh, 2006:79).

There are two main research methods used to achieve proposed outcomes, these are quantitative and qualitative. The qualitative method is more concerned with the quality of information; so as to gain an understanding of the subject being researched through insights (McDonald and Headlam, 2008:8). This method therefore leaves room for interpretation, as the researcher collects written and verbal data; the data is transcribed and assessed from there into categories, themes or ideas which allows for researcher involvement to be high (Greener, 2008:35). High researcher involvement can allow for researcher biases to form while

interpreting the data.

In contrast the quantitative method has more of an inquiry basis; it is a structured process concerned with quantifying elements (McDonald and Headlam, 2008:8). The emphasis in this method is the collection and analysis of numerical data, this allows for the results to be detailed and presented in a statistical manner (University of Bradford, 2014:3). This allows for little researcher influence in the collection or interpretation of data, increasing the likelihood of unbiased results.

In order to achieve the purpose of this research, a quantitative method has been chosen. This allowed the research to take the form of a descriptive study where research is used to identify characteristics or elements of the respondents. From this identification the study took an exploratory path where the impact of the findings on investment performance was explored. An exploratory study is undertaken when few studies in the specific area exist, this allows for ideas to be tested and this then leaves room for further research. This applies to this research due to the few studies available on the subject and with the exact nature of the study.

The study has a deductive approach in that it has a clear, already established set of theories from previous research done on behavioural finance and that these are then tested in the collection and analysis of data (University of Bradford, 2014:4). This study also used a multi method collection technique which included a survey and the use of financial databases for historical performance data, therefore the data set consisted of primary and secondary data.

An important part of the method's guidance is the belief set. This is to insure that the purpose of the research is governed through the paradigm or belief set of the research. This is in order to direct the researcher toward the achievement of the research's goals. This is elaborated upon in the next section.

3.4 RESEARCH PARADIGM

Kuhn (2012:293) describes a paradigm as a cluster of beliefs, these beliefs then guide decisions as to what should be studied and how the results should then be interpreted. Whereas Guba (1990:17) believes the definition of a paradigm is one which is evolving and has a degree of flexibility due to it not being absolute. However Guba (1990:17) also sees it most frequently

as a guide of action governed by a set of beliefs. From these perspectives it is clear that a key concept of a paradigm is the beliefs that guide the research. Therefore it is important to identify which paradigm is suited to the research at hand.

There are a number of paradigms which govern certain research, activities and inquiries. According to Guba (1990:18) these can be characterised by their *Ontology* – the nature of reality, *Epistemology* – the relationship between the researcher and the ‘knowable’ and *Methodology* – the way in which knowledge is researched. From the realisation of these the researcher develops the set of beliefs or paradigms which determines the starting point, the method and what the inquiry is for the research at hand. The main paradigms used in research are positivistic, post positivism, critical theory and constructivism.

This research was guided by a positivistic paradigm. This paradigm will be explored through its ontology, epistemology and methodology and reasons as to the choice of paradigm will be laid out.

3.4.1 Positivistic Paradigm

The basic belief system starts with the realist *ontological belief*, where a reality exists and that the nature of how this reality works can be discovered, therefore aiming to predict or control phenomenon. The reality of the theory at hand allows for the exploration of how this works in a South African context as well as how this impacts fund performance. The *objectivist epistemology* allows for the researcher to be distant from the actual research – an observer so as to allow for unaltered results. This was achieved through the collection and analysis of data where the researcher could be distant from the respondents and the results were statistical in nature so there was no room for interpretation. This was then reinforced by the quantitative methodology.

The *methodology* then completes the way in which the inquiry takes form in order to lower biases and human errors (Guba, 1990:18-20). Due to the *quantitative methodological* nature of this research; where the researcher’s human involvement is near eliminated allowing for less bias in the data, the researcher is able to remain detached from the research. In order for the researcher to be guided by the objectivist element, the researcher’s approach needed to match the research being conducted. This can, however, differ by paradigm and the underlying assumptions associated with each paradigm.

All paradigms allow for concepts, opinions and worldviews to form, allowing for the discovery of ideas. The need to choose a paradigm is so that the guiding method and beliefs match the specific research at hand. The reasons for the choice in paradigm are laid out below:

The quantitative method is supported by the *objectivist epistemological* approach of being distant from the actual research in that the researcher is not directly involved and therefore does not apply any views or beliefs during the respondents answering of the survey (Guba, 1990:19). This is in the *realist ontological* view to uncover and examine how the existing truth regarding behavioural biases which have been proven in other research, work in a specific context. This research approach is therefore guided by a positivistic paradigm (Guba, 1990:18-23).

3.5 RESEARCH POPULATION AND SAMPLE

According to Greener (2008:47) a population is any group that is defined in relation to a research objective. Where the importance of the correct paradigm becomes apparent is in the decision-making throughout the research and therefore the conducting of the research. An essential aspect of this is deciding upon the data that will be assessed in order for the research to be conducted. When research is conducted there is an area of interest, within this area is a set of data which can be analysed in order to prove a hypothesis or create a concept. This is when population and sampling are developed in order for the research being conducted to progress.

Due to the size of the world and what people want to find out about certain aspects of that, the entire population cannot usually be approached due to size or co-operation of individuals. In this research the chosen population comprises of individual CIS managers. Due to the smaller size of this population, the entire population, can be researched. The majority of research uses populations which are in the thousands or larger and in this case it is nearly impossible to contact or facilitate research for the entire population. This research's entire population consists of 102 individual CIS managers (under the research constraints of active, individual and non-global CIS managers). With this rather small population size, it allowed the researcher to contact nearly each individual in the population, not accounting for individuals who have changed jobs or are not contactable.

3.5.1 Population

According to Singh (2006:82) a population is a group with certain or similar characteristics. This directly relates to this study's focus as it is on a group whose similarities are that they are South African based CIS managers who are individually responsible for actively managed decision-making regarding their specific fund, as mentioned in chapter two. This indicates a number of similarities and narrows the group down to a manageable population.

3.5.1.1 Convenience Sampling

According to Greener (2008:48) if researcher's can only ask a certain section of the population, then this must be justified. Sampling is designed to allow research to be conducted in an economical and accurate manner. Most research consists of large populations which are inaccessible or impractical to approach and therefore sampling assists in saving time, money and resources. Sampling also has structure and this structure is what allows for generalisation of the populations from findings and the error for estimation to be minimal.

Due to the small size of the population in this research the total population can be contacted to be a part of the sample. The advantage of this small population is that it is possible to get deep insights into the relevant population due to its size and the possible contact of the entire group, as well as a reduced risk in missing key information. It is also possible to make analytical generalisation about the population (Laerd, 2012:1).

This convenience sampling is slightly different to the usual method because it is within a small population and representatives from this population created the sample. This allows for the population to be accurately represented. This method was chosen because of the specific population and the high level of their responsibilities. As can be seen below it was very difficult to get high level asset managers to respond to the survey. Therefore, if the managers had been randomly selected and asked to participate beforehand the sample may have been much smaller and convenience sampling would have been used anyway.

The disadvantage of this method is that it can be time consuming and there is the concern of item nonresponse or complete nonresponse (Glasow, 2005:2-4). Due to the entire population needing to be contacted, even though there was a small population, this information is not always freely available. Contact details and positions needed to be gathered. This was

challenging in that it was reliant on people for responses. This was also time consuming due to the amount of research and follow-ups that took place. The other concern was that if a number of respondents did not take part or did not respond to a question then the generalisations could become compromised (Laerd, 2012:1).

In order to establish the population for this study a database was compiled. The database was constructed by extracting individually managed CIS's from Oldert (2012). Oldert's book is a summary of all Collective Investment Schemes available in South Africa as at 9 February 2012 (Oldert, 2012:458). Any collective investment schemes which were mentioned but not elaborated on in Oldert (2012) were researched and the managers' details were found on a reputable and up to date unit trust database, Moneyweb.

Once this database had been established, certain elements which did not fit the criteria of the research resulted in certain funds and managers being removed from the database. The key factors which are discussed in chapter two are that the managers need to be individually responsible, South African based and actively managing the fund.

The reasons for this are that the survey and individual fund performance needed to be specific to one individual manager. Therefore funds which had one or more managers did not fit the criteria. The study is also one which is seeking information regarding managers in a South African context and any managers who would compromise this were therefore excluded. The managers need to actively manage the portfolios so that the decision-making in the fund is a constant and frequent exercise so that this would have more of an impact on the fund than say a Fund of Funds manager where the manager manages managers of actively managed funds. Therefore the database was further reduced by eliminating funds which were not actively managed or indirectly managed as a Fund of Funds. The type of CIS's which were excluded were: Fund of Funds, Feeder Funds, Index Funds, purely global funds, Exchange Traded Funds and funds which were passively managed in any way.

From each CIS the fund manager listed was obtained; the manager's name, surname and company contact details were freely available to the public from Oldert (2012). Due to the lack of direct contact details for the fund managers, other methods had to be used to gather this information. Firstly the client servicing departments were contacted in order to request the fund manager company email addresses or for client services to forward the survey to the correct

manager.

A formal letter on a Rhodes University letterhead (APPENDIX A) was attached to this request explaining the purpose of the research and requesting the manager's contact details or if they would consider participating. Through this method, as well as gathering contact details via websites, online profiles and fund fact sheets, the researcher was able to compile a contactable database. From this database a data set of 102 active South African CIS managers were gathered. These managers were contacted to participate in the research.

3.6 DATA COLLECTION

Data collection is the process in which the data for analysis is collected. This process can be structured or unstructured depending on the guiding method of the research. (McDonald and Headlam, 2008:9). An important aspect of data collection is the research measuring instruments. Research measuring instruments are the tools used to gather the data needed for analysis. This research makes use of two research measuring instruments in order to conduct the research.

The first tool used is that of a survey; survey research can be described as the organised collection of information for the purpose of understanding and or predicting some aspects of a population of interest through respondents of the survey (Sukamolson, 2007:12). According to Pinsonneault and Kraemer (1993:77) it is a means for the gathering of information about actions, opinions or characteristics. The survey used was in the form of a questionnaire. This questionnaire allowed for a direct source of important information concerning the topic at hand (Sukamolson, 2007:12). This research used the questionnaire to gather information about characteristics and decision-making behaviour of asset managers. This formed the primary data set.

The advantage of using this method is to allow for the entire population to be contacted irrespective of where they may be located within South Africa. Surveys are also relatively easy to develop and distribute due to the allowances of technology. Surveys also allow for generalisations regarding the entire population (Bell, 2005:68). However, the use of a survey does come with concerns. The most relevant ones to this research are that: responses are not guaranteed, answers may not always be truthful in nature, misinterpretation of the questions

and that a large enough sample is needed in order to have reliable and valid results.

The second tool used was that of statistical performance data; this was collected via recognised financial databases: McGregor BFA and Money Mate. This data was historical performance data for each collective investment scheme in the data set. This formed the secondary data set.

This primary and secondary data collection will now be discussed further below.

3.6.1 Primary data

According to Berger (2011:33) primary data is the study of a subject through first hand investigation, this includes conducting a survey and the statistical data that is a direct result of the survey. The primary data collected in this research was in the form of a questionnaire (APPENDIX C) given to and completed by individual CIS managers in South Africa.

The questionnaire was developed through rigorous research into previous studies and biases verified by proponents in the field over the last few decades (see Tversky and Kahneman (1986), McNeil, Pauker, Sox and Tversky (1982), Bashir, Rasheed, Raftar, Fatima and Maqsood (2013), Kahneman and Tversky (1979) and Tversky and Kahneman (1981)). There are a large number of biases that have been demonstrated, however in this research the focus is that of investment professionals in the form of asset or fund managers instead of the average investor. Therefore, four specific biases were chosen – *overconfidence*, *optimism*, *loss aversion* and *frame dependence* - as previously discussed in chapter two. The questionnaire attempted to identify specific behavioural bias factors which affect the financial decision-making of a CIS manager based on these four biases.

When compiling the survey it was important to keep certain aspects in mind, firstly the anonymity of the respondents and to compile an interesting, thought provoking, compact and direct survey which would keep the respondents interest and not induce biased results through a long and complicated survey.

The questionnaire developed for this study consisted of two sections, the first consisting of demographic and work environment factors which is based on the studies by Drachter, Kempf and Wagner (2007) and Masood and Sergi (2009). The last section consisted of questions which have been previously used to study behavioural biases. The influential researchers' studies who

the questions were adapted from are: Shefrin (2001), Tversky and Kahneman (1981), Kahneman and Tversky (1979) and Tversky and Kahneman (1986) as discussed in detail in chapter two.

Therefore the questionnaire consisted of twenty five questions; four demographic questions, four work related questions, one baseline rationality question, four overconfidence related questions, four loss aversion related questions, three frame dependence related questions, four over optimism related questions and one mixed loss aversion and frame dependence question. The final questionnaire was then loaded onto Google documents, as a questionnaire, so that it would be convenient and easy for the respondents to complete. Google documents has a feature which allows one to create a questionnaire online, this survey or the link to the survey, is then sent to the recipient for a quick and convenient way to respond. The responses are then saved online in a secure storage format and the results are then available in an excel spreadsheet format.

The questionnaire was then distributed to the CIS managers. The distribution process began with the questionnaire being distributed to each manager with an individualised letter with the Rhodes University letterhead (APPENDIX B). This was to encourage participation in the questionnaire. The letter stated the objectives of the research, an explanation of how to answer the questionnaire and the assurance of anonymity through the use of a unique identifying number which only the researcher and supervisor had access to and how the results could lead to improved fund management in the future of the industry.

The barriers to data collection involved time, slow responses from the respondents, server errors where emails could not be delivered and certain companies blocked Google documents and therefore the questionnaire could not be opened and completed. Therefore, a few email batches were sent with the word format of the questionnaire as an attachment. The respondents indicated their answers on the document and returned the questionnaire to the researcher. This was then captured by the researcher onto the online system.

Another barrier was that some respondents did not understand some, two-part, questions fully and did not correctly complete the questionnaire. This lead to those individuals being approached directly, via email, to answer those specific questions in order for the respondents to remain part of the study. Once all responses had been captured the database was complete.

3.6.2 Secondary data

The secondary data collected in this research took the form of fund performance data, or share prices (NAV to NAV). Each CIS that corresponded with a fund manager that participated in the questionnaire was used to form a database of funds. The performance data from each fund was extracted from McGregor BFA and Money Mate financial databases. The data was collected over a five year period (01/01/2008 to 31/12/2012) for an in depth and long term look at the performance.

The NAV is the CIS's net asset value, this represents the share price. This is calculated by dividing the total net assets of the fund (less fees and expenses), by the number of shares in issuance (Morningstar, 2014). Timing market returns over a short term period such as a year is difficult, however, there has been research which indicates that asset classes can offer positive returns for a fund investor who has a longer term outlook.

A five year period was chosen because most CIS's have a performance outlook of between three and five years. The majority of fund managers do not recommend investing into the funds if the investor does not have a time horizon of at least three years. Compound performance plays a role and therefore the longer one is invested into the fund, the greater the reward. Therefore, to be fair to fund managers, a five year time horizon has been chosen. This also allows for a more comprehensive, wider time period of analysis. The data was collected on a daily basis to allow for changes in the performance to be more accurately recorded. By using a more frequent interval for the data it allows for a more in-depth look into periods of instability and how decision-making can impact a fund.

These returns were over a very volatile period in the investment market and therefore the shorter term returns were better. This was done on purpose in order to assess the funds over a comparable period of uncertainty. This will also show their worst standard deviations and Sharpe ratios because of high volatility.

Some specific fund data was only available over a shorter period or over shorter periods due to fund starting dates, a fund name change or a change in management of the fund. In the case of a fund name change the data was extracted under both fund names and used as one fund in analysis. In the case of change in management the time period applicable to the manager who participated in the research is extracted or used in the analysis.

A fund's annual rate of return comprised of dividend payments, changes in NAV, capital gains and expenses - it is therefore a net performance figure. The important aspect is to have a consistent measure for performance in order to be able to make accurate comparisons (Sharpe, 1966). Therefore the performance data collected was consistently downloaded as NAV to NAV in local currency, net of fees and therefore a net performance figure.

3.7 DATA CAPTURING

Data capturing is the way in which the data collected is captured in order to be analysed. In this research the data capturing consisted of a number of activities. Firstly each answered questionnaire was checked for errors or missing answers. Any questionnaire with errors or missing answers was then eliminated from the research data.

The data from the questionnaire was automatically captured onto an online spreadsheet through the use of Google Documents. Any questionnaires manually completed via word document were then captured by the researcher onto the same spreadsheet as if the questionnaire was answered via Google Documents. Each questionnaire can be identified by the corresponding unique identifying number of the respondents.

Once all the data had been collected, sorted and eliminated it was downloaded onto Microsoft Excel as a spreadsheet.

3.8 STATISTICAL ANALYSIS

According to McDonald and Headlam (2008:24) statistical analysis is a mathematical method of interrogating data. When conducting this 'interrogation' it is important that the applicable statistical tools are used, that the data is accurate and the details noted. Once the data has been analysed then the interpretation of the results can begin (Rajasekar, Philominathan and Chinnathambi, 2006:13).

The data was analysed through the use of Microsoft Excel. Firstly, the first two sections of the questionnaire were analysed statistically using descriptive statistics. The advantage of using this technique is to understand the distribution of each variable in the questionnaire, from each participant (Punch, 2005:125). Therefore descriptive statistics were used to summarise the demographic and work related details in Section one of the questionnaire and the behavioural

bias related decision-making questions in Section two of the questionnaire (APPENDIX C).

In the analysis of the research data, frequency tables and histograms were used to summarise the data mentioned above. Frequency tables are used to give an overall summary of the response to each question in the questionnaire and histograms are used to give an illustrative summary of the responses (McDonald and Headlam 2008:64). This is a simple process which allowed the resultant data to be demonstrated in table and graph form in Microsoft Excel.

The funds were then organised into categories; equity, income, Islamic, bond and property funds. This was in order to make accurate comparisons between managers. The fund fact sheets were used to gather this information. Descriptive statistics of the behavioural bias results per fund category were then analysed. This also took the form of frequency tables and histograms done using Microsoft Excel.

Once the descriptive statistics had been calculated on the questionnaire responses, the statistics on the performance of the funds were analysed. This data consisted of interval data which was used to determine the positive or negative performance of the fund during the specified period.

Firstly, the simple compound average rate of return per fund category was calculated. This is the arithmetic mean of each fund that falls into the fund categories mentioned above. The mean is commonly defined as the average, in this case. This would be average response per question within each fund category, per period. These investment performance returns were calculated over six months, one year, two years, three years, four years and five years from the 01/01/2008 to 31/12/2012. This was calculated by totalling the total returns per fund category, for each period, and then dividing this by the total of the number of funds in the specific fund category. This was illustrated in table form.

The mean return within each underlying behavioural bias was then calculated. For each bias, the responses which correlated to the category within an underlying bias category were added up and divided by the number of funds in each underlying bias category. For overconfidence the categories were: overconfidence, 50% confident and 50% overconfident, confidence and under confident. For optimism: over optimistic, 50% optimistic % 50% optimistic, optimistic, and pessimistic. For loss aversion: loss aversion, 50% loss averse and 50% non-loss averse and loss averse. For frame dependence: frame dependent and non-frame dependent. This was

demonstrated in table form, per each overall behavioural bias.

The respondents were placed into the appropriate category using the responses from each question. The categorisation was determined using the theory and findings from the research that the questions were based on. (The 50%/50% categories were determined by the responses from the respondents. For example, if a respondent was found to demonstrate equal affinity for both confident and over confident they were categorised as 50% confident and 50% overconfident).

Once the simple returns were demonstrated, the risk-adjusted return was then calculated. Risk-adjusted returns allow for the performance of the funds to be adjusted for the risk taken in the portfolio (Marte, 2012:1). The reason why risk-adjusted returns are a beneficial indication of returns is that it allows for a more direct comparison of risk profiled funds. Therefore, this risk-adjustment allows for a simple way to compare managers to managers in their respective categories.

The common risk measures used in the investment environment are that of standard deviation, Sharpe ratio, Sortino ratio, alpha, beta and r-squared. Each of these measures are different in their approach to measuring risk. The key is to use the same risk measure to compare different investment returns in order to get an idea of relative performance or risk. It is also important that this is done between portfolios with similar risk profiles and objectives. For instance, it would not be beneficial to compare a money market fund's Sharpe ratio to an equity fund.

