# THE ROLE OF BEHAVIOURAL ASPECTS IN INVESTMENT DECISION-MAKING BY LISTED PROPERTY FUND MANAGERS IN SOUTH AFRICA

by

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- my two boys, Jacques-Louis and Neil, for making my life worth living;

and

**Our Heavenly Father, who makes all things possible.**

# ABSTRACT

This study was necessitated by the fact that, thus far, no prior research on the influence of behavioural aspects on the decision-making framework of listed property fund managers had been undertaken in the South African context.

The aim of this study was to determine whether behavioural aspects influence listed property fund managers in South Africa when they make decisions on property investments. To meet this objective, the study investigated the following aspects:

- the influence of behavioural aspects on property holding periods;
- the influence of various heuristic-driven biases and frame dependence (as behavioural aspects) respectively on the investment decisions of listed property fund managers in South Africa; and
- the importance of the use of market sentiment and personal experience rather than market fundamentals in listed property fund managers' decision-making in South Africa.

Questionnaires were sent to 29 listed property fund managers in South Africa. The 17 responses represented 80% of the total market capitalisation of listed property funds in South Africa. The data were analysed using non-parametric statistical measures.

The study led to the following important findings:

- property holding periods are not influenced by behavioural aspects;
- heuristic-driven biases do not influence the property investment decisions of listed property fund managers in South Africa;

- frame dependence, through the disposition effect and loss aversion, was a behavioural aspect that affected listed property fund managers' decision-making;
- listed property fund managers in South Africa indicated a strong orientation towards the use of a normative approach in property investment decision-making – market fundamentals and capital budgeting techniques as decision-making criteria were very important to them in their investment decisions;
- market sentiment and personal experience were used to some extent by listed property fund managers in South Africa; and
- the listed property fund managers in South Africa experience the influence of the national government on the property investment decisions that they as fund managers make as negative, possibly making them, as fund managers, susceptible to behavioural biases.

This study's conclusions indicate that listed property fund managers in South Africa are influenced by behavioural aspects in the form of frame dependence. Difficulties in buying new properties suggest that listed property fund managers in South Africa are, to some extent, loss-averse.

This study has pioneered research to establish whether behavioural aspects influence the decision-making of property fund managers in an emerging economy such as that of South Africa.

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# CHAPTER 1:
# INTRODUCTION

## 1.1 BACKGROUND

> Emotional decision-making is the default option for our brains. However, we all like to think that we only use logic to arrive at our decisions. In fact, without emotion, we would be largely incapable of making any decisions, but all too often we allow emotion to rule unchecked. Welcome to the human condition! (Montier, 2007:4).

The process by which human beings make decisions has been a critical research area for centuries – as Ye and Dent (2009:56) argue, understanding people's behaviour in a decision-making context can enhance the decision-making process.

Research on decision-making is often based on assumptions relating to human rationality, including consistency and coherence (Tversky & Kahneman, 1981:453). In traditional financial theory, decision-making models are based on the assumption of rational agents making rational decisions. Rationality presupposes that, when agents receive new information, they revise their views and make normatively satisfactory investment decisions based on these revised views (Barberis & Thaler, 2003:1055).

The normative decision-making paradigm used in traditional financial theory led to the development of models such as Von Neumann and Morgenstern's (1947:4) expected utility theory. Models such as the Efficient Market Hypothesis (EMH) followed (Fama, 1970:383). According to Shiller (2003:83), the "efficient

markets theory reached its height of dominance in academic circles around the 1970s. At that time, the rational expectations revolution in economic theory was in its first blush of enthusiasm, a fresh new idea that occupied the centre of attention".

Contrary to the normative decision-making framework, the subject field of behavioural finance rejects the notion that agents tend to maximise utility through decision-making. Behavioural finance argues that the axioms of expected utility are, in fact, violated as a result of the presence of behavioural aspects (Stracca, 2004:374).

Singh (2009:89) defines behavioural finance as "a field of finance that proposes psychology-based theories to explain market anomalies". In other words, behavioural finance involves a study of the process and influence of human aspects in decision-making and how they influence markets. Mullainathan and Thaler (2000:2) explain that the core principle of behavioural research in various disciplines is a focus on identifying the ways in which behaviour differs from a normative framework, and this principle can also be applied in an economic context.

Godoi, Marcon and Da Silva (2005:46) suggest that investors are subject to biases and framing dependence that can lead to errors in judgement in investment decision-making. For example, Menkhoff and Nikiforow (2009:318) found in a study that, because of their behavioural biases, German fund managers who endorse behavioural finance view markets differently from those fund managers who do not endorse behavioural finance. Doeswijk's (1997:573) findings are similar.

A growing body of research is exploring the relatively new research field of behaviour and property investment. French and French (1997:226), Gallimore, Hansz and Gray (2000:602) and Black, Brown, Diaz III, Gibler and Grissom (2003:85), all emphasise the influence of behavioural aspects in property investment decision-making. Studies by Crosby and McAllister (2004:22) and MacCowan and Orr (2008:342) have investigated the behaviour of property fund managers with regard to individual and mixed-asset funds. Extensive research has been conducted in the area of behavioural finance and its relation to property holding periods by researchers such as Fisher and Young (2000:327), Hutchison and Nanthakumaran (2000:33) and Gardener and Matysiak (2005:1).