Even though there are a wide variety of choices, the Sharpe ratio is the most commonly used in practice (Surz, 1995:70). The Sharpe ratio is a measure of the upside and downside volatility of an investment return giving a full indication of the risk-adjusted return (Surz, 1995:70). This also uses a changing, risk free rate, therefore changes in the economy are taken into consideration and it also allows for a more direct comparison to the funds benchmarks or the market (Sloma, 2012:1).

The risk free rate is a rate of return for an asset which is classified as risk free or has zero risk attached to it. Therefore the actual return will be equal to the expected return at the end of the investment period (Damodaran, 2008:3). Risk free rates are one of the most commonly used financial tools in financial theory. This is because in financial theory testing the returns are

looked at over and above the risk free returns that could be gained without added risk (Vaihekoski, 2009:2). This is due to the highly recognised belief that the more risk that is taken should be a direct link to greater returns due to the possibility of losses (Surz, 1995:70).

The commonly used assets for risk free rates are the short term government bonds of the region or the interbank lending rate if the government is in question as a risk free asset. There have been times that money market returns have also been used in this case. However, unlike cash, bonds are interest-bearing assets which therefore provide a return on investment (Tobin and Golub, 1998:81). This is therefore a certain return in a certain period (Reilly and Brown, 2012:10).

An important part of the use of risk free rates is the time period. In most contexts a 10 year government bond will act as a risk free rate. However, in recent years it has been increasingly difficult to justify that certain sovereigns are in fact free from default due to the financial crisis that has rocked most parts of the global economy. South Africa has not been under as much pressure as certain European or South American countries which have been on the brink of not being able to repay certain debts. Therefore, the South African government 10 year bond will suffice as the proxy for the risk free rate in this study. This data was collected from I-Net BFA, with a daily frequency. This was to allow for accuracy.

Once the risk-free rate had been calculated for each period (the mean of each period was determined by totalling the risk free rate per period and dividing this by the number of points in each period), the standard deviation was calculated per period. The standard deviation of the data was calculated for each fund manager, per period. The standard deviation is defined as the spread of the data about the mean value, demonstrating the range above and below (McDonald and Headlam 2008:29).

$$\text{Standard deviation} = \sqrt{\frac{\sum (x - \bar{x})^2}{(n-1)}} \quad \text{x- mean, n- population size}$$

To calculate standard deviation, the square root of the variance must be calculated. First the variance must be calculated. The mean of the numbers must be calculated, totalled and divided by the number of data points, and then for each number the mean is subtracted and then this number is squared. These numbers are then totalled and divided by the number of data points to work out the mean. Then the square root of this number is calculated and that is the standard

deviation.

The standard deviation was calculated in Microsoft Excel by using the formula for the whole population, using the compound investment return values. This calculation uses the mean of the population and the size of the population.

The Sharpe ratio was then calculated. This is calculated by dividing the effective return of a fund by its standard deviation. The effective return is calculated by taking the return for the period and subtracting the risk free rate for each period. Then the average for the period is calculated from the effective return. The standard deviation for this same period, as explained above, is then calculated. The effective return is then divided by the standard deviation for the same period.

$$\text{Sharpe Ratio} = \frac{\text{Effective Return (return-risk free rate)}}{\text{Standard Deviation}}$$

The risk-adjusted performance data was then calculated over the same periods mentioned above (six months, one year, two years, three years, four years and five years). The returns, above one year, were annualised before the Sharpe ratio was computed. The higher the fund's Sharpe ratio the better the funds historical risk-adjusted investment performance and the greater the return per unit of risk, therefore the better the compensation for the risk taken on (Marte, 2012:1). If the fund has a lower risk level than the market, the return above the risk free rate is amplified and vice versa for a higher level than the market (Sloma, 2012:1).

Descriptive statistics were then used to determine whether or not there was any correlation between the behavioural biases and the corresponding fund's performance. The mean Sharpe ratio, the minimum Sharpe ratio, the maximum Sharpe ratio, the median Sharpe ratio and mean Standard deviation per underlying bias category were used to illustrate this. The means were calculated by totalling the Sharpe ratio (and standard deviation) per bias category and dividing this by the number of data points in each category. The minimum Sharpe ratio is the smallest ratio found within each underlying bias category, the maximum was the largest Sharpe ratio found within each underlying bias category. The median ratio is the value separating the higher half of the data set from the lower half of the data set. This was calculated in Microsoft Excel and illustrated in table format.

The mean Sharpe ratio per underlying behavioural bias category, for each time period, were then calculated as above, in Microsoft Excel and illustrated in table form.

3.9 RELIABILITY and VALIDITY

Reliability and validity are essential to research in order to establish whether the research instruments being used provide a good measure or not. Reliability is most concerned with the consistency of questionnaire responses over time (Glasow, 2005:1-2). Greener (2008:37) defines reliability as a term for repeatability over time, or the audibility of the research design. This allows for confidence regarding the research to be instilled or for the research be repeated (Greener, 2008:37).

Validity is more concerned with the representation of the sample to allow for meaningful and useful inferences to materialize (Creswell, 2003:179). This is also referred to as the extent the data accurately measures what it planned to measure (University of Bradford, 2014:26).

These are measured statistically through various methods applicable to the research at hand, which will be elaborated upon below.

3.9.1 Reliability

Reliability allows for the researcher to determine whether the same result will be repeated by using the same measure (McDonald and Headlam, 2008:69). When measuring reliability the response to an item or measurement reflects the true score for the intended concept or random error. Therefore, a measurement is reliable when reflecting a mostly true score, relative to the error (Statsoft, 2014).

The main methods used to calculate reliability are; Cronbach's Alpha, Spearman-Brown split-half coefficient and correction for attenuation (Statsoft, 2014). The reliability of the questionnaire used in the research was assessed using the split-half reliability method and expressed as the correlation coefficient and the Spearman-Brown split-half coefficient. This is the correlation between the scores of two halves of a measuring instrument (Cook and Beckman, 2006:166.e11).

This method involves dividing the questionnaire into two halves by a random manner. In this

case the questionnaire was split into even and odd questions (the two part frame dependent questions were used as one for consistency). The odd and even questions are then summed and the correlation between the two halves is calculated. The correlation coefficient is calculated by summing the scores of each respondent, in each half, and calculating the correlation between the two. This was calculated using Microsoft Excel, with the formula below.

$$\text{Correl}(X, Y) = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

However this correlation coefficient does not test the whole instrument and therefore the Spearman-Brown split-half coefficient is used to determine the correlation of the questionnaire as a whole (Cook and Beckman, 2006:166.e11). This calculated by:

$$\rho = \frac{2r}{1+r}$$

$$\text{Spearman-Brown} = (2 * \text{correlation coefficient}) / (1 + \text{correlation coefficient})$$

This method can, however, be complicated in this research context due to the variability of the behavioural biases being tested, as well the manner in which the questions are presented. For instance, not all of the questions have the same scale or have the same frame. Therefore the reliability score may be lower than a good score. This experimental instrument is being tested to see its significance and where it can be improve for future research.

3.9.2 Validity

Validity is concerned with the control and representation of the sample (Singh, 2006:80). This will allow for generalisation of the data when finalised. In this study due to the population being the sample, for validity purposes the respondents form the 'sample'.

Validity is designed to determine whether the research measures what it intended to measure as well as the degree of reliability of the results (Golafshani, 2003:599). Validity has a strong positivism background, were the criterion in which research is measured for validity is a result of other empirical conceptions (Golafshani, 2003:599). There are various measures of validity, however, the ones of concern in this study were face validity and external validity (Creswell,

2003:179; Greener, 2008:37).

Face validity is concerned with whether or not the method of researching makes sense or not as an instrument to collect information regarding the subject at hand (Greener, 2008:37). This is usually shown when any person can identify that the instrument looks like it tests what it says it tests. This validity is useful in encouraging participation in the research and through this participation, approval is given (Greener, 2008:37). External validity involves the degree to which the research score predicts a criterion measure. In other words do the results correlate with other results (Creswell, 2003:179). This is where the generalisability of the results is tested.

Validity methods can be measured through the use of statistical measures. The most common one used for construct validity and therefore overall validity is factor analysis, this allows for the variables in the study to be reduced and for structure to be detected. However, factor analysis typically requires large sets of data and then these factors are extracted and reduced. In this research the data set does not require being reduced. Hogarty, Hines, Kromrey, Ferron and Mumford (2005:222) also highlight the ambiguity surrounding the ratio of sample size to variability. They found little evidence of a ratio yielding any good factor recovery.

To determine face validity the researcher discuss the instrument and how it tests what it intends to. To determine the external validity the response rate was used. Usually a response rate of 50% and higher is needed in order to achieve validity, however in population studies to be certain that the population is representative, the makeup of demographic information is also essential. If the demographic percentage of the response and the population are similar then the questionnaire responses are representative of the total population (Kelly, Clark, Brown and Sitzia, 2003:262).

Collis and Hussey (2003:59) also indicated that research using a positivistic paradigm focuses on measurement precision and repeatability and therefore the likelihood of low validity is higher.

There are also various threats to validity such as;

- Environment of the test when conducted;

- The concern of the respondents over being evaluated;
- Test construction;
- Lack of pilot testing due to a specific group;
- Language Barriers; and
- Not answering survey correctly (in the correct order etc.).

Brown (1996:188-192).

3.10 ETHICAL CONSIDERATIONS

The ethical issues pertaining to this research are the anonymity of respondents and the voluntary participation of the data collection. The researcher understands that much of the information gathered in this study is of a personal and professional nature as it relates directly to the competency of the participant's profession and is therefore sensitive. Due to the highly sensitive nature of the data the respondents were sent unique identifying numbers, which have been mentioned in the chapter. Within the individualised letters sent to each participant, the researcher was able to explain what precautions were put in place to secure the identity of each participant.

Through the unique numbers, the respondents became anonymous and only the researcher and supervisor had access to this information. The information relating to the details of the respondents is kept in a password protected folder and the backup is also kept as a password protected folder, in a safe. The respondents will be sent feedback in the form of the Thesis or a Journal article, whichever is preferred by the participant. The researcher is aware of all ethical considerations and will keep within the regulations set out by the Department of Management Ethics Committee. The research data gathered will only be used for research purposes.

3.11 SUMMARY

This chapter outlined the methodology used to conduct the research. The importance of this research was discussed in terms of the objectives of the research (in chapter one). The methodology chosen, the paradigm which guided the study and the convenience sampling were discussed. The data collection, data capturing and analysis were outlined and explained, with

the instruments used being discussed and how these were then tested for reliability and validity. Finally, the ethical considerations were outlined and the methods for overcoming these were discussed. In the next chapter the findings are discussed.

CHAPTER 4

RESULTS and FINDINGS

4.1 INTRODUCTION

The results are an integral part of research where the facts found during research are presented. This allows for the experiments that were carried out to reveal whether they were of value and what was found. This allows for cause and effect to be examined (Rajasekar *et al.* 2006:32).

The purpose of this research was to establish whether there is a relationship between behavioural biases of fund managers and whether these behavioural biases have an effect on fund performance. The purpose of this chapter is to present the results and discuss the findings of this research.

Firstly, the response rate of the findings will be presented and discussed. This will be followed by descriptive statistics of the demographic and work environment factors of the respondents. Descriptive statistics of the behavioural bias results are then presented in order to identify whether South African fund managers do suffer from any of the biases in this research, followed by the bias results per fund category. The performance of the funds are then discussed, per fund category and per behavioural bias. The relationship between behavioural biases and fund performance is then presented to see if there is a significant relationship and then the reliability of the measuring instrument is then assessed through the use of the split-half correlation coefficient and the Spearman-Brown correction coefficient. The validity is then presented by face validity and then the generalizability or external validity of the response rate is discussed. This chapter then concludes with a summary of findings.

4.2 RESPONSE RATE

Table 4.1 illustrates the response rate achieved for this research. The total population of this research was 102 active, individually responsible asset managers. The total number of respondents in this research were 53, there were 42 questionnaires which were answered correctly and 11 were completed incorrectly and were therefore un-usable. The total response rate was 52% (total response/population) and the usable response rate is 41% (usable responses/total population). The validity of this response rate will be discussed later on in this chapter.

Table 4.1 Response rate

Asset Managers	
<i>Population</i>	102
<i>Unusable responses</i>	11
<i>Declined</i>	4
<i>Non-response</i>	45
<i>Non-response rat</i>	44%
<i>Usable responses</i>	42
<i>Usable response rate</i>	41%
<i>Total responses</i>	53
<i>Total response rate</i>	52%

4.3 DEMOGRAPHIC AND WORK ENVIRONMENT INFORMATION

Microsoft Excel was used to summarise the demographic, work environment and self-perception information as shown in the below figures 4.1 to 4.8. Microsoft Excel was used to demonstrate the frequency tables and bar graphs related to the data captured via the questionnaire with N = 42 respondents, this is shown in APPENDIX D.

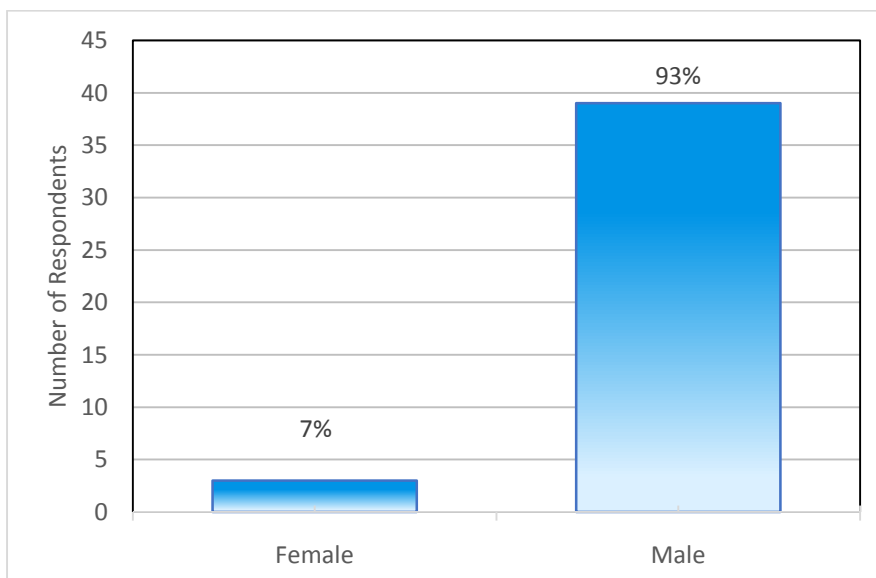
Figure 4.1: The gender of respondents

Figure 4.1 illustrates the gender composition of the respondents. 39 (93%) of the respondents were male, and 3 (7%) of the respondents were female.

Figure 4.2: The age of respondents

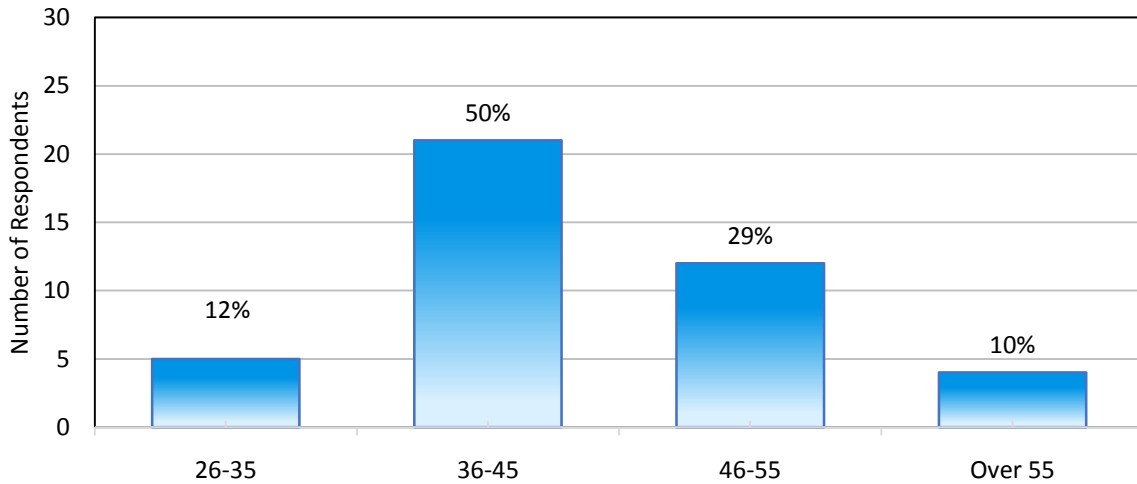


Figure 4.2 demonstrates the age of the respondents. The majority of the respondents were between the age 36-45 years old with 21 (50%), 5 (12%) respondents were between the age of 25 and 35, 12 (29%) respondents were between the age of 46-55, 4 (10%) respondents were over 55 and 0 (0%) respondents under 25.

Figure 4.3: The highest level of education achieved by respondents

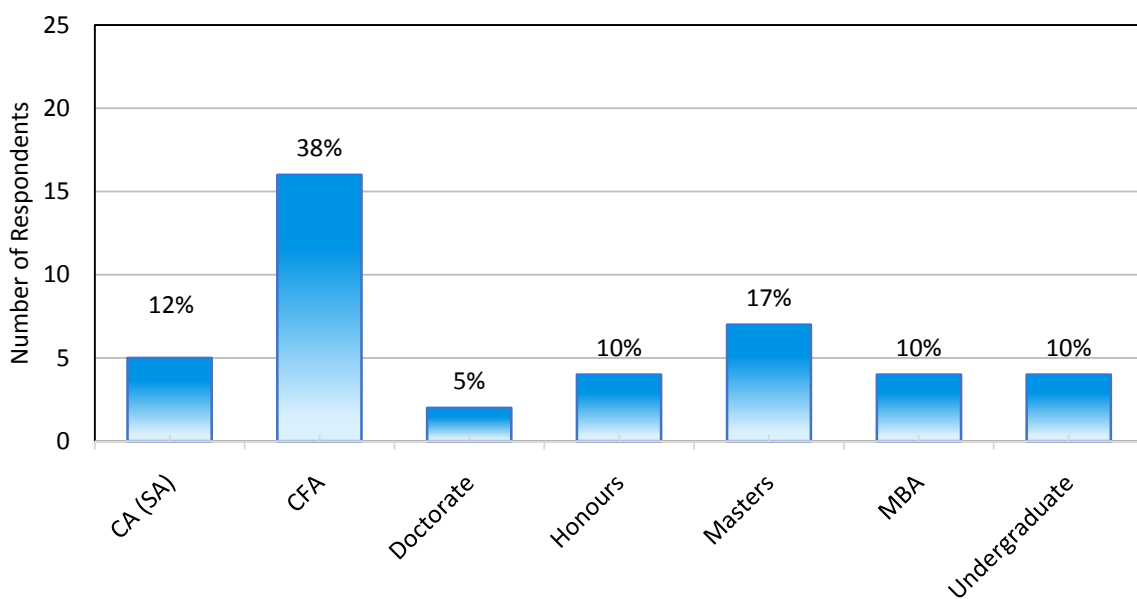


Figure 4.3 illustrates the highest level of education achieved by respondents. The majority of respondents achieved a CFA 16 (33%). There were 7 (17%) respondents that achieved a Master's Degree; 5 (10%) respondents achieved a CA (SA), 2 (4%) respondents achieved a Doctorate Degree, 4 (8%) respondents achieved a MBA, 4 (8%) respondents achieved a Honours Degree, 4 (8%) respondents achieved an undergraduate degree, 0 (0%) respondents achieved a Diploma and 0 (0%) respondents achieved a Matric Certificate as their highest qualification.

The possible reasons for this are that the CFA is becoming an industry standard for asset managers. This is the most recognised and specified qualification to have on the investment industry. There is still however, debate about what qualification is higher or on the same level as it. Therefore, a CA (SA) and Master's degree are the other most widely found qualifications in this field.

Figure 4.4: The nationality of respondents

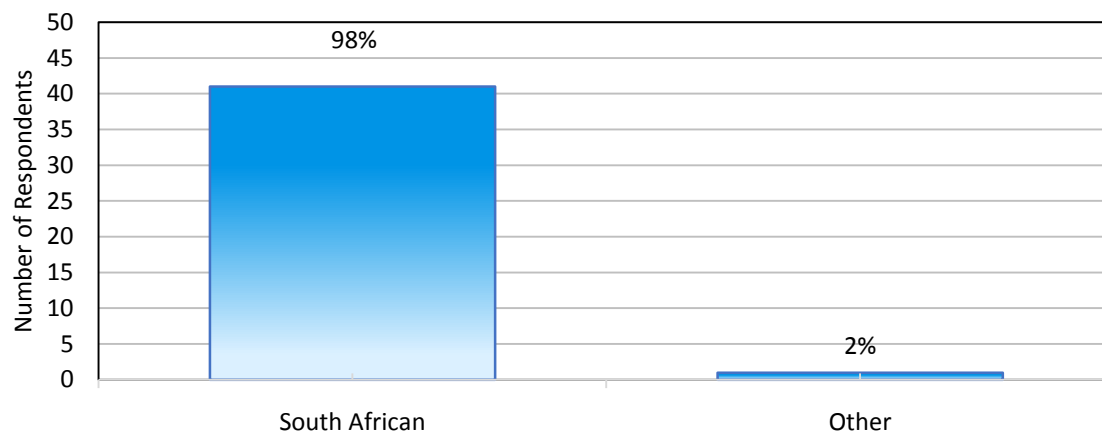


Figure 4.4 demonstrates the nationality of the respondents. The majority of the respondents with 41 (98%) were South African and the remaining 1 (2%) of the respondents were other nationality's.

Figure 4.5: The number of funds respondents are responsible for

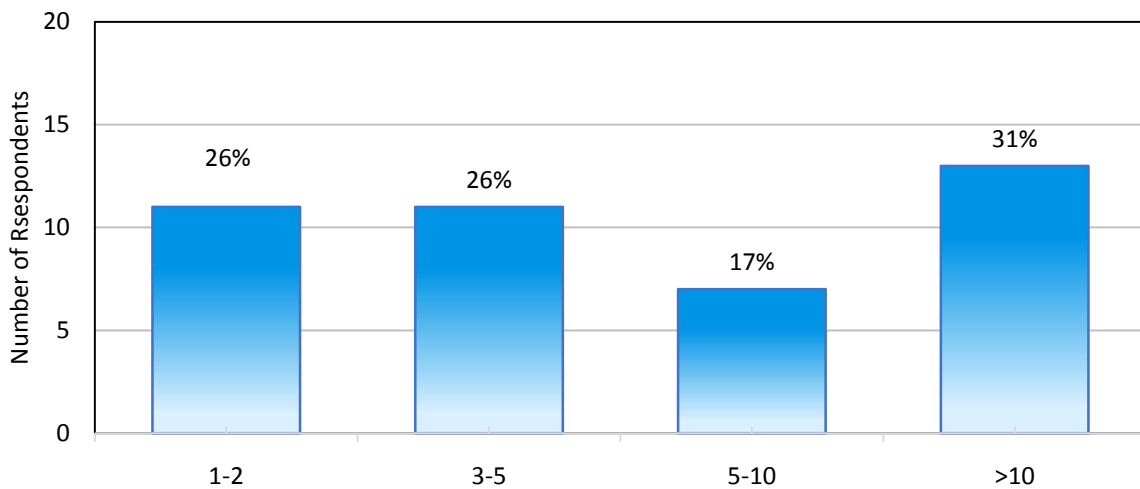


Figure 4.5 demonstrates the number of funds the respondent is responsible for. The majority of respondents, 13 (31%), are responsible for greater than 10 funds, 11 (26%) respondents are responsible for 1-2 funds, 11 (26%) respondents are responsible for 3-5 funds and 7 (17%) respondents are responsible for 5-10 funds.

Figure 4.6: The number of years of experience of respondents as fund managers

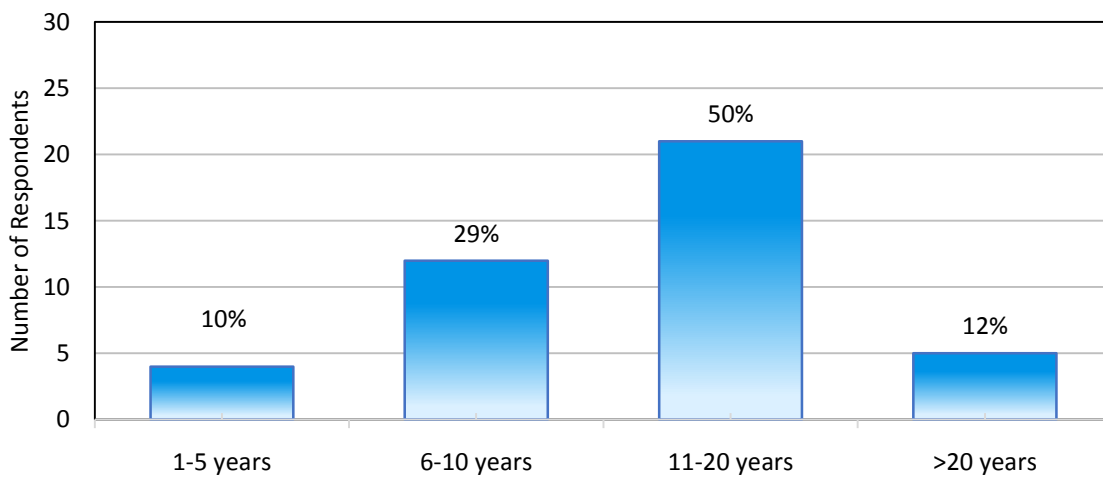


Figure 4.6 demonstrates the number of years of experience of respondents as fund managers. The majority of the respondents, 21 (50%), have 11-20 years of experience, 12 (29%) of respondents have 6 -10 years of experience, 5 (12%) of respondents have greater than 20 years of experience and 4 (10%) of respondents have 1 -5 years of experience.

Figure 4.7: The respondents' self-perception of risk

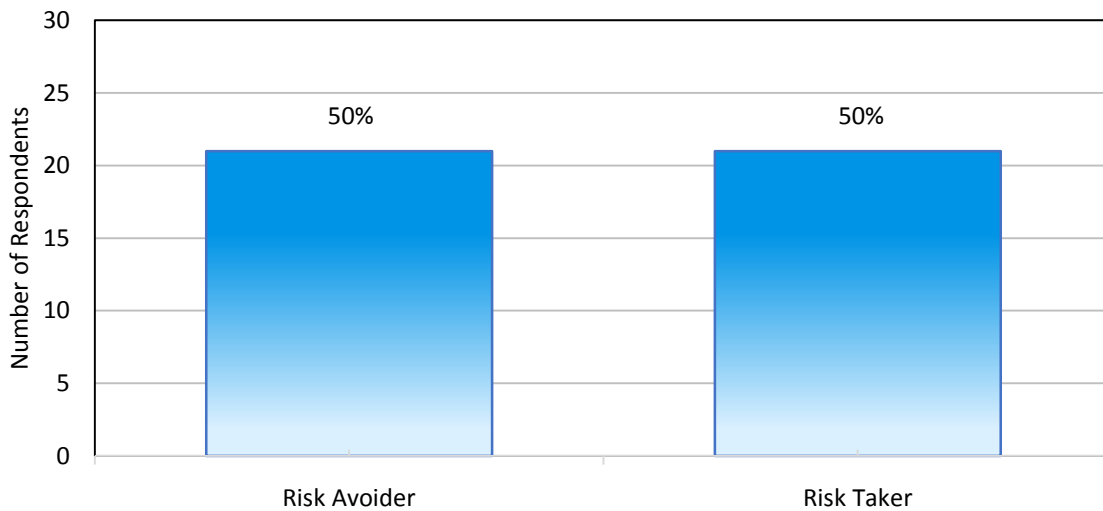


Figure 4.3 demonstrates the respondents' self-perception of risk. 21 (50%) of the respondents had a risk avoiding self-perception of their risk appetite and the other 21 (50%) had a risk taking self-perception of their risk appetite.

Figure 4.8: The respondents' self-perception of confidence

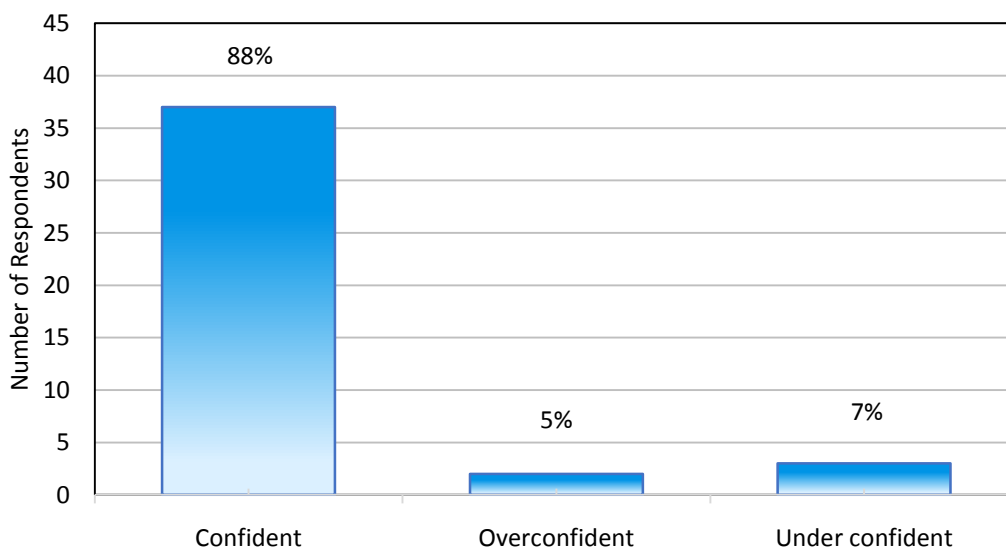


Figure 4.8 illustrates the respondents' self-perception of confidence. 37 (88%) of the respondents perceived themselves to be confident, 3 (7%) perceived themselves as under confident and 2 (5%) of respondents perceived themselves as overconfident.

Figure 4.9: Rationality baseline test

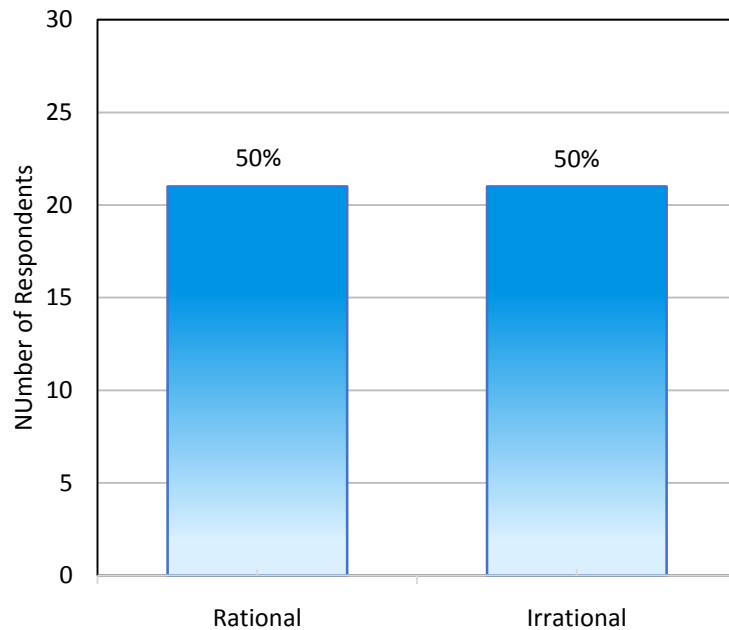


Figure 4.9 illustrates the rationality baseline results from the questionnaire distributed. 21 (50%) of the respondents were found to be rational and 21 (50%) of the respondents were found to be irrational.

4.4 BEHAVIOURAL BIAS RESULTS

Microsoft Excel was used to summarise the underlying behavioural biases per behavioural bias category as shown in the below figures 5.0 to 5.3. Microsoft Excel was used to demonstrate the frequency tables and bar graphs related to the data captured via the questionnaire with N = 42 respondents, this is shown in APPENDIX E.

Figure 5.0: Overconfidence bias results

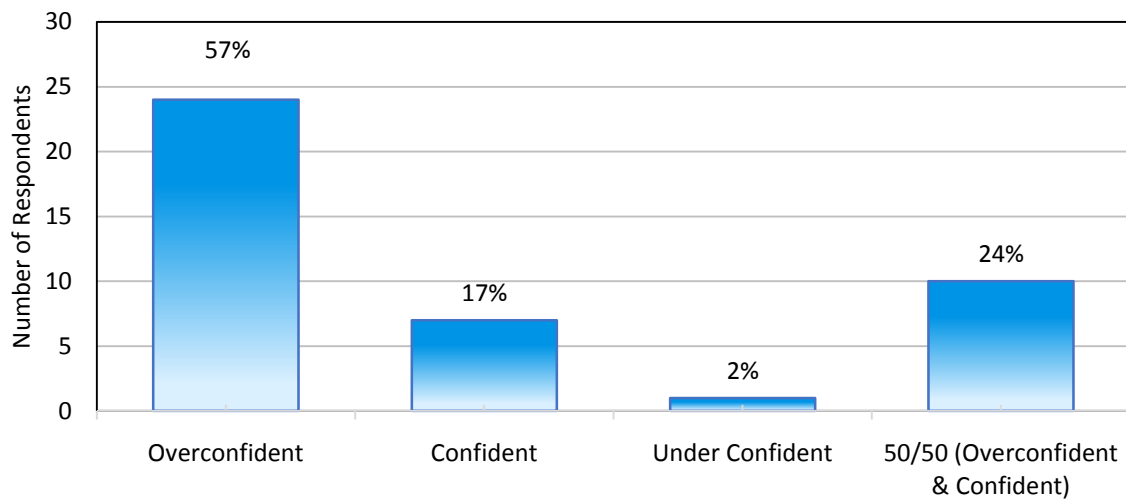


Figure 5.0 illustrates the overconfidence bias results from the questionnaire distributed. 24 (57%) of respondents were overconfident, 10 (24%) of respondents were 50% overconfident and 50% confident, 7 (17%) were confident, 1 (2%) was under confident. (1 (2%) respondent was 50% overconfident and 50% under confident. This respondent was directly between over and under confident and therefore was labelled in the confident category).

Figure 5.1: Optimism bias results

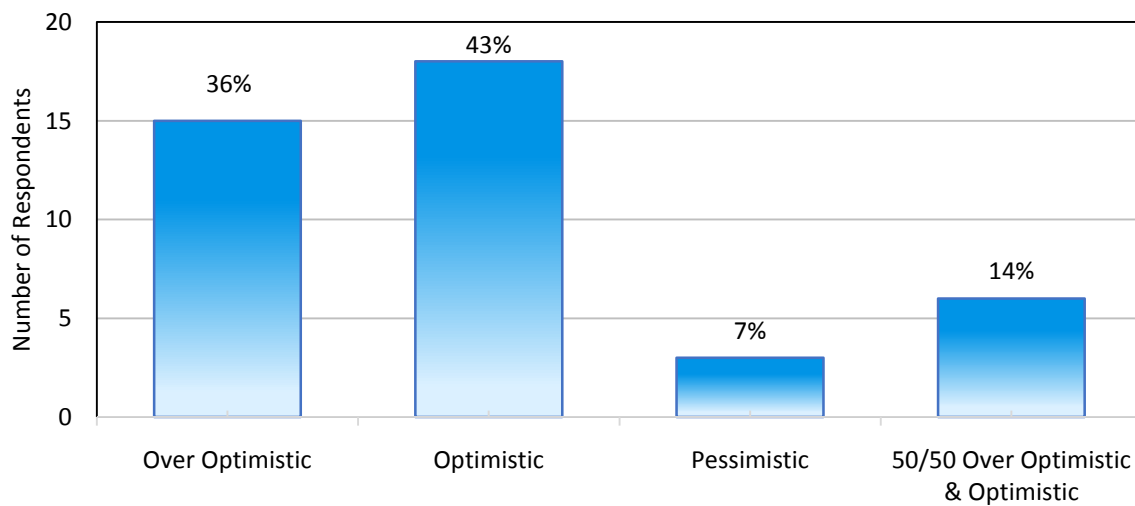


Figure 5.1 illustrates the overall results of optimism bias from the questionnaire. The majority of respondents, 18 (43%) were optimistic, 15 (36%) of respondents were over optimistic, 6 (14%) of respondents were 50% over optimistic and 50% optimistic and 3 (7%) of respondents were pessimistic.

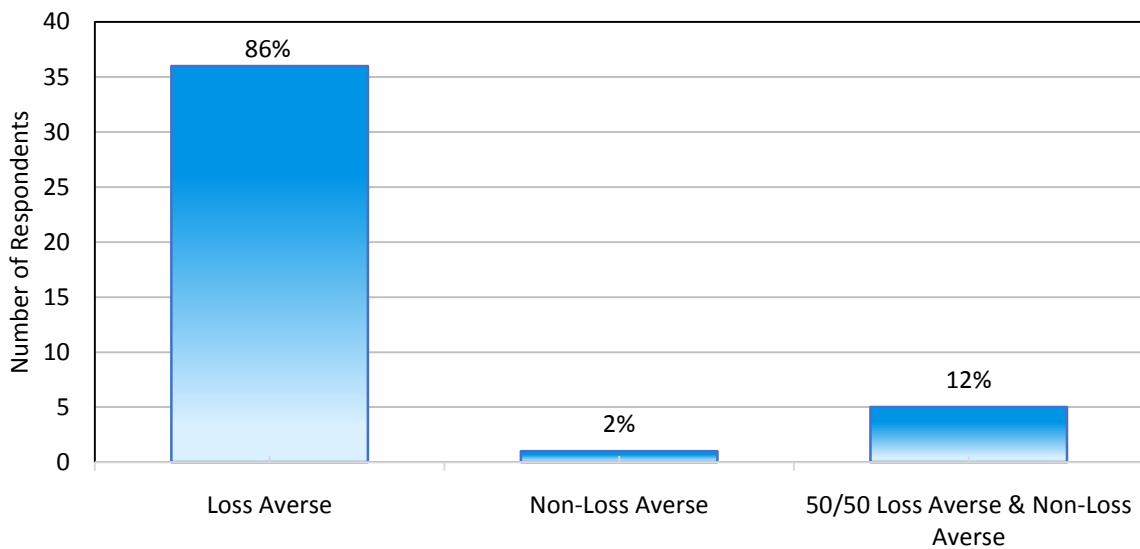
Figure 5.2: Loss aversion bias results

Figure 5.2 illustrates the loss aversion bias results from the questionnaire distributed. 36 (86%) of respondents were loss averse, 5 (12%) of respondents were 50% loss averse and 50% non-loss averse and 1 (2%) were non-loss averse.

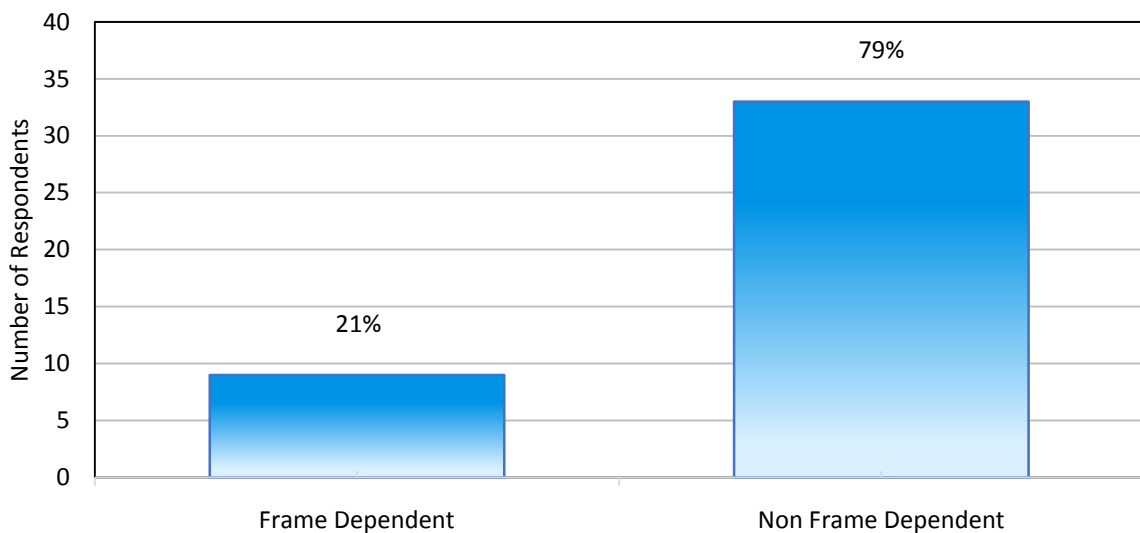
Figure 5.3: Frame dependence bias results

Figure 5.3 illustrates the frame dependence bias results from the questionnaire distributed. The majority of respondents 32 (78%) were found not to be frame dependent (non-frame dependent). 9 (22%) of respondents were found to be frame dependent.