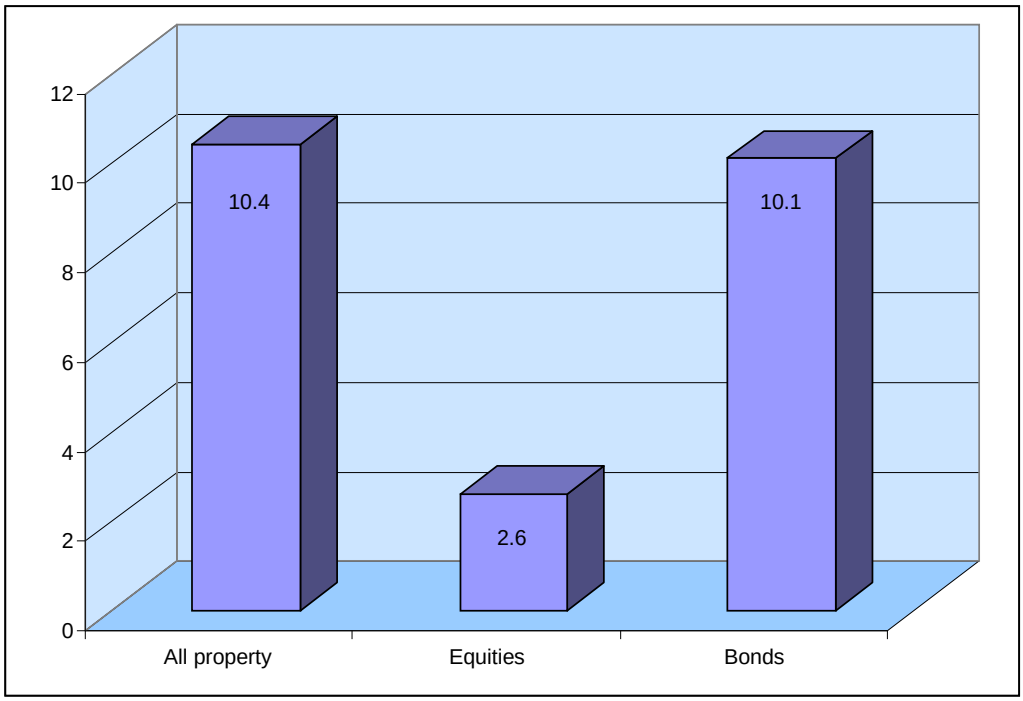
It is clear from the above comments that a number of studies have been conducted to ascertain the relationship between behavioural finance and investment decision-making. Studies have also been conducted to investigate the influence of behavioural finance in a property context. This study adds to the current body of research by investigating the influence of specific behavioural aspects in the South African listed property fund market.

## 1.2 THE LISTED PROPERTY FUND INDUSTRY IN SOUTH AFRICA

This study focused on investigating the influence of specific behavioural aspects in the South African listed property fund market; hence, it is appropriate to provide an overview of the current state of the South African listed property fund industry. An overview of this industry provides background on the context in which property investment decisions are made by South African listed property fund managers.

The South African listed property fund industry has developed into one of the country's main investment industries over the last 12 years. According to the South African Property Owners Association (SAPOA) and the Investment Property Databank (IPD) South Africa Annual Property Index, 2011, market capitalisation increased from R7 billion in 2000 to R205 billion by the end of 2011. However, the total return of the sector decreased significantly from a high of 35% in 2006 to a return of 10.4% at the end of 2011. This slump can be attributed mainly to the 2008 financial crisis. Nevertheless, listed property still outperformed equities (2.6%) and bonds (10.1%) as an investment class in South Africa by December 2011, as shown in Figure 1, below.

**Figure 1: Total return (%) of the major investment classes in South Africa for 2011**



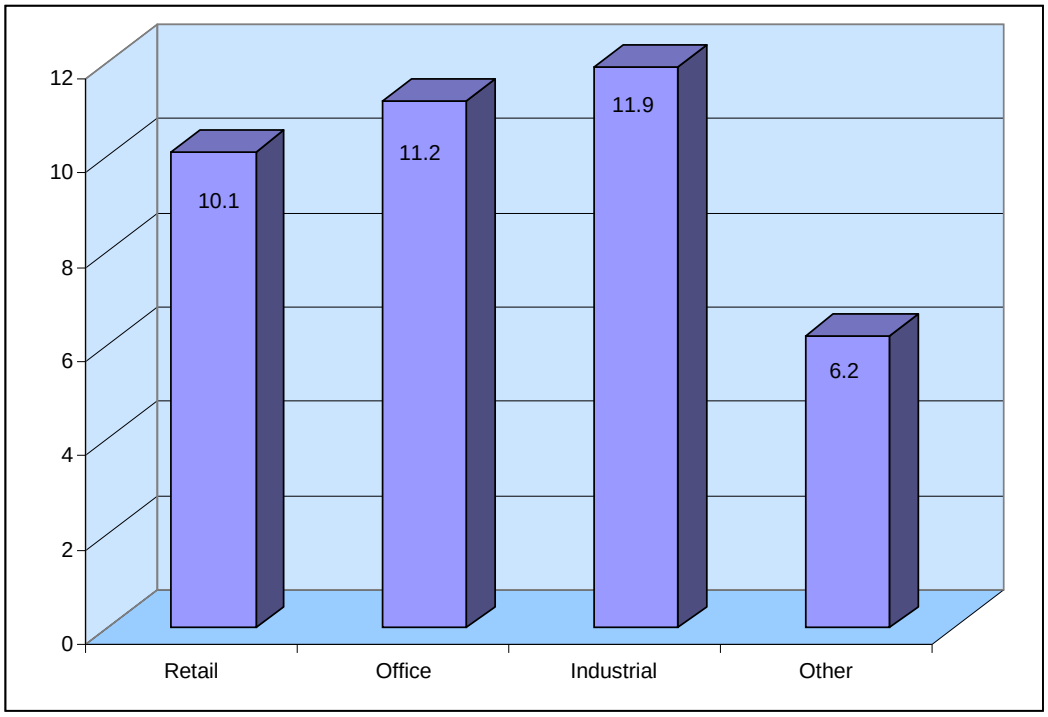

Source: SAPOA/IPD South Africa Annual Property Index (2011:1)

By December 2011, 30 funds were listed under the listed property sector (Index J253) on the Johannesburg Securities Exchange (JSE). These funds hold fixed

property as an investment, and each fund's portfolio consists of a different mix of residential, retail, commercial, industrial, leisure and mixed-use properties.

As Figure 2 (below) shows, by December 2011, the top performing property sector was industrial properties, with a total return of 11.9%, followed by office properties, with a return of 11.2%, and retail properties, with a return of 10.1%.

**Figure 2: Total return of the major property sectors in South Africa in 2011**




Source: SAPOA/IPD South Africa Annual Property Index (2011:1)

Although some funds yielded high returns throughout the recession, others have not performed well and some have even de-listed. According to the South African Real Estate Report (2012:5) compiled by Business Monitor International, factors such as the uncertainty of economic recovery and decreasing consumer and business confidence, a slow-down in public sector investment and increasing political uncertainty make the property industry in South Africa a complex environment.

Mooya (2010:150) claims that the South African property industry is influenced by three key issues:

- economic and social transformation;
- economic duality and institutional pluralism; and
- the emerging economy status of South Africa.

Mooya (2010:153) argues that although South Africa has a first world financial system that creates a positive environment for property developers and investors, the lack of economic growth, increasing levels of unemployment and high level of unequal income distribution typical of a third world economy also persist in the country.

A prior study by Ramabodu, Kotze and Verster (2007:20) concluded that the South African property industry is unique because South Africa is a country of diversity and cultural differences that need to be acknowledged. Their findings illustrate the environment in which property investors in South Africa make investment decisions.

Thus far, in the South African context, only limited research has been undertaken on human behaviour and how it influences property investment decision-making. This study investigated behavioural aspects in the listed property fund industry, given the unique South African environment in which property fund managers have to make decisions. Hence, among other things, the behavioural aspects investigated include the presence of biases, framing dependence and the influence of the use of information on which to base investment decisions.

## 1.3 THE RESEARCH PROBLEM AND ITS CONTEXT

The main aim of this study was to ascertain whether behavioural aspects influence the investment decisions made by listed property fund managers in South Africa. The fund managers selected for this study were individuals, not organisations, with who the power vested to make the final investment decision.

French and French (1997:226) are of the opinion that there are discrepancies between what property decision-makers are perceived to do in practice, and the actual final outcome of their decisions. These authors also show that there are some behavioural factors that may influence decision-making in property investments.

Hence, this study investigates the following hypotheses:

**Hypothesis 1:**

> The holding period of property as an investment is influenced by behavioural aspects.

A review of the literature on property holding periods (see Section 4.2 for more detail) revealed that property holding periods are becoming shorter. Reasons for this include changing market conditions, subsequent changes in investment strategies and numerous behavioural factors. This hypothesis focuses on the influence of behavioural aspects on holding periods in a South African context.

**Hypothesis 2:**

> Listed property fund managers in South Africa are influenced by heuristic-driven bias in investment decision-making.

The aim of this study was to determine whether or not behavioural aspects influence property fund managers' buying and selling decisions. Heuristic-driven bias as a behavioural aspect was tested by investigating the existence of representativeness, overconfidence, anchoring and adjustment, conservatism, herding, aversion to ambiguity and emotion.

**Hypothesis 3:**

> Listed property fund managers in South Africa are influenced by frame dependence in investment decision-making.

Frame dependence as a behavioural aspect was tested by exploring the presence or absence of loss aversion, the disposition effect and mental accounting.

**Hypothesis 4:**

> Listed property fund managers in South Africa base their investment decisions on factors such as market sentiment and personal experience, rather than market fundamentals.

A study conducted by Gallimore and Gray (2002:7) found that in order to substitute for deficiencies in the market fundamentals available for decision-making, fund managers rely on market sentiment. The authors concluded that

stronger reliance on market sentiment rather than on market fundamentals may lead to market inefficiency, as well as possible behavioural biases in the investment decisions that are made.

## 1.4 DELIMITATIONS

The scope of the study covers the following:

- This study investigated listed property fund managers in South Africa, employed at South African based listed property funds, only.
- In view of the fact that listed property fund managers deal exclusively with individual and multi-sectoral portfolios, the following types of property investors were excluded from the study:
  - individual property investors and other property professionals;
  - investors through collective investment schemes;
  - pension and provident funds;
  - unit trusts, and
  - unlisted property funds.
- In order to identify those behavioural aspects that influence the investment decisions of property fund managers, the study investigated only the length of holding periods in property investments, heuristic-driven bias, frame dependence and market inefficiency as behavioural aspects.

## 1.5 LIMITATIONS

The study has a number of limitations:

- This study is limited to the Republic of South Africa.
- This study is limited to listed property fund managers and the property investment decisions they make on behalf of the funds that employ them.

- The sample size is relatively small because of the limited number of listed property fund managers in South Africa. There were only 29 listed property fund managers in South Africa at the time when this study was conducted.
- The property investment types included in the study are limited to industrial, commercial, retail, leisure, mixed-use and residential property investments.
- No behavioural aspects other than holding periods, heuristic-driven bias, frame dependence and market inefficiency were investigated. Hence, the conclusions drawn, and the recommendations proposed, relate only to these behavioural aspects.
- Heuristic-driven bias as a behavioural aspect was tested by examining issues such as representativeness, overconfidence, anchoring and adjustment, conservatism, herding, aversion to ambiguity and emotion only. These heuristic-driven biases were chosen because they are the most relevant to the listed property fund industry (see Sections 3.3.1 and 4.3.2 for more detail).
- Frame dependence as a behavioural aspect was tested only through loss aversion and the disposition effect, as well as mental accounting. This decision was made because these aspects of frame dependence have the most relevance to the listed property fund industry (see Sections 3.3.2 and 4.3.3 for more detail).
- The results were applicable to listed property fund managers in South Africa only. Therefore the results should not be generalised to the property industry as a whole or to any other investment industry.