4.5 DESCRIPTIVE STATISTICS OF FUND CATEGORIES AND BEHAVIOURAL BIASES

Table 4.2 Fund categorisation

<i>Type of Fund</i>	<i>Number of Funds</i>
<i>Domestic Equity</i>	34
<i>Domestic Bond</i>	2
<i>Domestic Income</i>	13
<i>Islamic Funds</i>	4
<i>Domestic Property</i>	3
<i>Total</i>	56

Due to the small sizes of responses gathered from domestic bond, Islamic and domestic property fund managers no real inferences can be made about the managers in these categories. Therefore the descriptive statistics used in this section will use total funds, domestic equity, domestic income and other (bond, property and Islamic funds) to depict the behavioural bias results in the fund category section. APPENDIX F contains all the frequency tables and bar graphs for the biases per fund category captured from the questionnaire, N= 56 funds and 42 managers (some managers have more than one fund they are responsible for).

Figure 5.4: Overconfidence results per fund category

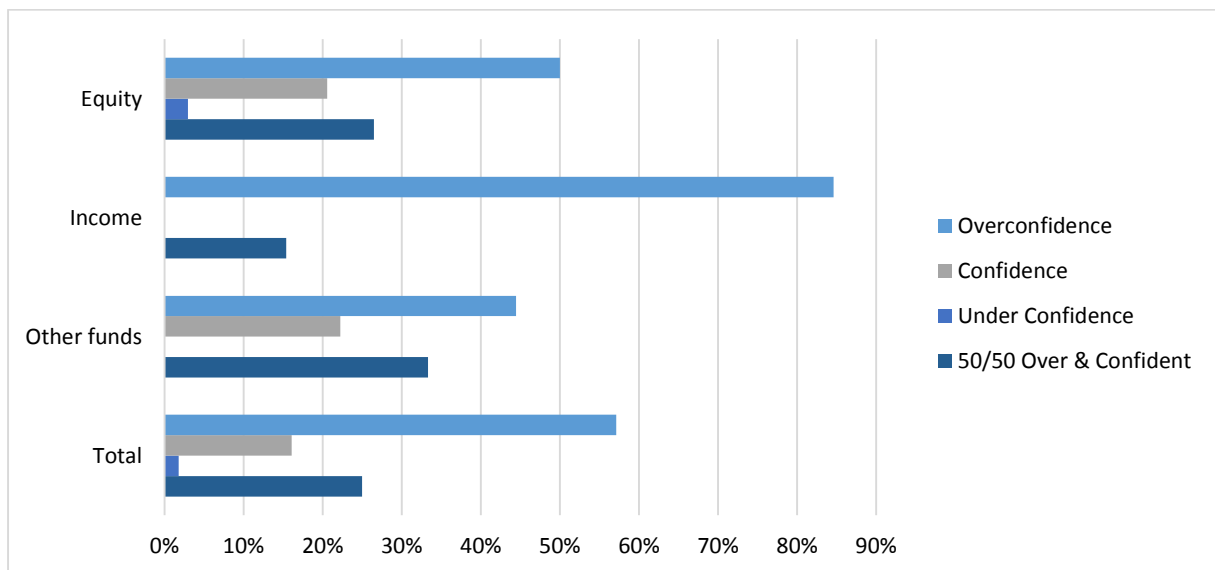


Figure 5.4 illustrates the overconfidence results per fund category from the questionnaire distributed. Of the total funds 57% were overconfident, 16% were confident, 25% were 50% overconfident and 50% confident and 2% were under confident. Of the 'other' funds the majority of respondents were overconfident 4 (44%), 2 (22%) were confident, 0 (0%) were under confident and 3 (33%) were 50% overconfident and 50% under confident.

Of the equity fund respondents, the majority were overconfident 17 (50%), 7 (21%) were confident, 1 (3%) was under confident and 9 (26%) were 50% overconfident and 50% under confident. Of the income fund respondents, the majority were overconfident 11 (85%), 0 (0%) were confident, 0 (0%) were under confident and 2 (15%) were 50% overconfident and 50% under confident.

Figure 5.5: Optimism results per fund category

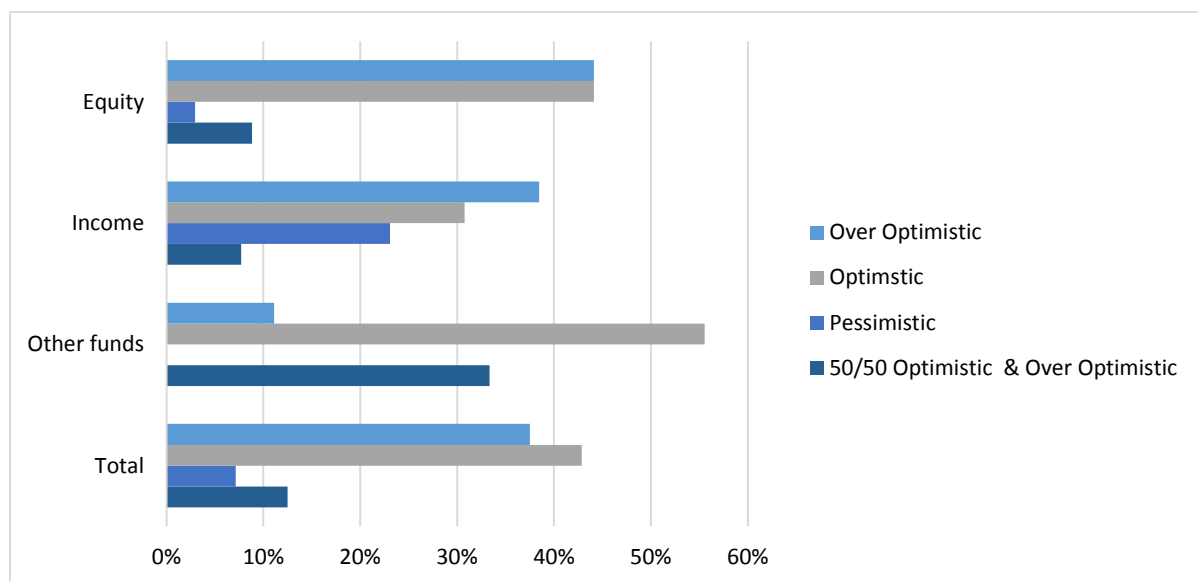


Figure 5.5 illustrates the optimism results per fund category from the questionnaire distributed. Of the total number of respondents, the majority were optimistic 24 (43%), 21 (38%) were over optimistic, 7 (13%) were 50% over optimistic and 50% optimistic and 4 (7%) were pessimistic.

Of the 'other' funds the majority of respondents were optimistic 5 (56%), 1 (11%) were over optimistic, 3 (33%) were 50% over optimistic and 50% optimistic and 0 (0%) were pessimistic.

Of the equity fund respondents, there was a split for majority between optimistic 15 (44%) and over optimistic 15 (44%), 3 (9%) were 50% over optimistic and 50% optimistic and 1 (3%) was pessimistic. Of the income fund respondents, the majority were over optimistic 5 (38%), 4 (31%) were optimistic, 1 (8%) was 50% over optimistic and 50% optimistic and 3 (23%) were pessimistic.

Figure 5.6: Loss aversion results per fund category

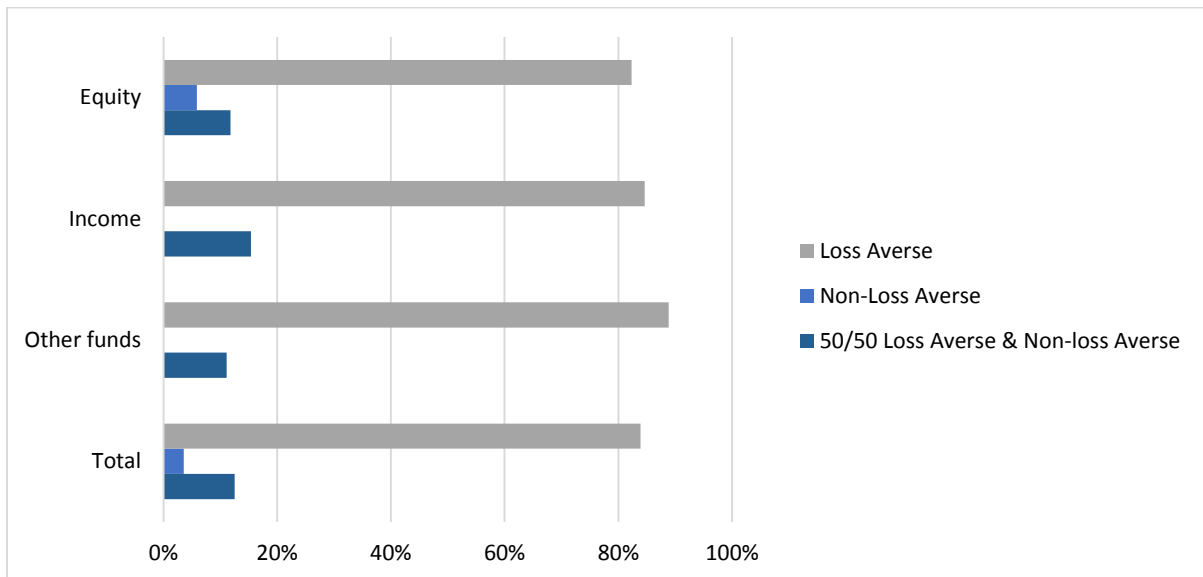


Figure 5.6 illustrates the loss aversion results per fund category from the questionnaire distributed. Of the total number of respondents, the majority were loss averse 47 (84%), 2 (4%) were non-loss averse and 7 (13%) were 50% loss averse and 50% non-loss averse. Of the 'other' funds the majority of respondents were loss averse 8 (89%), 0 (0%) were non-loss averse and 7 (11%) were 50% loss averse and 50% non-loss averse. Of the equity fund respondents the majority of respondents were loss averse 28 (82%), 2 (6%) were non-loss averse and 4 (12%) were 50% loss averse and 50% non-loss averse. Of the income fund respondents, the majority were loss averse 11 (85%), 0 (0%) were non-loss averse and 2 (15%) were 50% loss averse and 50% non-loss averse.

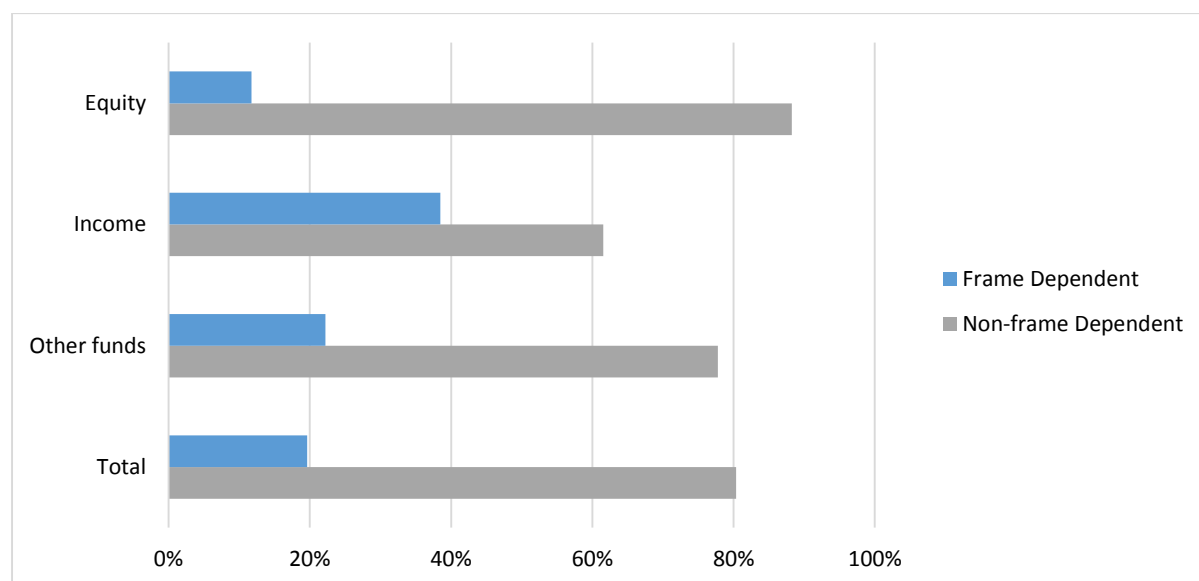
Figure 5.7: Frame dependence results per fund category

Figure 5.7 illustrates the frame dependence results per fund category from the questionnaire distributed. Of the total number of respondents, the majority were non-frame dependent 44 (79%) and 12 (21%) were frame dependent. Of the ‘other’ funds the majority of respondents were non-frame dependent 6 (67%) and 3 (33%) were frame dependent. Of the equity fund respondents, the majority were non-frame dependent 30 (88%) and 4 (12%) were frame dependent. Of the income fund respondents, the majority were non-frame dependent 8 (62%) and 5 (38%) were frame dependent.

4.6 INVESTMENT RETURNS OF COLLECTIVE INVESTMENT SCHEMES

Table 4.3: Compound average rate of return per period

	<i>Property</i>	<i>Bonds</i>	<i>Income</i>	<i>Islamic</i>	<i>Equity</i>
6M	28.55%	8.82%	4.75%	14.16%	20.14%
1YR	27.01%	7.95%	3.49%	7.33%	11.65%
2YR	14.51%	4.29%	2.30%	3.94%	6.48%
3YR	15.64%	5.01%	1.88%	8.00%	8.02%
4YR		1.45%	0.25%	8.13%	10.21%
5YR		2.63%	0.31%		3.44%

Table 4.3 illustrates the average compound rate of return per period, per fund category. Over six months, one year, two years and three years the property funds were the best performing class with equity funds in second, Islamic funds in third, bonds in fourth and income last. Over

four years and 5 years the property funds did not have enough data and therefore the equity funds were the top performing asset class, with Islamic funds in second, bonds in third and income last.

The figures 4.4 to 4.7 below indicate the compound rate of rate of return per period, within each bias category.

Table 4.4: Average rate of return per overconfidence bias category

	Overconfidence	50/50 Overconfident & Confident	Confidence	<i>Under confidence*</i>
6M	13.69%	16.27%	22.11%	41.65%
1YR	8.70%	9.88%	11.26%	31.43%
2YR	4.96%	5.38%	6.50%	18.73%
3YR	5.87%	6.89%	7.82%	22.09%
4YR	5.95%	7.97%	10.66%	21.23%
5YR	2.30%	2.95%	3.18%	9.84%

**As already mentioned, under confident has only one respondent and therefore the average rate of return is not something that any conclusions can be drawn from.*

Table 4.4 demonstrates that confident managers yielded the best returns over all periods and that overconfident managers yielded the worst returns over the same periods.

Table 4.5: Average rate of return per over optimism bias category

	Over Optimistic	50/50 Over optimistic & optimistic	Optimistic	Pessimistic
6M	13.11%	16.12%	19.73%	11.22%
1YR	6.92%	12.07%	12.18%	7.72%
2YR	3.76%	5.76%	7.61%	4.36%
3YR	4.98%	8.11%	8.52%	5.19%
4YR	5.76%	7.60%	9.92%	4.39%
5YR	2.15%	2.40%	3.79%	1.41%

Table 4.5 demonstrates that optimistic managers yielded the best returns over all periods and that over optimistic managers yielded the worst returns over the same periods, except for 6 months, four years and five years where pessimistic managers yielded the worst return.

Table 4.6: Average rate of return per loss aversion bias category

	Loss Averse	50/50 loss averse & non-loss averse	<i>Non-loss averse</i>
6M	15.95%	17.59%	16.72%
1YR	10.09%	11.57%	-2.28%
2YR	5.56%	7.93%	-1.79%
3YR	6.87%	7.55%	1.59%
4YR	7.77%	7.09%	4.88%
5YR	2.81%	4.23%	-2.98%

**2 respondents were non-loss averse and therefore no real inferences can be made about this.*

Table 4.6 demonstrates that 50% loss averse and 50% non-loss averse managers yielded the best returns over all periods (except for the 4 year period where loss averse managers outperformed). Loss averse managers yielded the worst returns over all periods, yet these results were not far off the 50% loss averse and 50% non-loss averse manager results.

Table 4.7: Average rate of return per frame dependence bias category

	Frame Dependent	Non-frame dependent
6M	18.08%	15.67%
1YR	13.74%	8.85%
2YR	8.24%	4.96%
3YR	9.78%	6.02%
4YR	10.20%	6.92%
5YR	3.49%	2.62%

Table 4.7 demonstrates that frame dependent managers yielded the best returns over all periods and that non-frame dependent managers yielded the worst returns over the same periods. This being said, the non-frame dependent manager results were positive over all periods and the results were not far off the frame dependent managers.

4.7 THE IMPACT OF BEHAVIOURAL BIASES ON THE PERFORMANCE OF FUNDS

The Sharpe ratio has been used to demonstrate the risk-adjusted returns of the fund's investment returns. As already mentioned in chapter three, this is so that the returns can be compared in an equivalent manner.

These risk-adjusted returns as whole per bias category, within each behavioural bias were calculated. This can be seen below. The Sharpe ratio is interpreted as acceptable if 0.6 in a managed fund and good if it is 1 and above (Epstein, 1992:118). However there were very few actively managed funds which met this criteria in this research. Therefore when the arithmetically correct mean was calculate using all the managers (in each section), the majority of the Sharpe ratios were negative. Therefore the Sharpe ratios have been compared to each other, within each bias category. This is essentially a rolling scale of highest score to lowest score.

Table 4.8: Impact of overconfidence on investment returns of funds

Bias Category	n	Mean Sharpe Ratio	Min Sharpe Ratio	Max Sharpe Ratio	Median Sharpe Ratio	Standard Deviation
Overconfident	32	-2.687	-50.731	3.649	-0.356	0.081
50/50 Overconfident & Confident	14	-0.679	-10.322	2.808	-0.087	0.091
Confident	9	0.268	-1.179	4.423	-0.002	0.147
<i>Under Confident*</i>	<i>1</i>	<i>1.854</i>	<i>0.096</i>	<i>4.590</i>	<i>1.171</i>	<i>0.107</i>

* There was only one under confident manager and therefore no inferences will be made about this.

Table 4.8 illustrates the confidence related risk-adjusted investment returns. Fund managers who were found to be overconfident had a mean Sharpe ratio of -2.687. The mean Sharpe ratio of 50% overconfident and 50% confident managers (50/50) was higher at -0.679 and the mean Sharpe ratio of confident managers was 0.268.

Table 4.9: Impact of over optimism on investment returns of funds

Bias Category	n	Mean Sharpe Ratio	Min Sharpe Ratio	Max Sharpe Ratio	Median Sharpe Ratio	Standard Deviation
Over Optimistic	21	-2.695	-50.731	3.584	-0.535	0.082
50/50 Over Optimistic & Optimistic	7	-1.171	-10.188	2.680	0.195	0.071
Optimistic	24	-0.900	-30.115	4.590	0.039	0.118
Pessimistic	4	-0.430	-1.947	3.242	0.358	0.083

Table 4.9 illustrates the optimism related risk-adjusted investment returns. Fund managers who were found to be over optimistic had a mean Sharpe ratio of -2.695. The mean Sharpe ratio of 50% over optimistic and 50% optimistic managers (50/50) was higher at -1.17, the mean

Sharpe ratio of optimistic managers was -0.900 and the mean Sharpe ratio of pessimistic managers was -0.430.

Table 5.0: Impact of loss aversion on investment returns of funds

Bias Category	n	Mean Sharpe Ratio	Min Sharpe Ratio	Max Sharpe Ratio	Median Sharpe Ratio	Standard Deviation
Loss Averse	47	-1.440	-50.731	4.590	-0.199	0.091
50/50 Loss Averse & Non Loss Averse	7	-2.986	-30.115	3.649	0.018	0.085
Non Loss Averse	2	-0.227	-0.842	0.591	-0.310	0.212

Table 5.0 illustrates the loss aversion related risk-adjusted investment returns. Fund managers who were found to be loss averse had a mean Sharpe ratio of -1.440. The mean Sharpe ratio of 50% loss averse and 50% non-loss averse (50/50) was lower at -2.986 and the mean Sharpe ratio of non-loss averse managers was -0.227.

Table 5.1: Impact of frame dependence on investment returns of funds

Bias Category	n	Mean Sharpe Ratio	Min Sharpe Ratio	Max Sharpe Ratio	Median Sharpe Ratio	Standard Deviation
Frame Dependent	12	0.351	-10.188	4.590	0.077	0.084
Non-Frame Dependent	44	-1.868	-50.731	4.423	-0.280	0.091

Table 5.1 illustrates the frame dependence related risk-adjusted investment returns. Fund managers who were found to be frame dependent had a mean Sharpe ratio of 0.351. The mean Sharpe ratio of non-frame dependent managers was lower at -1.868.

From table 5.2 to table 5.5 below show the mean Sharpe ratios for each period of investment return, per bias. This correlates to the discussions above.

Table 5.2: Mean Sharpe ratio per overconfidence bias category

	Overconfidence	Confidence	<i>Under confidence</i>	50/50 Overconfident & Confident
6M	-1.51	1.44	4.59	0.23
1YR	-2.29	0.45	3.06	-0.48
2YR	-3.40	-0.16	1.04	-0.92
3YR	-3.48	-0.02	1.30	-0.79
4YR	-2.72	0.15	1.04	-0.86
5YR	-2.72	-0.26	0.10	-1.26

Table 5.3: Mean Sharpe ratio per over optimism bias category

	Over Optimistic	Optimistic	Pessimistic	50/50 Over optimistic & optimistic
6M	-2.19	0.59	0.67	0.22
1YR	-2.69	-0.37	-0.26	-0.67
2YR	-3.39	-1.24	-0.60	-1.90
3YR	-3.27	-1.47	-0.59	-1.61
4YR	-2.28	-1.30	-0.85	-1.54
5YR	-2.36	-1.61	-0.95	-1.52

Table 5.4: Mean Sharpe ratio per loss aversion bias category

	Loss Averse	Non-loss averse	50/50 loss averse & non-loss averse
6M	-0.49	0.55	-0.83
1YR	-1.19	-0.56	-2.12
2YR	-2.00	-0.48	-3.44
3YR	-1.90	-0.32	-4.22
4YR	-1.43	-0.14	-3.72
5YR	-1.64	-0.40	-3.58

Table 5.5: Mean Sharpe ratio per frame dependent bias category

	Frame Dependent	Non-frame dependent
6M	0.62	-0.80
1YR	0.23	-1.55
2YR	-0.58	-2.41
3YR	-0.92	-2.48
4YR	-0.83	-1.93
5YR	-0.94	-2.04

4.8 RELIABILITY OF THE MEASURING INSTRUMENTS

The purpose of this section is to state the reliability of the measuring instrument. The measuring instrument used in this research was that of the questionnaire. Due to the experimental nature of this research, the components of the questionnaire have been used in other research and proven to be reliable but the questionnaire as a whole has not been tested.

Therefore there is no previous reliability to back up the reliability of the experimental measuring instrument. Reliability determines whether or not the measuring instrument is free from error or not.

4.8.1 Split-half reliability

The reliability of the questionnaire was established through the use of the split-half reliability method. Due to their not being a way to test the reliability with a test and retest scenario this is the most appropriate reliability measurement for this research. Table 5.6 shows the split-half correlation coefficient and the Spearman-Brown correction coefficient for the whole questionnaire.

Table 5.6: Split-half coefficient and Spearman-Brown correction score for questionnaire

Correlation coefficient	0.3	Poor
Spearman-Brown correction	0.5	Acceptable

APPENDIX G shows the sums of scores for the two halves of the questionnaire. The coefficient, once calculated, varies between 0-1. The closer the score is to 1 the more reliable the measure is. The general consensus is that 0.7 is good and scores below 0.5 are poor. However Bryman and Bell (2007:164) indicate that a score between 0.50 and 0.69 indicates an acceptable level of reliability. Therefore as a whole this study has an acceptable level of reliability.

Therefore this measuring instrument is seen as reliable and has internal consistency.

4.9 VALIDITY OF THE RESEARCH

The validity for this instrument was determined through face validity and external validity. However, it is important to bear in mind that the validity of a questionnaire which has a

positivistic paradigm is not usually high due to the reliability being a greater concern, and this is not necessarily problematic (Collis and Hussey, 2003: 59).

4.9.1 Face Validity

Face validity is used to demonstrate whether or not the instrument appears to measure what it intends to (Greener, 2008:37).

The instrument used for this research was applicable to a setting in which behavioural situations were used to ascertain an individual's decision-making impulses. The scenarios used were able to determine a person's first instinct in decision-making. The indirect questions allowed for the researcher to collect data on a person's preferences or 'rules of thumb' when making any decision. This has proven to be effective and provide appropriate testing of the biases. Therefore, this instrument was used to test people's behaviour reactions and this is what the researcher believe it tested.

4.9.2 External Validity

External validity is the level in which the research can expect to predict a measure. This deals with the correlation between the research's results and other future results. Therefore this has to do with the generalizability of the results to the entire population.

For this research the response rate was used to determine whether validity was achieved. In most research cases a response rate of 50% and higher is needed in order to achieve validity. However, this applies to studies which use a sample. In population studies to be certain that the population is representative, the makeup of demographic information is also essential. If the demographic percentage of the response and the population are similar then the questionnaire responses are representative of the total population (Kelly, *et al.* 2003:262).

The response rate has already been mentioned at the beginning of this chapter. Figure 6.0 below demonstrates the usable response rate, the demographic information of the population and the demographic information of the usable response rate.

Table 6.0: Demographic response rate summary

	Male	Female
Demographics of Response Rate	93%	7%
Demographics of population	93%	7%

The demographics of the response rate were calculate by taking the number of females that responded divided by the total response ($3/42*100 = 7.14\%$), the same was done for the males ($39/42*100 = 92.86\%$). The demographics of the population were calculated by dividing the total number of women in the population by the total population size ($7/102*100 = 6.86\%$) and the men were calculated in the same way ($95/102*100 = 93.14\%$).

This demonstrates that the responses are representative of the population and that this research therefore has external validity, if so required. However, due to the experimental nature of this research no inferences for the greater population of asset managers will be made.

4.10 SUMMARY

The empirical results of this research were presented and discussed in small detail in this chapter. Firstly, the response rate was identified and explained, then followed the descriptive statistics regarding the demographic and work environment factors found from the questionnaire, in bar graph format.

The investment returns were then presented via tables, per behavioural bias. Then the relationship between each bias, its sub-categories, and the risk-adjusted investment returns were presented in table format and discussed.

The following chapter concludes the research and the recommendations as well as identifies any limitations the research encountered.

CHAPTER 5

DISCUSSION OF RESULTS

5.1 BRIEF SYNOPSIS OF THE RESEARCH

This research examined the behavioural biases of the fund manager in a decision-making context. The research assessed the fund manager's investment returns and then assessed these investment returns in conjunction with the behavioural biases to identify whether or not a relationship exists.

The below chapter overview summarises the manner in which each chapter contributed to this research by meeting the objective and purpose.

Chapter one was an introduction to the research. This chapter introduced the purpose of the research, the research problem and the background theory: classical finance, newer behavioural finance concepts and the collective investment scheme. The layout of the research was also presented: aims, objectives, research design and methodology. This chapter also outlined the research going forward.

Chapter two was a review of the literature. This chapter defined classical finance, classical corporate finance, behavioural finance, behavioural corporate finance and collective investment schemes. Behavioural finance was discussed in great detail, this included the proponents of the field's research and the field's criticisms. The behavioural biases which affect fund managers were discussed in more detail and narrowed down to the ones which are more relevant to fund managers. Collective investment schemes were then discussed with the background, managers and investment returns playing a large role.

Chapter three focused on the research design and methodology of the research conducted. The research method, paradigm, population and research method were considered. The data collection, data capturing and statistical analysis were discussed. The measuring instruments used in this research were discussed, as well as the reliability and validity of these instruments. Lastly the ethical considerations relating to the research being conducted were also revealed.

Chapter four focused on the empirical findings and results of the research. This chapter

identified the response rate, laid out the findings from the questionnaire: demographic, work environment and behavioural bias, decision-making data and the investment return data found. This chapter then identified the relationship, or lack thereof, between certain behavioural biases and the corresponding investment returns. The results were in the form of descriptive statistics in order to assess if there was any relevant data pertaining to the research objectives.

5.2 DISCUSSION OF THE RESULTS

It remains in this chapter to explore the implications of these findings on the decision-making of fund managers on what impact this has on CIS performance. The research findings will be discussed in conjunction with the literature in chapter two. The question that this research aims to answer is: “Do internal behavioural biases have a role to play in the performance in collective investment schemes?”

In order to answer this question the objectives of the research are used to demonstrate the structure of this chapter. These are the research objectives:

- Determine the behavioural biases of South African collective investment scheme managers in a decision-making context;
- Determine the performance of the corresponding South African collective investment scheme; and
- Investigate the relationship between behavioural biases and the performance of collective investment schemes.

Each objective will correlate to specific result areas from the previous chapter.

5.2.1 Objective: Behavioural biases of South African CIS managers

The aim of this objective was to determine whether or not South African collective investment scheme managers’ were susceptible to any manager specific behavioural biases in a decision-making context.

These behavioural biases were determined through the use of the situational questions in part two of the questionnaire distributed to the asset managers. These were scenarios in which respondents indicated their answers and then the specific bias was interpreted (from previous research conducted by Tversky and Kahneman (1981), Shefrin (2001), Kahneman and Tversky (1979), McNeil *et al.* (1982) and Tversky and Kahneman (1986)).

The results from the overall behavioural bias testing as well as results per fund category: domestic equity, domestic bond, domestic income, Islamic funds and domestic property will be discussed in relation to the above objective. However as mentioned in chapter four the property, bond and Islamic funds are only a small number of respondents and therefore this group is known as 'other funds'.

The main findings from these results showed that the majority of South African CIS managers' were overconfident, loss averse, optimistic and non-frame dependent. Therefore, the overall behavioural bias results were conflicting, some showed that asset managers are in fact susceptible to the applicable behavioural bias and some showed that they are not.

The overconfident results confirm the findings from previous research conducted by Svenson (1981). This study found that the majority of people tend to be overconfident in their abilities and skills in relation to their counterparts. The respondents regarded themselves as much more skilful and less risky than average, illustrating overconfidence. The results also supported the research conducted by Stein (2003) who found overconfidence was prevalent within almost each key employee who made decisions within a company. Stein (2003) also found that to really show overconfidence, it must be associated with a firm's decisions and also the outcome of those decisions.

To further compel the evidence for overconfidence being prevalent, not only was overconfidence the overall majority, but also the majority within each fund category. This is also interesting because the majority of respondents indicated that they were confident, not overconfident, when asked to indicate their own perception of their confidence level. This finding of overconfidence being prevalent in asset managers is significant in the South African CIS industry. Overconfidence can be one of the more detrimental behavioural biases to investment returns.

The loss averse results were also in line with previous research and theory. The results from this study confirmed Kahneman and Tversky's (1979) prospect theory results in that the majority of people feel a more persuasive impulse to avoid losses rather than to achieve gains. This finding also supports Shefrin's (2008) findings that people tend to throw profits after bad investments in the hopes of perhaps breaking even or lowering the loss. Tversky and Kahneman's (1986) theory is also supported in that when investors are given a choice the majority will almost always choose the option that is depicted in gains rather than losses, even if the result is equal. This finding is further supported by the fund category result, the majority of respondents were loss averse within each category. This indicates the prevalence of this bias within the South African CIS industry.

The overall optimism results from this study contradict the previous research and theory. The results found that the majority of asset managers were optimistic. Whereas, the majority of research found that over optimism was more prevalent. Research conducted by Lovallo and Kahneman (2003) contradicted the findings, they found that the majority of people saw themselves as above average and therefore had an inflated idea of events or future outcomes associated with themselves. Weinstein's (1980) study also differed from the findings in that it found that the subjects that were tested tended to think they were more likely than average to experience positive future life events, such as living past 80. These subjects also tended to think they were less likely to experience negative future life events, such as being retrenched. Therefore, demonstrating over optimism.

Optimism was the most prevalent in 'other funds' and overall but equity fund managers' were equally split between over optimism and optimism and the majority of income fund managers' were over optimistic. Therefore, optimism was the most prevalent behaviour found with over optimism not far behind. Therefore, in this research context over optimism is not a behavioural bias that fund managers are particularly susceptible to, except in certain sectors, such as equity and income. However, over all, the over optimism bias is not as prevalent as optimism in South African asset managers.

Frame dependence results from this study also contradicted that of previous research conducted. Thaler (1999) found that people organise, analyse and report financial events by grouping certain things into non-interchangeable mental accounts. This is the compartmentalising of financial aspects, instead of looking at it as a whole. Kahneman and

Lovallo (1993) also found that people would separate their money into separate accounts and not rectify the debt with the savings, incurring interest expenses. Kahneman and Lovallo (1993) discovered this was the same for investment scenarios: investors tended to separate riskier investments from less risky investments, when in actual fact this would have the same impact if it were in the same portfolio. Tversky and Kahneman (1986) found that when people were given a choice between two risk averse and risk taking scenarios (with the same figures and scenarios), but they were asked in a positive frame and a negative frame, most people chose the opposite to their first selection: they chose the positively framed one even though it was risk taking instead of risk averse.

The overall majority result was non-frame dependent, this was further reinforced by each fund category also being dominantly non-frame dependent. Therefore, South African CIS managers do not seem to be as susceptible to frame dependence.

5.2.2 Objective: Performance of the South African collective investment scheme's

The aim of this objective was to determine the simple compound returns of the South African collective investment schemes. The average simple compound rate of return per underlying bias category and per fund category results are discussed in this section.

The main findings from this section are that property funds yielded the best returns over the majority of periods, with income funds performing the worst over all the periods. This is an interesting finding because most would presume that equity funds would be the outperformer, however, as already mentioned this could be due to the time period chosen.

The results of the average compound returns over the selected periods revealed that overconfident, over optimistic, loss averse and non-frame dependent managers performed the worst over most periods. These results are consistent with the research done on the effects of these biases on investment returns, with the exception of frame dependence.

The overconfidence results support the theory that overconfident managers have been found to yield lower investment returns due to these overestimated beliefs in oneself. These are what can lead to lower overall returns, as found by De Bondt *et al.* (2008) and Barber and Odean (2001).

De Bondt *et al.* (2008) found that investors overestimation in their ability and to correctly pick stocks or estimate market events develops into a compulsive behaviour to take risks, without appropriately assessing the returns. Therefore, investors who were overconfident tended to trade more often and received significantly lower yields. Barber and Odean (2001) found that overconfident investors overestimate the precision of their information or knowledge and therefore, overestimate expected gains. Therefore, resulting in lower returns. Overconfident investors tend to ignore rational decisions regarding the fact that expected gains should outweigh costs and therefore misjudge actual expected gains. This leads to an expectation of being able to predict stocks that will succeed or outperform, instead of doing the appropriate work needed to make these decisions (Pompian, 2006).

The over optimistic results support the research conducted by Baker *et al.* (2007), this study found that people do not form beliefs logically and this usually leads to illogical or irrational decision-making. This over optimism is what leads to asset managers taking risks when they believe that positive outcomes will occur (Baker *et al.* 2007:169). They then also give more weight to negative information, than positive. This study found that in an investment perspective this leads to managers taking risks when they believe positive outcomes will occur.

The study conducted by Kahneman and Lovallo (2003) is also supported by the findings in that they found that those that were over optimistic tended to misperceive the causes of certain events and then believe this will happen in the future, regardless of the context. This usually leads to managers taking credit for positive outcomes but blaming external forces for negative outcomes. This can also lead to the passing up of investment opportunities as well investing in opportunities which gains have been overestimated (Lovallo and Kahneman, 2003).

These behaviours are what lead to underperformance. Therefore, these results emphasise the fact that over optimistic managers yield lower investment returns. Even though in this research the majority of asset managers did not suffer from over optimism, the managers that did, supported the theory that over optimism can have a negative impact on investment returns.

The loss aversion investment return results show that loss averse managers' yielded the lowest results over all periods, except over four years. This then emphasises the fact that loss aversion can negatively impact fund returns. Furthermore, this was also the case within each fund category.

This supports the research findings by Kahneman and Tversky (1979) on the prospect theory. They found that people had conflicting ideas about gains and losses, people would make decisions on perceived gains rather than perceived losses. This inability to see gains and losses equally supports inaction over action, favours the avoidance of risk and thereby the loss of opportunities. This usually results in the loss of more money being paid after bad investments in the hopes they will recover and therefore the loss of potential outperformance. These negative impacts on a portfolio are what lead to underperformance. Therefore, supporting the finding that loss averse managers' yield lower investment returns.

The frame dependence results conflict with previous research conducted. It was found that the non-frame dependent funds were the lowest performing funds during each period. This result is further emphasised by this being evident within each fund category as well. Therefore, the majority of South African CIS managers are not susceptible to the frame dependence bias. This directly conflicts with the theory that frame dependence negatively effects investment returns.

The research conducted by Thaler (1999), Thaler and Shefrin (1988), Kahneman and Lovallo (1993), Thaler (1990) and Tversky and Kahneman (1986) all found that frame dependent managers cannot see decisions together, but see them separately. Tversky and Kahneman (1986) found that people are highly sensitive to reference points and this violated the rational assumptions of the EMH theory. This in turn leads to lower returns due to the investments not benefitting from one another. They evaluate all assets as entities which need to be considered in unison. Therefore the non-frame dependent managers should have higher investment returns than frame dependent asset managers.

But in this research's case the managers who outperformed are the ones which do see different assets as non-interchangeable mental accounts.

5.2.3 Objective: The relationship between behavioural biases and the performance of CIS's

The aim of this objective was to determine whether there is a relationship between fund manager behavioural biases and the corresponding funds investment returns. Risk-adjusted returns were used to comparatively demonstrate the effect of the behavioural biases on the investment returns.

The overconfident bias results revealed that overconfident managers yielded the lowest average risk-adjusted returns and confident managers have the highest returns on a risk-adjusted basis.

This finding is supported by, already mentioned, previous research's findings that overconfident managers tend to be more risk taking. Therefore, the funds they manage are more risk aggressive, incur more fees due to excessive trading, making the wrong decisions based on information that may not be available and believe too strongly in their own abilities (Weinberg (2009), De Bondt *et al.* (2008), Stein (2003), Svenson (1981) and Barber and Odean (2001)).

This indicates that managers who are confident, but not overconfident, yield better returns. When a manager is not overconfident there are many advantages such as less frequent trading, decisions not only based on a manager's belief in himself, less aggressive risk taking and more diversification. This would result in lower fees, lower taxes in some cases and less chance of higher losses. These managers are also less likely to charge performance fees. The disadvantage of this is that some opportunities could be missed. Therefore, an investor would most likely choose a confident, rather than an overconfident manager. However, under confident could be the preferred manager, but due to the low amount of respondents who were under confident this research cannot make any inferences regarding this.

The over optimism risk-adjusted returns results showed that the pessimistic managers realised the highest returns, on a risk-adjusted basis and over optimistic managers yielded the lowest risk-adjusted returns. This is supported by the over optimism research conducted by (Weinstein (1980), Kunda (1987), (Baker *et al.* (2007), Lovallo and Kahneman (2003)).

A pessimistic manager has advantages such as not allowing themselves to believe that they have a unique insight when this is not true and they don't believe that bad investments won't happen to them, they have a more realistic view. Therefore, there will be little underperformance and other adverse consequences due to overestimated self-belief and managers over estimated views. Therefore, an investor would most likely choose a pessimistic or optimistic manager, rather than an over optimistic manager.

The loss aversion risk-adjusted returns results showed that the non-loss averse managers realised a higher return on a risk-adjusted basis and the managers who were 50% loss averse

and 50% non-loss averse produced the lowest risk-adjusted returns.

A loss averse manager would hold onto losing assets, excessively risk avoid, miss opportunities and also tend to prematurely divest from assets which are prospering. This means that a non-loss averse manager would not as easily lose out on missed opportunities, would not multiply losses through incorrect portfolio balance and therefore won't limit the possibility of realising higher performance. Therefore, an investor is more likely to invest with a non-loss averse manager than a loss averse manager.

The frame dependent risk-adjusted return results revealed that the frame dependent managers realised the highest returns on a risk-adjusted basis and non-frame dependent manager realised the lowest returns on a risk-adjusted basis. This directly conflicts with previous research conducted in this area.

A frame dependent manager would normally have non-existent or low diversification which can lead to portfolio imbalance and therefore, negative returns. This would be a direct result of seeing investments in separate mental accounts, rather than as a whole. However, in this research it was found that from an investment fund performance perspective, an investor would prefer to invest with a frame dependent manager than a non-frame dependent manager.

5.3 CONCLUSION

To conclude, CIS performance was found to be worse when a manager was susceptible to a behavioural bias in comparison to managers who were found to be in the neutral or 50%/50% categories. This was however, not the case for frame dependent managers. In the case of frame dependence, the managers who were non-frame dependent were in fact worse performers.