## 1.6 DEFINITION OF TERMS

The terms listed below are important in the context of this study and are therefore briefly defined for the purposes of the study.

- *Behavioural finance*

  "Behavioural finance is a framework that augments some parts of standard finance and replaces other parts. It describes the behavior of investors and managers; it describes the interactions of outcomes between investors and managers in financial and capital markets; and it prescribes more effective behavior for investors and managers" (Statman: 2008:15).

- *Frame dependence*

  Frame dependence is a term that reflects the fact that problems in respect of decisions may be modelled in different frames from those of the decision-maker (Barberis & Thaler, 2003:1073).

- *Fund manager*

  In the context of this study, a fund manager is an individual, and not an organisation or enterprise, in which the power vests to make the final property investment decision.

- *Heuristic-driven bias*

  Heuristic-driven bias refers to the "principles underlying rules of thumb and the systematic errors associated with them" (Shefrin, 2002:13).

- *Investment decision-making*

  Investment decision-making refers to the process of investors making a judgement on which assets to acquire, taking into consideration the risk

associated with such a judgement, in order to achieve their financial objectives.

- *Investment information*

  Investment information in this context is a collection of facts in respect of the property investment industry that may be used in order to draw certain conclusions.

- *Irrational investment decision-making*

  Irrational decision-making with regard to investments is decision-making that is not consistent with the use of reason and arises from a lack of information and/or inefficient markets.

- *Listed property fund*

  A listed property fund in the context of this study refers to a property fund that is listed on the JSE.

- *Market fundamentals*

  Market fundamentals are factual data that could be important in the understanding of the listed property fund industry.

- *Market inefficiency*

  Market inefficiency pertains when a lack in the availability and use of information leads to mispricings in the market and therefore renders the market as inefficient.

- *Market sentiment*

  Market sentiment is a subjective measure of investors' perceptions about the listed property market.

- *Modern portfolio theory*

  Modern portfolio theory examines the construction of investment portfolios to maximise return, taking into account the level of market risk associated with the portfolio and the inherent risk associated with the investment (in this case, property investment).

- *Property holding period*

  The property holding period is the time from the moment a property is bought until the time that same property is sold, usually expressed in months.

- *Property investment*

  Property investment is the process of holding, buying and selling property in order to realise capital gains and financial returns.

- *Prospect theory*

  Prospect theory is a descriptive theory that bases its principles on the observations of people's actual actions.

- *Rational investment decision-making*

  Rational investment decision-making refers to decision-making with regard to investments which is consistent with the use of reason and is based on all the information available, without any biases or heuristics.

## 1.7 LIST OF ABBREVIATIONS

CAPM = Capital Asset Pricing model

CEO = Chief Executive Officer

CFO = Chief Financial Officer

CPI = Consumer Price Index

EMH = Efficient Market Hypothesis

EPS = Earnings Per Share

IPD = Investment Property Databank

IRR = Internal Rate of Return

JSE = Johannesburg Securities Exchange

MBA = Master of Business Administration

MIRR = Modified Internal Rate of Return

MPT = Modern Portfolio Theory

NPV = Net Present Value

RADR = Risk Adjusted Discount Rate

REIT = Real Estate Investment Trust

SAPOA = South African Property Owners Association

UK = United Kingdom

US = United States

## 1.8 ASSUMPTIONS

The following assumptions were made for the purposes of this study:

- It was assumed that listed property fund managers act as individuals in the investment decision-making environment in which they operate. Group decisions were excluded for the purposes of the study, because they may lead to skewed results – the decision dynamics within a group differ from those involved in an individual decision. Only individuals completed the questionnaire used (see Chapter 5, Section 5.3 and Appendix 1 for more detail).

- Property fund managers in South Africa's main business activity is to obtain positive returns, as well as to achieve capital and income growth on property investments.
- Listed property fund managers in South Africa all possess a similar skills set with which to make property investment decisions.
- Listed property fund managers in South Africa all conduct their business in the same way.
- Heuristic-driven bias, frame dependence and market inefficiency were the only behavioural aspects investigated in order to determine their influence on the investment decisions made by listed property fund managers in South Africa. These behavioural aspects have been researched and tested, which validated the results of the study.
- The data presented applied for the year 2011 only.

## 1.9 SIGNIFICANCE OF THE STUDY

The subject field of behavioural finance and how it applies to listed property funds in South Africa had not previously been researched. Thus the importance of this study lies in its endeavour to identify the influence of behavioural aspects such as heuristic-driven bias, frame dependence and market inefficiency on the decision-making realm of listed property fund managers in South Africa. The study achieved this by conducting an empirical analysis on listed property funds and their managers, based on a review of the relevant academic literature.

The results of this study shed light on the use of normative models in relation to prescriptive models in property fund managers' decision-making framework. It shows whether heuristic-driven bias, frame dependence and market inefficiency

as behavioural aspects are present and to what extent these factors influence property investment decision-making in South Africa.

This study is a pioneering attempt to establish whether behavioural aspects influence the investment decision-making of property fund managers in an emerging economy such as South Africa, or whether they follow a strictly normative approach.

The conclusions of this study show that listed property fund managers in South Africa do not necessarily follow a strictly normative approach to investment decision-making, and that behavioural aspects may influence the investment decisions that they make.

## 1.10 OUTLINE OF THE STUDY

The study consists of four parts, as outlined below.

The first part (Chapter 1) introduces the topic, and indicates the main research problem and the thesis statement. This chapter also presents the background to both the literature review and the empirical study.

The second part (Chapters 2, 3 and 4) deals with the literature review that forms the theoretical base for the empirical research. Chapter 2 discusses traditional (or normative) financial theory ranging from neoclassical economics to the expected utility theory and relevant asset pricing models, as well as the concept of market efficiency derived from the expected utility theory.