Therefore, behavioural biases do have an impact on South African CIS performance. This means that awareness of these biases and their effects on performance need to be noted and taken into consideration when making decisions.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This final chapter will focus on the main findings of the research and summarise the main set of results. Recommendations for asset managers and for future research will also be made.

6.2 FINDINGS

The aim of this research was to establish whether or not there is a relationship between possible behavioural biases of fund managers and their fund investment performance. This could assist investors or fund of fund managers to make more accurate decisions regarding who invests money on their behalf.

The results from this study support and contradict previous behavioural finance findings and theory. The study supports the belief that overconfidence is prevalent when decision-making and is further supported by the results that indicate this bias does have a negative impact on investment returns. This study also supports the notion that loss aversion is a bias which is present and the results also show that this bias leads to underperformance.

This study contradicts the theory that frame dependence is a bias which investors are subject to and that this leads to negatively impacted returns. The study also challenges the finding that the majority of people are over optimistic, but does support the theory that those who are over optimistic return lower investment performance.

There were a few demographic related findings that are also worth mentioning. The majority of respondents, and the population, in this industry are male. The average age of an asset manager is between 36-45 years old and the most common highest qualification is a CFA, with a master's degree in second place. The majority of asset managers are also responsible for greater than 10 funds and the majority of asset managers have 11-20 years of experience. These findings leave further room for research.

The main findings from this research are that asset managers are susceptible to behavioural biases: specifically overconfidence and loss aversion. Furthermore, they are not particularly

susceptible to frame dependence or over optimism. These biases are supported by the findings that when a manager is susceptible to these biases their funds will almost certainly be negatively impacted by these behavioural biases, on a risk-adjusted basis.

These results were found by considering the impact of people's emotional and cognitive biases on everyday decisions, investment professional decisions and therefore the resultant impact on the market. This research added value by determining whether or not asset managers are susceptible to certain behavioural biases and by examining the fund performance of managers in relation to the behavioural bias or biases they are prone to.

Therefore, some of the results from this study supported the EMH theory in that frame dependence did not yield lower results. Therefore, this bias showed that investors are rational and did not have an impact on the efficiency of the market. However, all the other biases results directly conflict with EMH's assumptions and support behavioural finance.

This research has demonstrated the importance of behavioural finance as a field within the South African CIS industry. Behavioural finance is a field which is still gaining ground around the world, and a little more slowly in South Africa. It is a way in which to explain what classical finance has never been able to.

This field will not be considered a viable source of valuable information in the investment industry if the possible negative impact on returns is not demonstrated. Awareness of the different behavioural biases and their possible negative consequences that can impact this field also need to be made clear. These are what result in irrational investors and therefore inefficient markets. Kahneman and Tversky (1979) revolutionised the thinking towards behavioural and finance. The prospect theory directly challenged the EMH assumptions of rational decision-making and assumptions that all relevant information is accurate, unbiased, and freely available as well as consumed before a decision is made (Kahneman and Tversky, 1979:263).

This study, like Chandra's 2008 study, concludes that these behavioural biases need to be taken into account when making investment related decisions. If not, fund performance may well suffer. This also leaves room for further research, without the specific South African knowledge regarding these biases, markets will remain inefficient and irrational.

6.3 RECOMMENDATIONS

There are several recommendations that can be made which pertain to asset managers and the field of research. These recommendations are based on the findings from this research.

6.3.1 Recommendations for asset managers

As mentioned in the above two sections the existence of behavioural biases in active South African asset managers has been shown and that these can affect their funds investment returns. Therefore, the recommendation for asset managers is to become more aware of this field of research and how behavioural biases can affect investment returns. It is important for each manager to become aware of their own behavioural biases which they suffer from. Each manager will be different and will not suffer from all the behavioural biases which have been identified so far.

Once an asset manager has become aware of the possibility of the biases affecting their investment returns they will realise that this is a relevant and important part of investing. When they have identified their biases they have won half of the battle. Once these biases have been identified, they can then be considered, before any decision is made and this could lead to better, more profitable and more beneficial investing.

The lack of interest in this field from South African asset managers is a concern and was a frustration for the researcher. South Africa, as an emerging economy, needs to be more involved in research, forward thinking and understanding of what developed markets are looking at. The boundaries between these economies have narrowed within the last few decades and therefore, the knowledge gap should have also decreased. Due to developments in technology South Africa can have the same information availability as anywhere in the world and therefore, there is no excuse for ignorance.

Behavioural biases can be overcome; the recommendation for this process is to:

- Believe that behavioural biases are a significant finding and that each and every person is susceptible to them. “The first principle is that you must not fool yourself –and you are the easiest person to fool.” (Feynman, 1974).

- Personal identification of behavioural bias. This can be done through previous survey questions, knowledge gathering or previous behaviour analysis.
- Knowledge about behavioural bias (continuous training and education): each behavioural bias is different and the process to overcome them will also be different.
- Recognition of bias during decision-making process; make sure there is a clear and consistent process to follow in order for less biases to impact decision-making. With the correct processes, contingency plans and individuals other than the main decision-maker being involved the likelihood of errors decreases.
- Keep records of mistakes and successes in order to assess for any errors or patterns that develop, or have developed.
- This will be an ongoing process with constant information upgrades, education and awareness necessary.

There is no recipe for success in overcoming biases and therefore recognition, awareness and education are the best steps to get in front of peers.

6.3.2 Recommendations for future research

It is recommended that:

- Research is conducted to find out why so few asset managers are women.
- Research is done on the awareness, understanding and interest in behavioural finance in South Africa.
- More in-depth research on overconfident asset managers.
- More in-depth research into each behavioural bias.

- Frame dependence research is conducted in a controlled environment for potentially more accurate results.
- Research into how to overcoming specific behavioural biases.
- This research can also be extended to asset managers of specific sectors or different types of collective investment schemes.
- It would also be beneficial not to collect data directly from asset managers due to the time delays and difficulties with this set of professionals.
- Research into whether or not CFA qualified individuals believe that this qualification prepared them adequately for going into the investment industry.

6.4 LIMITATIONS

This research does have its limitations and these will be noted below.

- The respondents of the survey became the sample of the population due to the size of the population. Whole population research is not a very widely used approach and therefore this was a more experimental approach to research in a certain business sector.
- The population is a very specific set of people and this provided various challenges for information gathering. The lifestyle they lead could also lead to rushed answers and potential for error.
- This research also only looked at individual managers who actively manage collective investment schemes. This could be widened.
- The questionnaire was experimental in nature and reliability and validity could be improved and the questionnaire could be used for research in different contexts.

- Due to the high job level that the respondents held this could leave room for bias with regards to their answers due to the pressure of the industry.

The results obtained from the questionnaire distributed revealed that asset managers do fall prey to behavioural biases and when they are affected by a behavioural bias they behave irrationally. This can lead to inefficient markets. In conclusion behavioural finance is a very important tool which can be used in an investment context to improve performance.

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APPENDIX A – MANNED EMAIL LETTER**RHODES UNIVERSITY****DEPARTMENT OF MANAGEMENT***Where leaders learn*

DATE

Dear Sir/Madam

MASTERS RESEARCH QUESTIONNAIRE

I am a financial management Masters student at Rhodes University, who under the supervision of Johan Hefer and Trevor Amos, is researching the impact of behavioural biases on the performance of collective investment funds.

In reaching our research objectives we need to collect data from Collective Investment fund managers through the use of an online questionnaire. In order to distribute this questionnaire and have the highest possible response rate it would be beneficial to have the direct (work) email addresses of the fund managers that I wish to ask to participate in the research. The fund managers will receive a cover letter regarding the research and a link to the online questionnaire. The contact information will be kept private and only used for the purpose of this study. The data gathered will be reported on an anonymous basis.

The fund managers that we would like to send the email to at your institution is:

Mr X

If it is not possible to get their direct email addresses could I send an email to the person manning this email address and request that they forward the email to the relevant managers. I would appreciate your help and consideration.

Yours Faithfully

A handwritten signature in blue ink, appearing to read 'Stacey Muller'.

Stacey Muller
608m0116
stacemuller@gmail.com
0823702297

A handwritten signature in black ink, appearing to read 'Johan Hefer'.

Johan Hefer
C.A. (S.A.)
j.hefer@ru.ac.za
046 – 603 8737

APPENDIX B – COVERING LETTER**RHODES UNIVERSITY****DEPARTMENT OF MANAGEMENT***Where leaders learn*

DATE

Dear Sir/Madam

**COLLECTIVE INVESTMENT MANAGER BEHAVIOURAL BIASES
QUESTIONNAIRE**

I am a Financial Management Masters student at Rhodes University in Grahamstown who is currently researching the impact of behavioural biases on Collective Investment Managers in a decision-making context and how this in turn affects the performance of the respective fund. To answer my research questions I would like to ask you to answer a questionnaire. This questionnaire consists of 25 questions and should take about 15 minutes to complete.

Your participation in this questionnaire will add greatly to the body of my research and in turn develop a South African context into behavioural biases research. As you are aware this area is receiving a large amount of attention at the moment.

All answers will be handled anonymously and confidentially through your unique identifying code, which must be entered in the online questionnaire. Only I, the researcher, and my supervisor will have access to this information for the sole purpose of data analysis. All findings will be given in aggregate and without it being possible to identify individuals.

Your unique code is: xx

Yours Faithfully



Stacey Muller
608m0116
stacemuller@gmail.com
082 370 2297

APPENDIX C – QUESTIONNAIRE

I am a Financial Management Masters student at Rhodes University in Grahamstown who is currently researching the impact of behavioural biases on Collective Investment Managers in a decision-making context and how this in turn affects the performance of the respective fund.

This questionnaire consists of 25 questions and should take about 10 - 15 minutes to complete. In each question please indicate which alternative best reflects your own opinion or experiences, There are no right or wrong answers in this context.

Your participation in this research will greatly help the financial research in a South African context. All answers will be handled anonymously and confidentially.

The questionnaire below is in a two part form:

Part I: Demographic and work environment factors;

Part III: Personality's effect on decision-making – Scenario testing.

Indicator Number: _____

DEMOGRAPHIC

Gender	Male	Female
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Please Choose your relevant age group:	Under 25	26-35	36-45	46-55	Over 55
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Please indicate you highest level of education achieved	Doctorate Degree	CFA	CA (SA)	Master's Degree	MBA
	Honours Degree	Undergraduate Degree		Diploma	Matric Certificate

Nationality	South African	Other
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WORK

Please indicate how many funds you are responsible for	1-2	3-5	5-10	>10
Please indicate the number of years of experience you have as a fund manager	1-5	6-10	11-20	>20

Would you consider yourself a...	Risk Taker	Risk Avider
----------------------------------	------------	-------------

Would you consider yourself...	Under confident	Confident	Overconfident
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Do you give consent to participate in this survey?

YES	NO
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PART II

DECISION-MAKING SCENARIOS

Please read the below scenarios and then X your answer

Question 9

Problem 1: Suppose you face a situation where there is a 75 percent (%) chance that you will lose R76 000 and a 25 percent chance that you will win R24 000. Imagine that before you learn the outcome of this gamble, you are offered R1000. If you accept the R1000 and lose the gamble, your net loss will be R75 000, and if you accept the R1000 and win the gamble your net gain will be R25 000. Would you accept the R1000 or decline it?

ACCEPT DECLINE

Question 10

Relative to all the people you work with, how would you rate yourself as a driver? (1) Above average? (2) Average? (3) Below average? Here average is defined as the median.

Above Average

Average

Below Average

Question 11

You have won R80 000. You must now decide whether A) You can receive another R4000 without doing anything or B) flip a fair coin and receive another R10 000 if heads comes up or lose the original R10 000 if tails comes up.

A	B
---	---

Question 12

What do you believe is the likelihood that you will live past 80?

Above Average	Average	Below Average
---------------	---------	---------------

Question 13

Problem 1: Assume yourself richer by R2400 than you are today. You have to choose between:

A: A sure gain of R800

B: 50% chance to gain R1600 and 50% chance to gain nothing

A	B
---	---

Problem 2: Assume yourself richer by R4000 than you are today. You have to choose between:

C: a sure loss of R800

D: 50% chance to lose nothing and 50% chance to lose R1600

C	D
---	---

Question 14

Relative to all the people you work with, how would you rate yourself when it comes to your job related activities? (1) Above average? (2) Average? (3) Below average? Here average is defined as the median.

 Above Average Average Below Average**Question 15**

Scenario: The official sick day policy at your company allows you not to go to work without calling in sick. If your boss (who travels 80% of the time) happens to be away, you will not be penalized and stay at home without using a sick day. If, however the boss happens to be at work that day you will be penalized 3 sick days.

Do you A) go to work or B) stay at home?

 A B**Question 16**

Problem 1: Imagine that the U.S is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If program A is adopted, 200 people will be saved.

If program B is adopted, there is $\frac{1}{3}$ probability that 600 people will be saved, and a $\frac{2}{3}$ probability that no people will be saved.

A	B
---	---

Problem 2: If program C is adopted 400 people will die.

If program D is adopted there is a $\frac{1}{3}$ probability that nobody will die, and a $\frac{2}{3}$ probability that 600 people will die.

C	D
---	---

Question 17

How easy do you think it would be to find another job in the same salary level as your current job if you lost your current job?

2 weeks	Less than a month	Between two weeks and six months	Between one and six months	Up to six months	Up to a year
---------	-------------------	----------------------------------	----------------------------	------------------	--------------

Question 18

How would you rate your athletic ability compared to those in your age group? (1) Above average? (2) Average? (3) Below average? Here average is defined as the median.

Above Average	Average	Below Average
---------------	---------	---------------

Question 19

Problem 1:

Surgery: of 100 people having surgery 90 live through the post-operative period, 68 are alive at the end of the first years and 34 are alive at the end of five years.

Radiation therapy: of 100 people having radiation therapy all live through the treatment, 77 are alive at the end of one year and 22 are alive at the end of five years.

Problem 2:

Surgery: of 100 people having surgery 10 dies during surgery or the post-operative period, 32 die by the end of the first year and 66 die by the end of five years.

Radiation therapy: of 100 people having radiation therapy, non-die during treatment, 23 die by the end of year one and 78 die by the end of five years.

Question 20

You have to immediately dispose of one of two stocks in your portfolio:

A) A stock that is 50% up or

B) A stock that is 50% down.

Question 21

Problem 6: What would you say is the general reason for the best investment decisions?

Good advice	Strong market	Own skill and intelligence	Luck	Fortunate timing
-------------	---------------	----------------------------	------	------------------

Question 22

What do you believe is the likelihood of you being sued by someone?

Above Average	Average	Below average
---------------	---------	---------------

Question 23

Imagine that you face the following pair of *concurrent* decisions. First examine both decisions, and then indicate the option you prefer.

First decision: Choose between

- A. a sure gain of R19 200
- B. a 25 percent chance of gaining R80 000 and a 75 percent chance of gaining nothing.

Second decision: Choose between

- C. a sure loss of R60 000
- D. a 75 percent chance of losing R80 000 and a 25 percent chance of losing nothing.

A B C D**Question 24**

What do you believe is the likelihood that you would have your car stolen (victim of burglary)

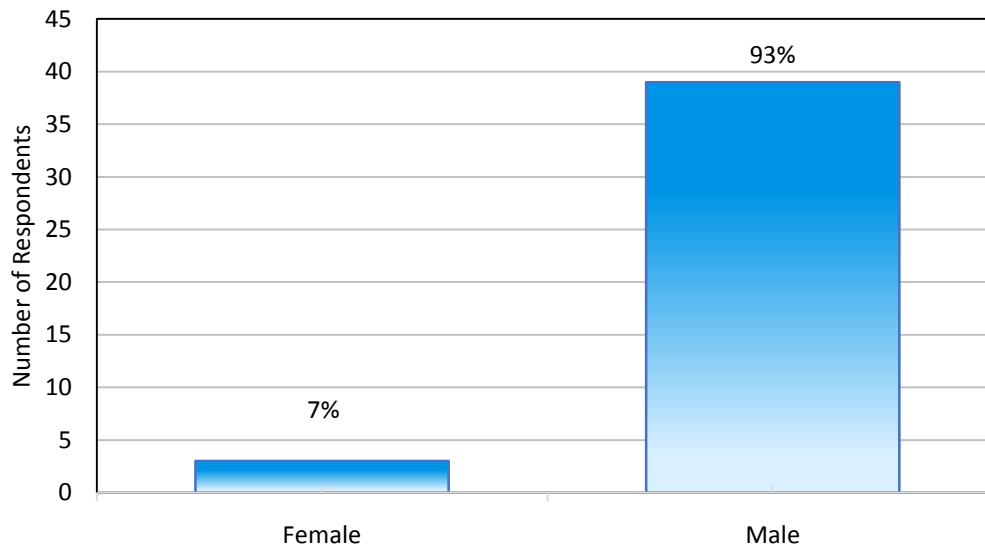
 Above Average Average Below average**Question 25**

In a scenario where you could gain 10% returns above your annual performance by ticking the box below, however if more than 50% of all collective investment scheme managers tick the box then you will have 10% deducted off your last year's performance. Tick the box or leave it empty.

APPENDIX D – DESCRIPTIVE STATISTICS OF DEMOGRAPHIC, WORK ENVIRONMENT AND SELF-PERCEPTION RESULTS.

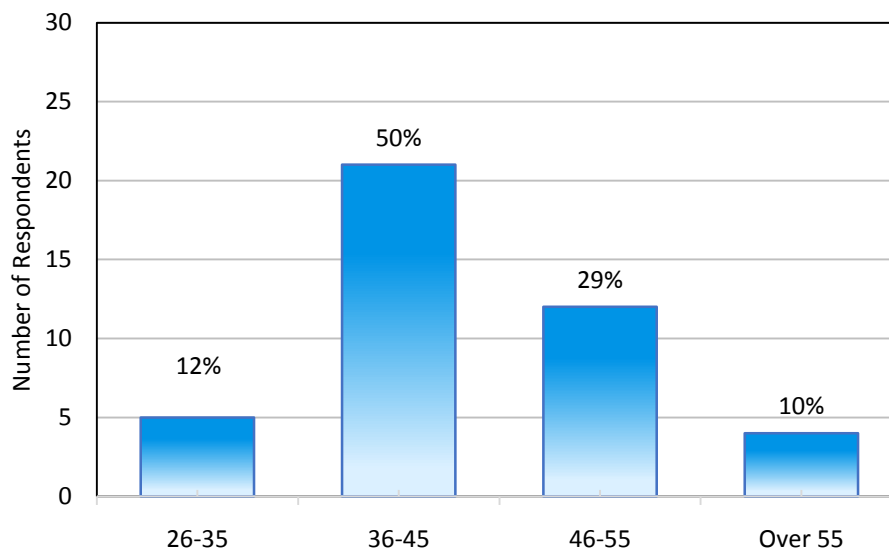
D.1 Descriptive statistics of demographic environment information

1. Gender of respondents



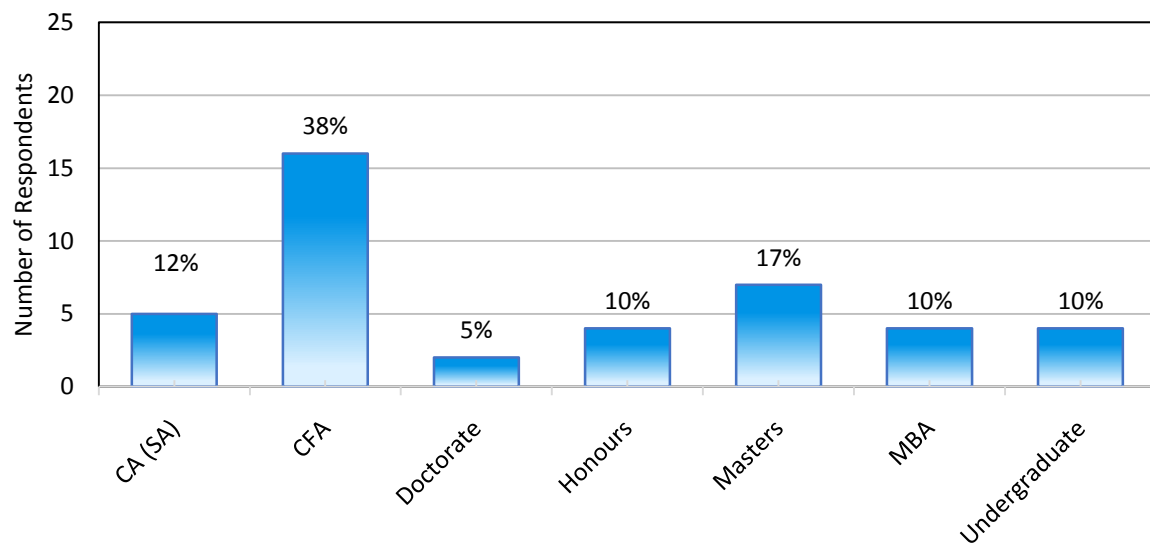
Gender	Count	Percent
Female	3	7%
Male	39	93%
Total	42	100%