The field of behavioural finance is discussed in Chapter 3. Prospect theory as a descriptive model is explained. Next, literature that relates to the behavioural

aspects of heuristic-driven bias, frame dependence and market inefficiency is reviewed.

In Chapter 4, the literature review focuses on the research that has been conducted into property and the extent to which that research reflects behavioural finance. Specific attention is paid to holding periods, the influence of heuristic-driven biases, frame dependence and market inefficiency on property investment decision-making. Chapter 4 also examines the literature on property fund managers and their investment decision-making.

The third part of the study deals with the empirical study. This part consists of two chapters. Chapter 5 contains a discussion of the research methodology, and Chapter 6 outlines and discusses the results obtained from the analysis of the data.

Finally, in the fourth and final part, Chapter 7 presents a summary of the study and the conclusions drawn. It also sets out a number of recommendations made and suggests possible areas of future research.

# CHAPTER 2:
# TRADITIONAL FINANCE THEORIES

## 2.1 INTRODUCTION

Property is a valuable asset which is often regarded as symbolic of stability and independence. Decisions regarding property and, in particular, property investments, have an effect on the productivity, wealth, and growth of a society. The aim of this chapter is to explore how traditional finance theories evolved as normative models and how these models are related to property. Literature on discrepancies between the traditional finance theories is also discussed.

This chapter begins with a discussion of neoclassical economics, because it was on the basis of this school of thought that the traditional, modern and normative theories of financial decision-making evolved. This discussion contains an explanation of the birth of the “rationality” concept as it is reflected by the neoclassical approach, and then the contribution of this rationality concept to the notion of maximising utility is considered.

The chapter then discusses the theory of expected utility in more detail. This theory incorporates the neoclassical approach in a model of the decision-making process under uncertain conditions. The main aim of discussing the theory of expected utility is to emphasise the behavioural challenges that have emerged from the application of the neoclassical approach to financial decision-making.

Thereafter, the modern finance theory models, with special reference to asset pricing in terms of the Capital Asset Pricing Model (CAPM) and market efficiency as explained by the Efficient Market Hypothesis (EMH), are briefly reviewed. The assumptions on which the EMH is based are of great significance to the modern finance theory models because of the discrepancies that arise when these assumptions are applied to financial decision-making.

Next, the relationship between modern finance and property, with specific reference to research conducted in this field, is discussed. Firstly, it is important to understand that modern finance theory and property do not function independently of each other. Risk and the diversification of risk are important concepts in property investment decisions, at both the individual and mixed asset levels. Secondly, in view of this relationship between modern finance and property investments, some difficulties that arise in applying modern finance theory to property investment decisions need to be discussed, together with the possible influence of behavioural aspects on the investment decisions of property fund managers.

## 2.2 NEOCLASSICAL ECONOMICS

The classical economics approach was increasingly controversial by the late 19$^{th}$ century, because this approach was constantly questioned with regard to the interpretation of the terms “value” and “worth”. The willingness of individuals to pay more than an object was “worth” was a critical issue, since it was clear that market prices no longer reflected the true “value” of any particular objects.

The theory of value and asset distribution among social classes forms the basis for the neoclassical economic theories. According to John Maynard Keynes

(1936:8), value was defined as a function of supply and demand, and this came to be known as “the concept of marginalism”. Hennings and Samuels (1990:5) explain that the concept of marginalism acquired various meanings as it evolved. These various meanings include the marginal utility theory of value, adjusting at the margin, and forced maximisation by economic role players that led to the theory of price and asset allocation.

The economic theories that evolved from the concept of marginalism formed the basis for the birth of neoclassical economics. Weintraub (2010:1) lists the following assumptions of neoclassical economics:

- People have rational preferences regarding the possible outcomes associated with value.
- Manifested independent decision behaviour is based on all possible and relevant information.
- Businesses strive towards profit maximisation, whereas individuals’ main goal is maximising utility.

If individuals have rational preferences and choices, it should be assumed these preferences are complete and transitive, and utility theory outlines these preferences (Ackert & Deaves, 2010:4). In relation to the argument that people use all possible information to arrive at a decision, Ackert and Deaves (2010:4) posit that information and its availability come at a cost and that it is essential to define the relevance of this cost when financial decisions are made.

All the neoclassical theories are based on the construct of the rational person, who is claimed to make rational decisions, although, as Markowitz (1959:206) jokingly admits, “[t]he Rational Man, like the unicorn, does not exist”. Sargent

(2010:1) indicates that the proponents of the theory of rational expectations suggest that people base their decisions on maximum utility as main goal.

In the light of the above, it would appear that the neoclassical approach is founded on rational expectations which are, in turn, based on the assumptions explained above. The maximisation of utility is central to the neoclassical approach. It is therefore appropriate to investigate the evolution of the neoclassical approach via the expected utility theory.

## 2.3 EXPECTED UTILITY THEORY

Schoemaker (1980:13) points out that, for a long time, economic debate has revolved around the actual measurement of utility and its absoluteness. Due to this debate, Von Neumann and Morgenstern (1947:4) developed the expected utility theory in an effort to capture the concept of rational decision-making under risk. This theory is built on five distinctive axioms, namely

- complete ordering;
- continuity;
- independence;
- unequal probability; and
- complexity.

The normative theory supports the notion of the core of rational decision-making under risk, assuming that nobody would wittingly wish to violate axioms such as complete ordering, continuity, independence, unequal probability and complexity. Savage (1954:5) expanded normative research by incorporating the concept of “subjective probability” into the expected utility theory.

Samuelson (1937:155) also contributed to the normative theory's approach to the way in which people should react to decision-making under uncertainty. He proposed the discounted utility model (Frederick, Loewenstein & O'Donoghue, 2002:351). Samuelson's model takes into account intertemporal decision-making under uncertainty focusing on a single parameter in the discount rate. Samuelson's discounted utility model attempts to explain individuals' maximising utility by means of a trade-off between current and future gratification. In business firms, depending on the decision-making by management, maximisation of utility is achieved by maximising wealth (Ackert & Deaves, 2010:18).

The normative models have been criticised by a number of scholars. Tversky (1975:163) notes the domination of the expected utility theory of the analysis of decision-making under uncertain conditions. He remarks that this theory is applicable to both normative and descriptive theoretical frameworks. He argues that the axioms of the expected utility theory are recognised as being in line with the principles of rational behaviour of decision-making under uncertainty, but that the expected utility theory is implausible in terms of its axioms, as these axioms are of a descriptive nature.

In a study involving experiments that examined finance and individuals' savings, Mullainathan and Thaler (2000:9) showed that behavioural factors are essential elements of any descriptive theory of finance. Thus behavioural factors were included in the concepts of bounded rationality, bounded willpower and bounded self-interest. Rabin (2000:13), by using a process of calibration, concludes that the expected utility theory does not hold up in terms of risk aversion when the stakes are modest.

In research conducted by Frederick *et al*. (2002:393), it was found that the discount utility model enjoys limited empirical support. Frederick *et al.* (2002:393) point out that even when positing the theory, Samuelson (1937:155) raised concerns about the model's descriptive pragmatism. In his final comment in his 1937 paper, Samuelson (cited in Shiller, 2006:3) warns:

> In conclusion, any connection between utility as discussed here and any welfare concept is disavowed. The idea that the results of such a statistical investigation could have any influence upon ethical judgments of policy is one which deserves the impatience of modern economists.

Quiggin (2008:7) identifies two significant problems in respect of the expected utility theory:

- The behaviour of individuals is not consistent with the expected utility model, because individuals use high discount rates in determining their time preferences for the present to close future, but use lower discount rates in determining their time preferences for the close to distant future. This effect is also known as hyperbolic discounting.
- The market's performance is not consistent with the expected utility model, because of the problem stated in the point above, and because markets are not as efficient as is generally accepted in modern finance theory models.

The expected utility theory and its applicability have been hotly debated by academics and scholars. A school of thought in favour of examining human behaviour and its applicability to financial theory emerged from this debate. By implication, it is imperative to review both the modern finance theory models, as they stand currently, their basic assumptions and discrepancies in order to establish how useful these models are in predicting human behaviour.

## 2.4 ASSET PRICING AND MARKET EFFICIENCY

The field of finance relates mainly to the management of money, which entails the process of asset allocation by both individuals and business firms in order to maximise wealth, while taking into account the associated risks.

Johnstone (2010:20) stresses that economic outcomes are usually measured not in terms of utility, but rather in terms of money. If real and financial assets were to be measured strictly according to utility, the measuring of real and financial assets would be unmanageable. Modern financial theories attempt to provide ways of quantifying risk and return trade-offs in real and financial assets in terms of money or monetary value.

Ackert and Deaves (2010:19) maintain that the modern approach to financial decision-making is based on a range of assumptions about both human and market behaviour. They argue that finance has evolved from a social sciences basis to a more recent natural sciences basis, in terms of which everything is seen as conforming to a set of rules in a natural order. Shiller (2006:2) refers to the development of the modern approach to financial decision-making as a “neoclassical revolution”. He is of the opinion that this “revolution” includes the development of the CAPM, the EMH, Merton’s (1973:3) theory of rational option pricing and the pricing of options by Black and Scholes (1973:5).

Of special interest to this study is the way in which the modern finance approach comprehends the allocation and pricing of assets through their natural set of rules. Also of interest are the perceptions of market efficiency and its interpretations of asset prices and the availability of information.

Markowitz (1952:77) pioneered the modern portfolio theory (MPT) as a form of modern finance theory. He used the theory of optimal portfolio selection. MPT investigates investor beliefs in the future performance of financial assets and the ultimate portfolio choices made. Based on his study, Markowitz (1952:77) developed the efficient frontier, which enables investors to determine the amount of money which should be invested in each of the assets in a multi-asset portfolio.

Curtis (2004:17) expresses a number of concerns about the MPT. He claims that it constitutes a theoretical approach which attempts to describe the workings of capital markets, but which is not in fact ideal for use in the compilation of investment portfolios. Curtis concludes that the MPT is descriptive in nature and that the rationality concept of investors in this model is inaccurate.

The CAPM as a modern finance theory was developed by Sharpe (1964:425). Further work on it was carried out by Lintner (1965:14), who elaborated on the valuation and selection of risky assets. The CAPM expands on the MPT by taking into account the sensitivity of an asset to the market through the measurement of beta.

Bodie, Kane and Marcus (2000:232) point out that the CAPM assumes perfect competition in the market, identical holding periods by investors, identical efficient frontiers, limitless risk-free borrowing and lending opportunities, no taxes on capital gains or flotation costs, and the fact that the same information and economic perspectives are used when analysing and selecting assets. These assumptions clearly cannot reflect the actual market.

A study published by Fama and French (1992:427) brought the CAPM into disrepute, by proving that a firm's beta, thus market risk, does not necessarily lead to a prediction of future returns. The assumptions of the CAPM as a model should raise concern, particularly the assumption that all investors' expectations in respect of the return on assets are the same.

The EMH is a modern finance theory that looks at the allocation of resources in such a way as to ensure the optimal performance of those resources. According to Fama (1970:383), the perfect market is a market in which resource allocation depends on precise price signals in terms of which business firms make optimal investment decisions, and investors are able to select securities based on these investments.