2. Age of respondents



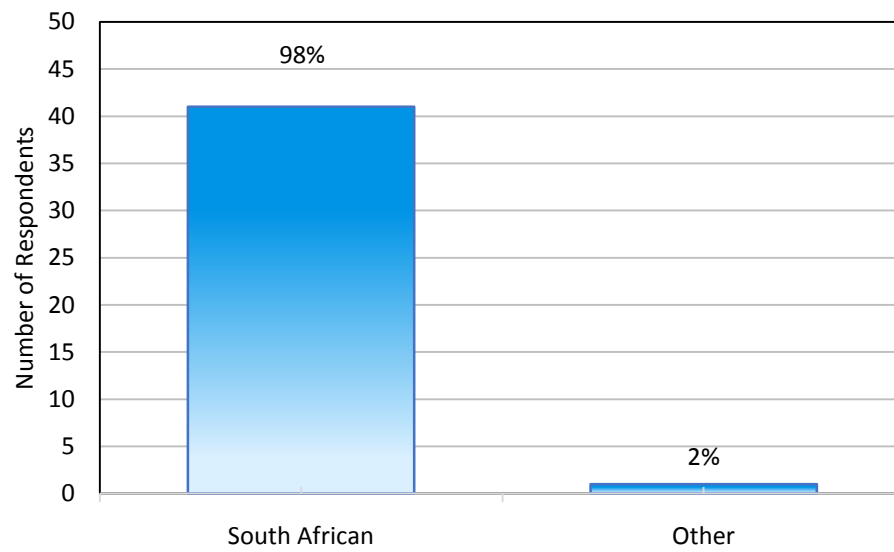
Age	Count	Percent
26-35	5	12%
36-45	21	50%
46-55	12	29%
Over 55	4	10%
Total	42	100%

3. The highest level of education achieved by respondents



Education	Count	Percent
CA (SA)	5	12%
CFA	16	38%
Doctorate	2	5%
Honours	4	10%
Masters	7	17%
MBA	4	10%
Undergraduate	4	10%
Total	42	100%

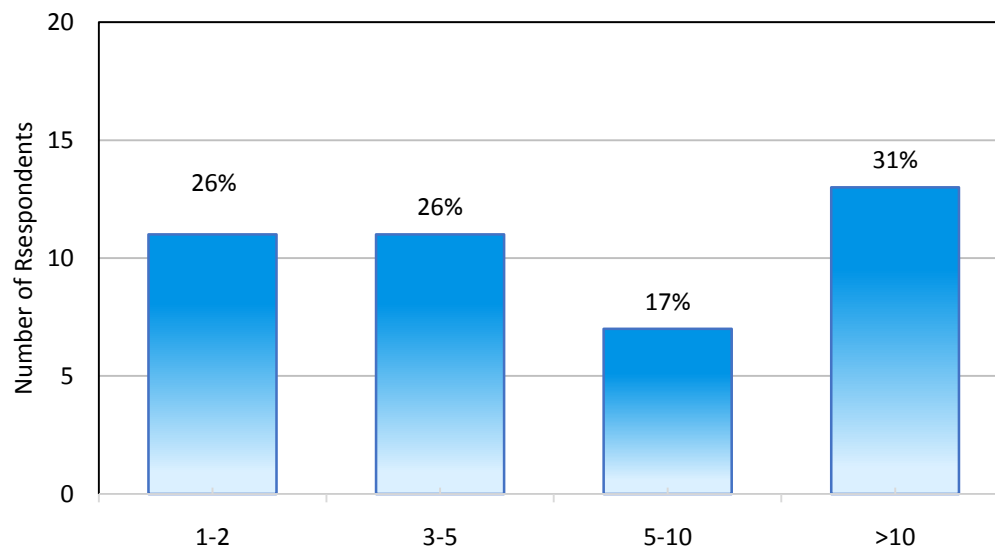
4. The nationality of respondents



Nationality	Count	Percent
South African	41	98%
Other	1	2%
Total	42	100%

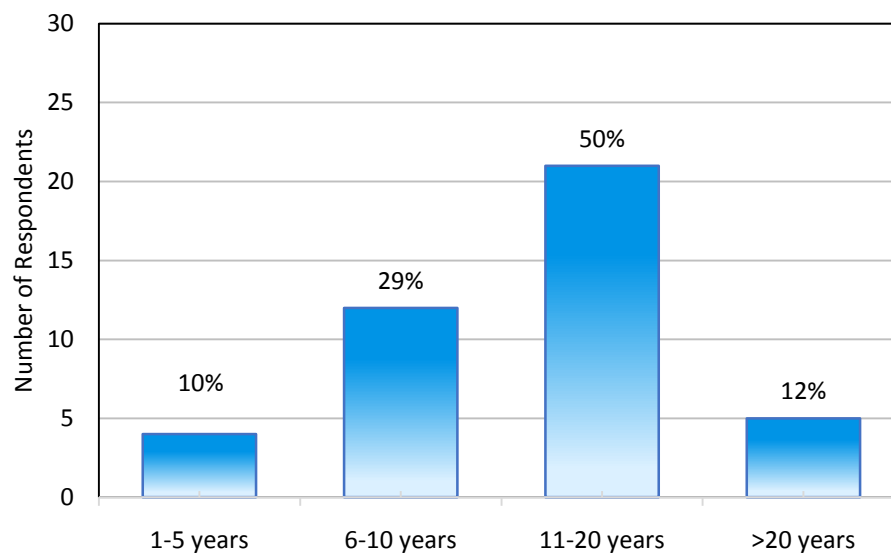
D.2 Descriptive statistics of work environment information

5. The number of funds respondents are responsible for



Funds	Count	Percent
1-2	11	26%
3-5	11	26%
5-10	7	17%
>10	13	31%
Total	42	100%

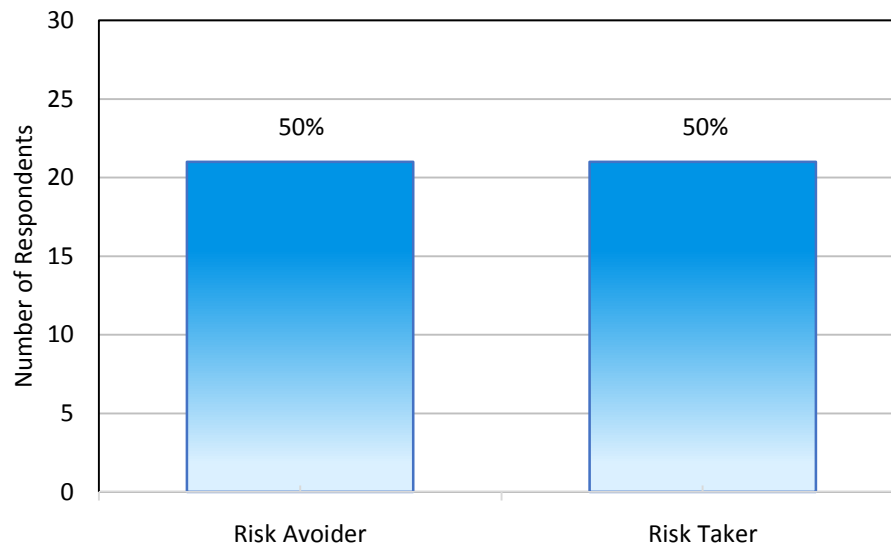
6. The number of years of experience of respondents as fund managers



Experience	Count	Percent
1-5 years	4	10%
6-10 years	12	29%
11-20 years	21	50%
>20 years	5	12%
Total	42	100%

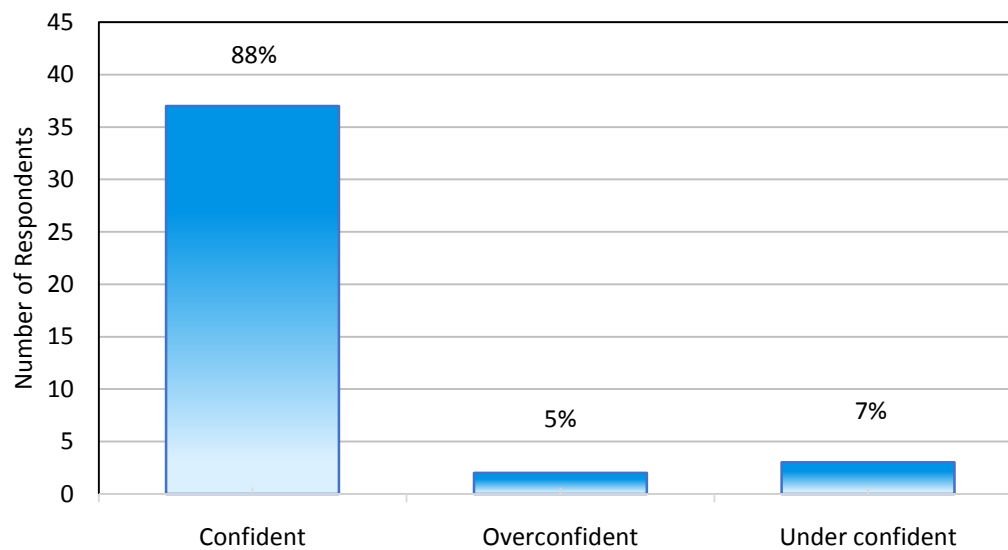
D.3 Descriptive statistics of self-perception

7. The Self-perception of risk of respondents



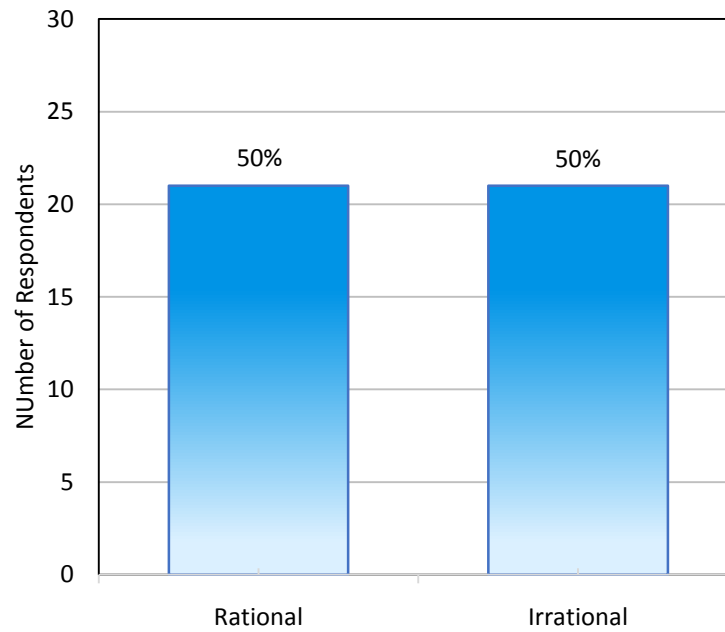
Risk Level	Count	Percent
Risk Avoider	21	50%
Risk Taker	21	50%
Total	42	100%

8. The self-perception of confidence of respondents



Confidence level	Count	Percent
Confident	37	88%
Overconfident	2	5%
Under confident	3	7%
Total	42	100%

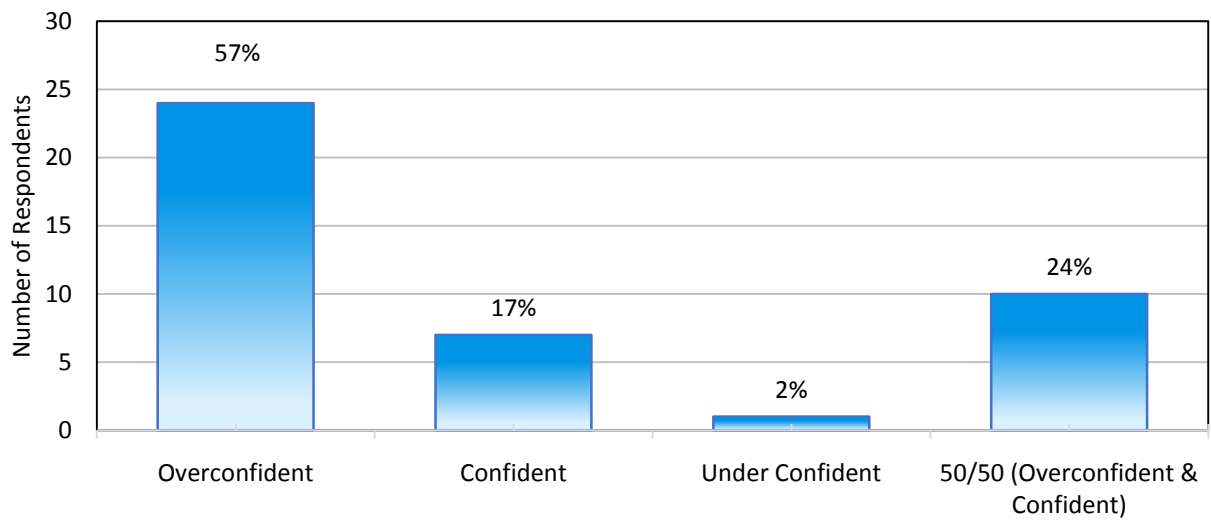
9. Rationality Baseline



Rationality	Count	Percent
Rational	21	50%
Irrational	21	50%
Total	42	100%

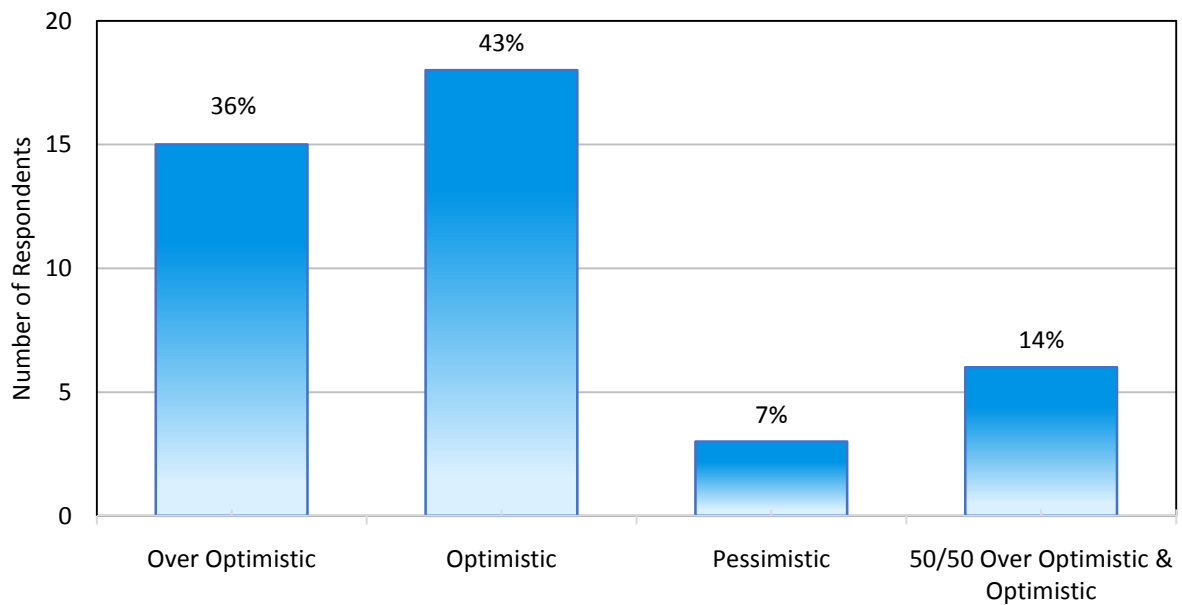
APPENDIX E – DESCRIPTIVE STATISTICS OF BEHAVIOURAL BIAS RESULTS

1. Overconfidence bias



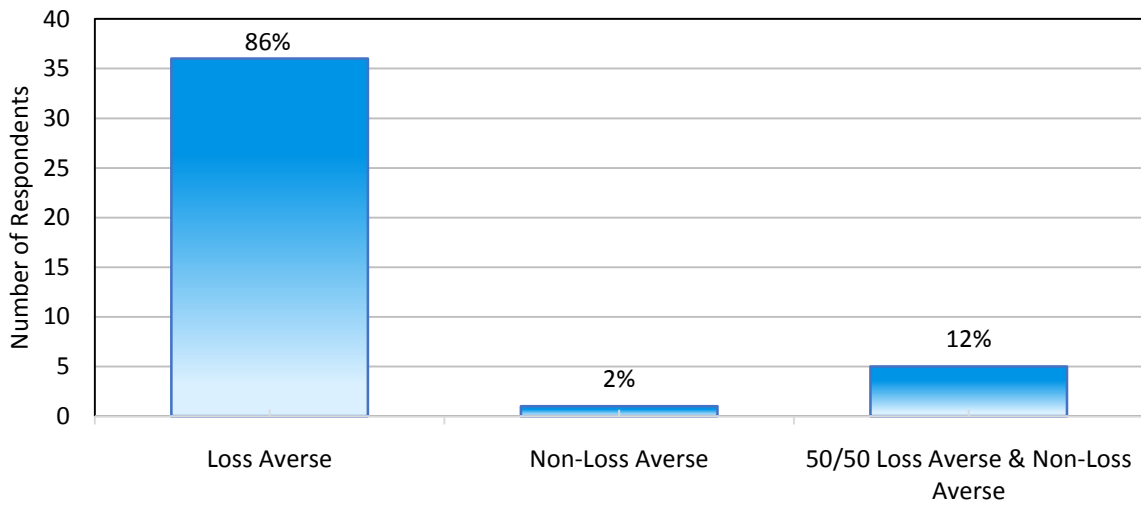
Bias	Count	Percentage
Overconfident	24	57%
Confident	7	17%
Under Confident	1	2%
50/50 (Overconfident & Confident)	10	24%
Total	42	100%

2. Over optimism bias



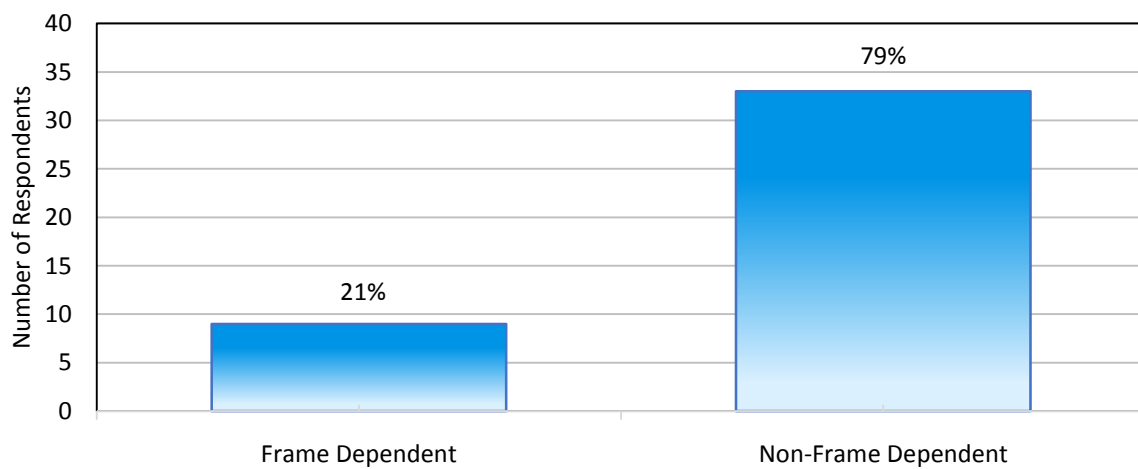
Bias	Count	Percentage
Over Optimistic	15	36%
Optimistic	18	43%
Pessimistic	3	7%
50/50 Over Optimistic & Optimistic	6	14%
Total	42	100%

3. Loss aversion bias



Bias	Count	Percentage
Loss Averse	36	86%
Non-Loss Averse	1	2%
50/50 Loss Averse & Non-Loss Averse	5	12%
Total	42	100%