Jagric, Podobnik and Kolanovic (2005:79) maintain that, in an efficient capital market, the prices of securities alter swiftly in response to the publication of new information and, thus, the existing prices of selectable securities always reflect all the relevant information relating to those securities. Jagric *et al*. (2005:79) list three important rules which they believe imply an efficient capital market:

- such a market involves great numbers of profit-oriented firms that compete with each other, analysing and valuing securities independently;
- the inception of all new information on any security is random, with independent timing in respect of the various publications of information on the security; and
- security prices are adjusted swiftly by competing investors so that these prices immediately reflect the effect(s) of all new information.

These “rules” imply that the prices of securities reflect all the available information, including new or future information. Bodie *et al*. (2001:269) explain that new information is by its very nature unpredictable and, thus, the price movements of securities which are affected by new information must be unpredictable as well. This effect is referred to in the financial literature as a “random walk”. In essence, this “random walk” shows the randomness and unpredictability of security price changes.

In order to obtain a better perspective on “all new and available information”, Fama (1970:383) divided information into three categories in terms of their market efficiency:

- in the weak form of the EMH, prices reflect information which is based on historical returns only;
- in the semi-strong form, prices both reflect and adjust to all publicly known information; and
- in the strong form of the EMH, prices also reflect information that is not publicly known.

The propositions of the EMH and its validity have been comprehensively empirically tested in the financial literature, and different points of view have been expressed (Yen & Lee, 2008:306). Barberis and Thaler (2003:1056) make the point that, in an efficient market, it is not possible to earn a return in any consistent way, particularly in respect of an excess return in the exposure to risk. Pesaran (2010:31) argues that, in an efficient market, the “random walk” mechanism is not effective, as the market tends to be occupied by risk-averse investors who question the “random walk” as a theory of asset pricing.

Shmilovici, Alon-Brimer and Hauser (2003:283) note that the true test of the EMH is its ability to put forward a trading strategy that displays evidence of excess return. As an example, Shmilovici *et al*. (2003:283) suggest testing the consistency of returns through a buy-and-hold investment strategy.

In his explanation of market efficiency, Shiller (1999:1307) concludes that, through extensive scholarly and academic research, the EMH has been demonstrated to display anomalies that imply both the incorrect interpretation of rational behaviour in efficient markets and the apparent influence of human behaviour. Any cognitive bias in the market makes it difficult to validate the efficiency of the market in terms of its use of information (Yamaji & Gotoh, 2010:117). Yamaji and Gotoh (2010:117) conclude that information-efficient markets may be improved, but that accounting disclosures tend to obstruct this process.

Ritter (2003:430) presented two important points – firstly, the EMH does not assume the rationality of investors, but specifically assumes the rationality of markets; secondly, the EMH does not assume that the markets predict the foreseeable future, but it does assume non-biased forecasts of the future.

Fama (1998:283) defends the notion of market efficiency by showing in a study that, in an efficient market, the frequency of both over- and under-reaction of security prices to information is equal. He concludes that anomalies – as Shiller (1999:1307) and other authors suggest – are consistent with market efficiency, because they are split randomly between under- and over-reaction. These anomalies also tend to disappear or be balanced out over time.

Shiller (2003:102) found, however, that no primary psychological principle exists in terms of which people always tend either to over-react or to under-react and that some of the anomalies identified have yet to be explained or disproved by research. Shiller (2003:102) concludes:

> … we have to distance ourselves from the presumption that financial markets always work well and that price changes always reflect genuine information. Evidence from behavioural finance helps us to understand, for example, that the recent worldwide stock market boom, and then the crash after 2000, had its origins in human foibles and arbitrary feedback relations and must have generated a real and substantial misallocation of resources. The challenge for economists is to make this reality a better part of their models.

The studies of Fama (1998:283) and Shiller (2003:102), and especially the challenges pointed out in these two studies, suggest that, on the one hand, markets may not be as efficient as they have been claimed to be, but that, on the other hand, the anomalies identified in recent research are consistent with the EMH.

Raines and Leathers (2011:544), in an assessment of the position of behavioural finance compared to Post-Keynesian institutionalist theories (theories that views money as an inseparable institution to other institutions of the economy) of financial markets, suggest that two approaches in the literature are available from the field of behavioural finance. The dominant narrow approach is constrictively aimed at changing the neoclassical approach, rather than rejecting it outright, whilst the broader approach may have some relation to the Post-Keynesian institutionalist theories.

Fung (2011:571) agrees that behavioural finance as field is more closely related to Post-Keynesian institutionalist theories than to neoclassical theories. However, he argues that behavioural finance models are objectionable because some important elements of the neoclassical theories are retained. Fung (2011:571) concludes that behavioural models do add value to Post-Keynesian institutionalist theories, because they incorporate human aspects through the dominant narrow approach, thereby revealing the deficiencies of the neoclassical theories.

## 2.5 MODERN FINANCE THEORY AND ITS RELATION TO PROPERTY

Modern finance theory is applied by fund managers to construct portfolios in such a way that returns are optimised, taking into account the different risk preferences of the fund managers. An efficient market assumes completely informed markets that take into consideration all new information and relies on the modern finance assumption that all information is available. It is on the basis of this concept that fund managers strive to maximise return whilst minimising risk through diversification (MacCowan & Orr, 2008:344).

Property markets pose a particular challenge, because the very characteristics of property markets imply risks. These characteristics, which are of a non-systematic nature, include illiquid fixed assets, high transaction costs, substantial barriers to entry and information that is highly priced (Gatzlaff & Tirtiroglu, 1995:180). Gatzlaff and Tirtiroglu (1995:180) are of the opinion that the participants in property markets are not price-takers, because prices are determined through private negotiations. Gatzlaff and Tirtiroglu (1995:180) conclude that difficulties in obtaining information on actual prices and income

flow in the property market might imply that the use of modern finance theories may lead to rough estimations of asset prices and may therefore constrain property market efficiency.