4. Frame dependence bias

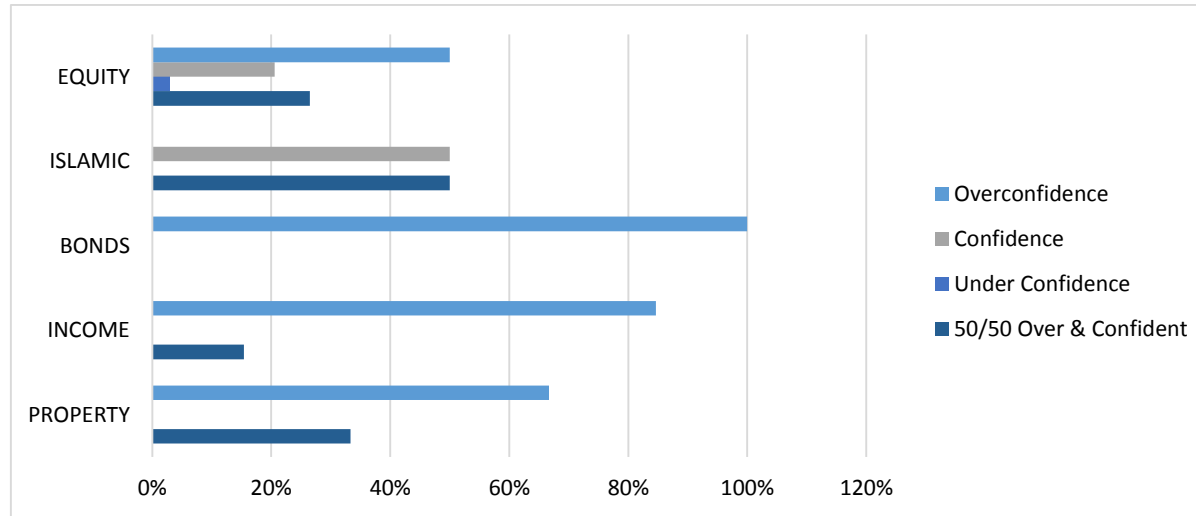


Bias	Count	Percentage
Frame Dependent	9	21%
Non-Frame Dependent	33	79%
Total	42	100%

APPENDIX F – BIASES PER FUND CATEGORY

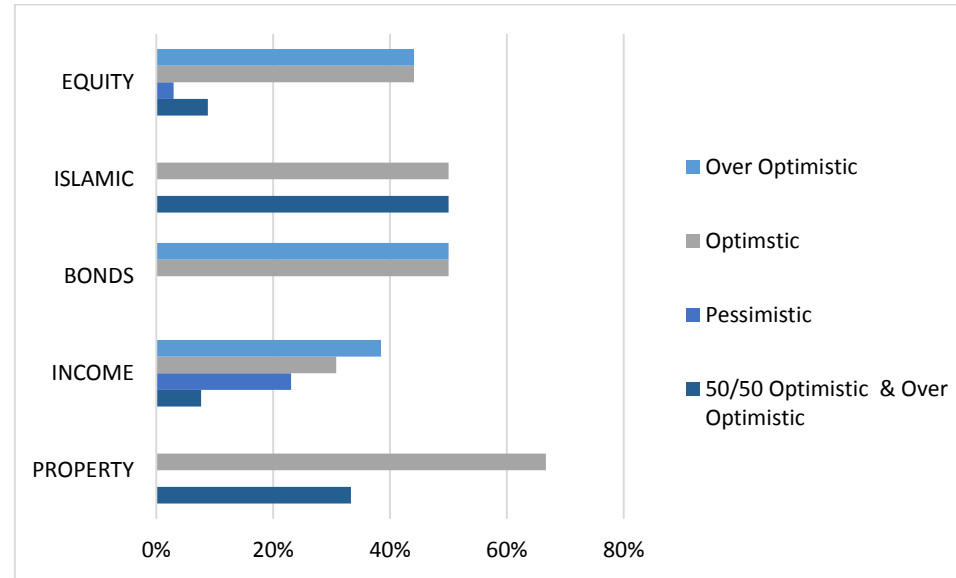
F.1 Underlying biases per each CIS category

1. Underlying overconfidence biases per CIS category



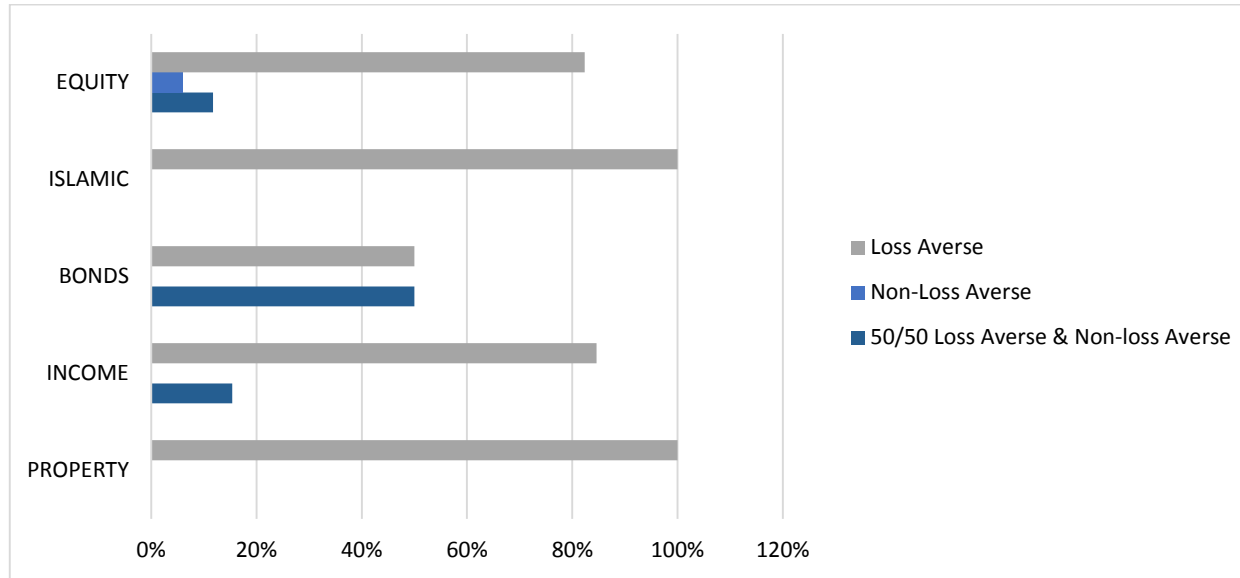
	Property		Income		Bonds		Islamic		Equity	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Overconfidence	2	67%	11	85%	2	100%	0	0%	17	50%
Confidence	0	0%	0	0%	0	0%	2	50%	7	21%
Under confidence	0	0%	0	0%	0	0%	0	0%	1	3%
50/50 Confident & Overconfident	1	33%	2	15%	0	0%	2	50%	9	26%
Total	3	100%	13	100%	2	100%	4	100%	34	100%

2. Underlying optimism biases per CIS category



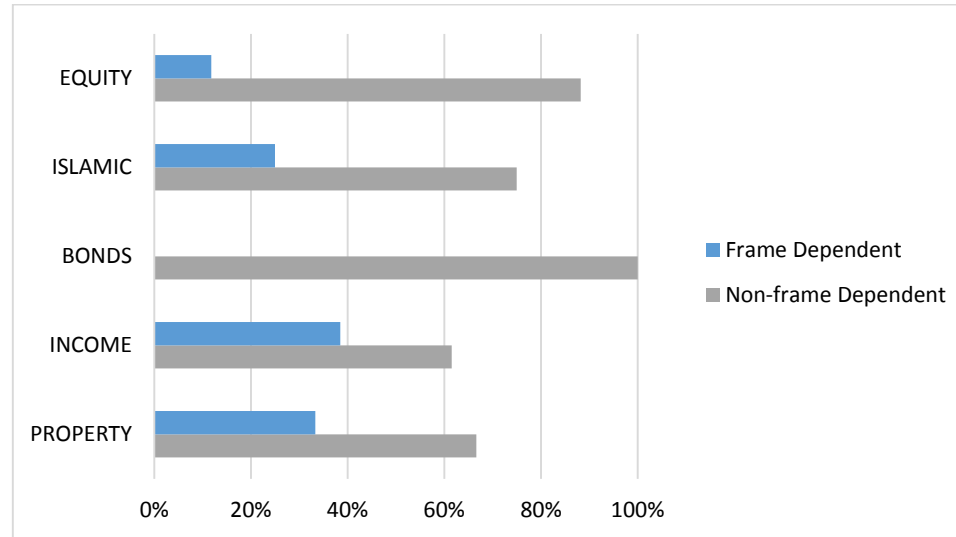
	Property		Income		Bonds		Islamic		Equity	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Over optimistic	0	0%	5	38%	1	50%	0	0%	15	44%
Optimistic	2	67%	4	31%	1	50%	2	50%	15	44%
Pessimistic	0	0%	3	23%	0	0%	0	0%	1	3%
50/50 Optimistic & Over Optimistic	1	33%	1	8%	0	0%	2	50%	3	9%
Total	3	100%	13	100%	2	100%	4	100%	34	100%

3. Underlying loss aversion biases per CIS category



	Property		Income		Bonds		Islamic		Equity	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Loss Averse	3	100%	11	85%	1	50%	4	100%	28	82%
Non-Loss Averse	0	0%	0	0%	0	0%	0	0%	2	6%
50/50 Loss Averse & Non-loss Averse	0	0%	2	15%	1	50%	0	0%	4	12%
Total	3	100%	13	100%	2	100%	4	100%	34	100%

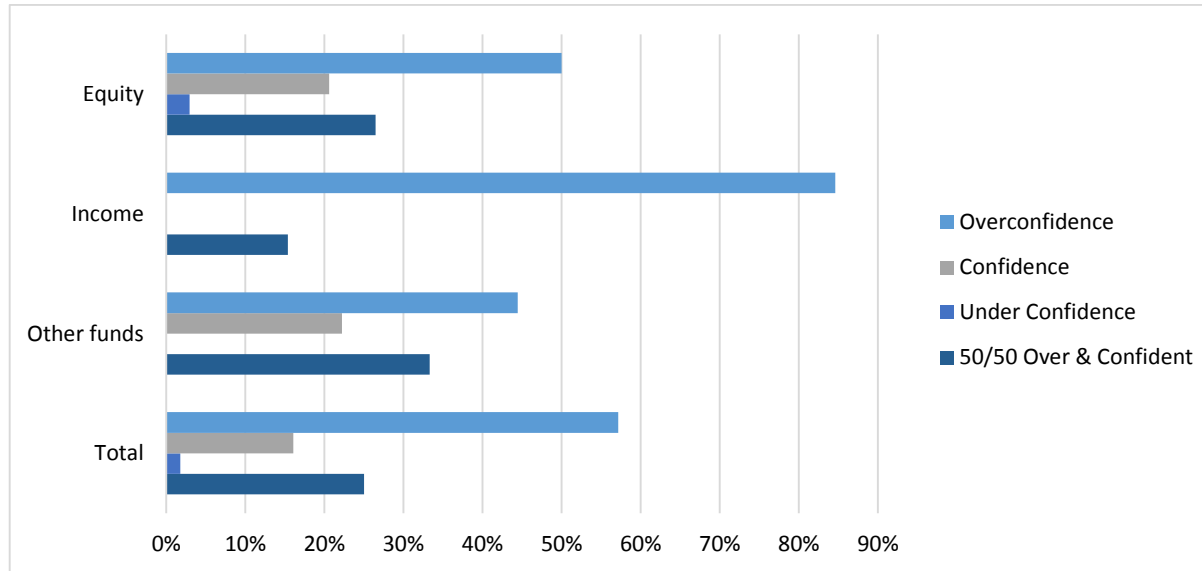
4. Underlying frame dependence biases per CIS category



	Property		Income		Bonds		Islamic		Equity	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Frame Dependent	1	33%	5	38%	0	0%	1	25%	4	12%
Non-frame Dependent	2	67%	8	62%	2	100%	3	75%	30	88%
Total	3	100%	13	100%	2	100%	4	100%	34	100%

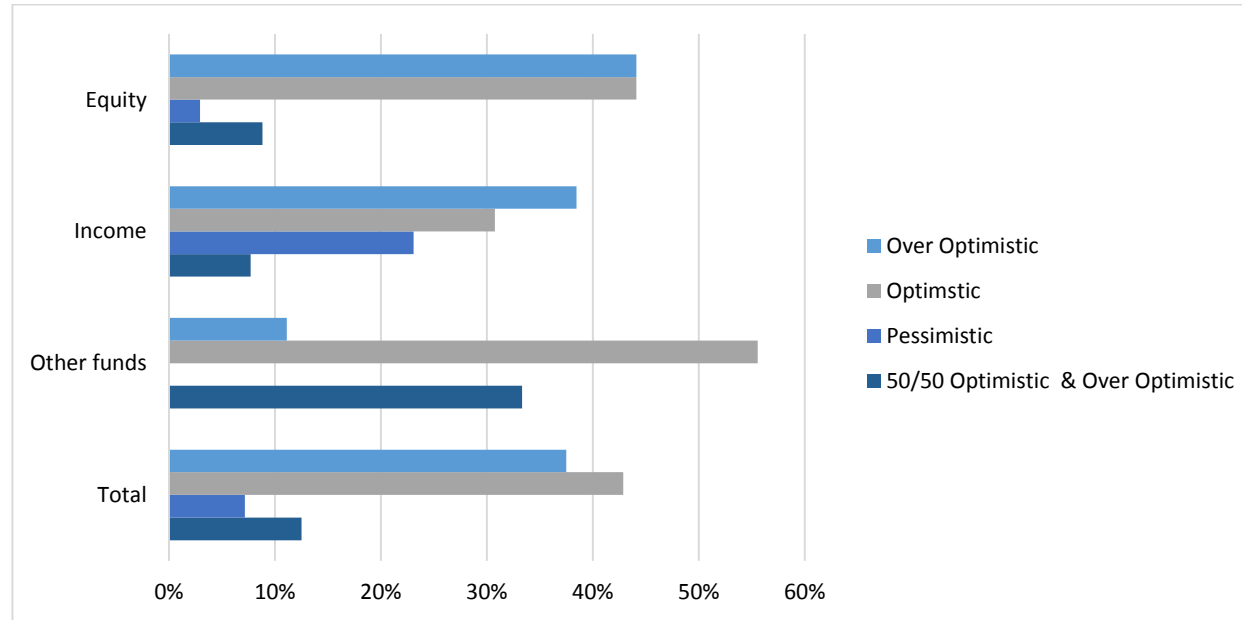
F.2 Underlying biases per summarised CIS category

1. Underlying overconfidence biases per summarised CIS category



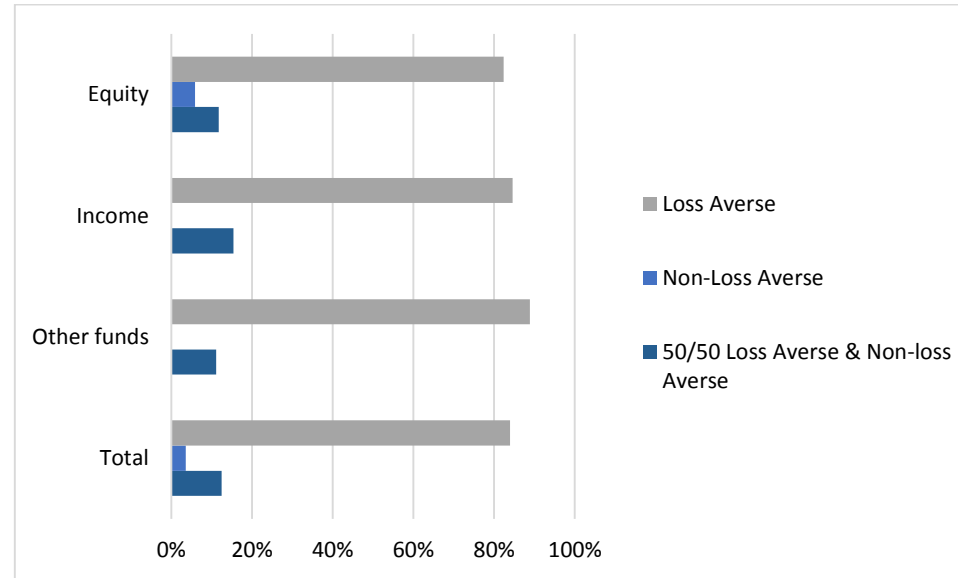
	Equity		Income		Other funds		Total	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Overconfidence	17	50%	11	85%	4	44%	32	57%
Confidence	7	21%	0	0%	2	22%	9	16%
Under confidence	1	3%	0	0%	0	0%	1	2%
50/50 Confident & Overconfident	9	26%	2	15%	3	33%	14	25%
Total	34	100%	13	100%	9	100%	56	100%

2. Underlying optimism biases per summarised CIS category



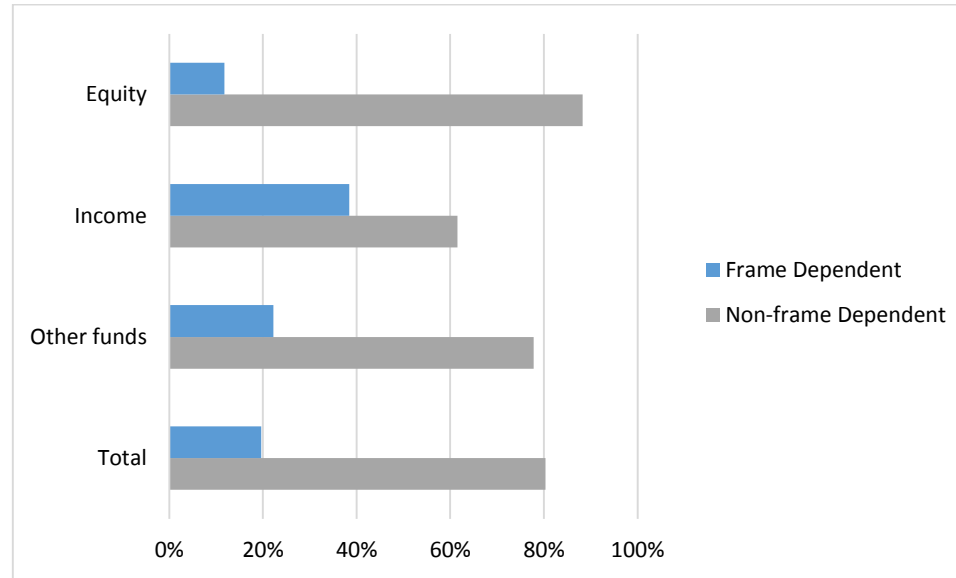
	Equity		Income		Other funds		Total	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Over optimistic	15	44%	5	38%	1	11%	21	38%
Optimistic	15	44%	4	31%	5	56%	24	43%
Pessimistic	1	3%	3	23%	0	0%	4	7%
50/50 Optimistic & Over Optimistic	3	9%	1	8%	3	33%	7	13%
Total	34	100%	13	100%	9	100%	56	100%

3. Underlying loss aversion biases per summarised CIS category



	Equity		Income		Other funds		Total	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Loss Averse	28	82%	11	85%	8	89%	47	84%
Non-Loss Averse	2	6%	0	0%	0	0%	2	4%
50/50 Loss Averse & Non-loss Averse	4	12%	2	15%	1	11%	7	13%
Total	34	100%	13	100%	9	100%	56	100%

4. Underlying frame dependence biases per summarised CIS category



	Equity		Income		Other funds		Total	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Frame Dependent	4	12%	5	38%	2	22%	11	20%
Non-frame Dependent	30	88%	8	62%	7	78%	45	80%
Total	34	100%	13	100%	9	100%	56	100%

APPENDIX G – SPLIT-HALF RELIABILITY TEST

Respondent	Score	Even	Odd
1	28	13	15
9	24	15	9
12	29	14	15
13	23	10	13
14	39	21	18
15	22	14	8
22	29	14	15
26	36	17	19
34	31	15	16
35	23	10	13
38	24	13	11
41	30	17	13
42	31	17	14
44	30	15	15
45	30	16	14
46	31	13	18
47	32	15	17
48	33	17	16
59	30	15	15
72	32	17	15
78	36	22	14
91	26	14	12
94	29	15	14
101	28	17	11
103	33	19	14
105	28	15	13
111	35	19	16
116	34	19	15
121	32	18	14
125	32	16	16
127	27	14	13
128	34	20	14
145	26	14	12
147	24	11	13
148	27	13	14
154	33	18	15
159	27	14	13
160	32	15	17
162	35	18	17
165	36	20	16
166	31	15	16
168	31	16	15

Correlation coefficient	0.3
Spearman-Brown correction	0.5