Baum, Crosby and MacGregor (1996:40) confirm that in securities markets where trading is frequent, it is possible to distinguish some dealers as price-takers. In property markets, which are characterised by infrequent trading, the dealers in property are price-makers rather than price-takers. In fact, the price of property as determined may lead to incorrect pricing of the property asset, due to its being subject to price-making.

As an asset class, property may be regarded as a risky investment. Based on the fundamental sources of risk, which include recession risk, interest rate risk and inflation risk, there is no reason to classify property investments as a lower risk class than equity investments. The complex nature of property investments and the difficulties that arise out of property investments are far broader than the simple risk-return trade-off implied by MPT (MacGregor & Nanthakumaran, 1992:27).

MPT suggests the efficient diversification of assets in order to minimise the risks associated with the diversification of assets. It is clear from the discussion above that property investment poses fundamental risks which are diversifiable. Hartzell, Hekman and Miles (1986:252) explain that property diversification through the MPT evolved because diversification encompassed the perception of increasing risk-adjusted returns in a mixed asset portfolio which includes real estate.

Chang, Huang and Wei (2005:128) used co-integration tests to establish that the stock market and property market in Taiwan are not co-integrated. Accordingly, they concluded that, for efficient diversification of portfolio risk, stocks and property should be included in the same portfolio.

According to Wolverton, Cheng and Hardin (1998:40), the four levels of property diversification should include the property component in a mixed asset portfolio, the geographical and/or economic features of the property component, the specific property type and the metropolitan area of the property type.

Young and Graff (1995:20) state explicitly that it is essential that the non-systematic risk of individual properties be considered over and above the market and sector risk exposures. A study conducted by Jud, Roulac and Winkler (2005:379) found that the risk associated with investment in housing is consistent in terms of non-systematic risk.

Some studies on international property diversification (Addae-Dapaah & Loh, 2005:225; Holsapple, Ozawa & Olienyk, 2006:37) investigated MPT and its application across borders, as well as comparisons between developed and emerging economies. Addae-Dapaah and Loh (2005:225) found that investors from developed economies may be in favour of investing in emerging markets due to risk characteristics. Holsapple *et al.* (2006:37) conclude that additional diversification benefits as well as return expectations serves as motivation for foreign investment.

The basic application of the modern finance theories in the property investment environment and the difficulties of and problems with such an application are evident from the above discussion on the MPT. Young and Graff (1995:20)

reason that the current application of the MPT in property investments is based on the stock market model and, thus, does not hold. McDonald (2005:276) confirms Young and Graff's conclusion and combines the CAPM with Tobin's Q theory (the market value of assets divided by the replacement value of assets) to understand and apply the pricing of property assets better.

Brueggeman, Chen and Thibodeau (1984:333) extended the CAPM to take into account the uncertainty of inflation and the inclusion of *ex post* data in order to improve portfolio performance. Fogler, Granito and Smith (1985:711) reject the random event argument that there is a positive correlation between property and the uncertainty of inflation. However, in a more recent study conducted by Cheng and Wolverton (2001:130), the downside risk approach was used rather than the MPT, and investors are warned about the pitfalls of comparing these two approaches.

The EMH is a direct outflow of both the MPT and the issue of market efficiency, while the application of the EMH in property markets has been widely researched and debated by academics. The availability as well as the cost of information has an immense influence on market efficiency in the property market. Gau (1987:1) and Atteberry and Rutherford (1993:377) investigated the three forms of market efficiency (weak, semi-strong and strong) in relation to property markets and all found inefficiencies arising from the lack of publicly available information.

Hepsen (2012:233), in investigating Turkish real estate investment trusts (REITs), indicates through empirical testing that calendar anomalies do exist and that they cause price irregularities that contradict the EMH as applied in the

REIT market. Hepsen (2012:233) points out that, in Turkey, the month of January adds a higher trading premium for individual and institutional investors, as January yields more positive trading behaviour than any other month of the year, hence proving that a January effect in Turkish REITs does exist. Hepsen (2012:233) also empirically shows that a "day of the week" effect exists in the Turkish REIT market, because returns on Tuesdays, Wednesdays, Thursdays and Fridays are higher than on Mondays. In terms of a "turn of the month" effect, he indicates that the volume of trading increases and is significantly higher at the turn of the month than in non-turn of the month days. Hepsen concludes that such calendar anomalies lead to mispricing of assets and subsequently influence asset pricing decisions made by fund managers as well as the fund's performance.

As will be discussed in detail later in this study, both information itself and the use of this information play a decisive role in the decision-making process, as applied by property fund managers. This, together with the difficulties faced in applying modern finance theories, may influence the behaviour of property fund managers in framing investment decisions.

## 2.6 SUMMARY

The primary purpose of this chapter is to place in perspective the evolution of the theory of financial decision-making, the way the process is perceived in modern finance models and the relationship of the theory to property investment decisions.

The evolution of the theory on the financial decision-making process highlights problems regarding the normative nature of expected utility and risk aversion,

as well as the fact that an account of the influence of essential behavioural factors on the expected utility theory are absent. It is shown that a number of relevant studies identify difficulties both in the determination of the value of property assets, as well as the efficiency of property markets.

It became evident that there is a relationship between modern finance theories and investment in property. However, there are discrepancies in this relationship as shown in the literature above. Both the concept of human behaviour and its influence on financial decision-making needs to be discussed more fully, especially to clarify its role in investment decision-making theory. This aspect is therefore discussed more fully in Chapter 3.

# CHAPTER 3:
# BEHAVIOURAL FINANCE AND DECISION-MAKING

## 3.1 INTRODUCTION

In order to understand the concept of human behaviour and its influence on financial decision-making, it is important to investigate the human aspect or psychology of decision-making. In fact, as early as 1936, Keynes recognised the field of psychology and its influences on financial decision-making (Montier 2007:36).

The main aim of this chapter is to describe how the theory of behavioural finance developed and to identify and review the behavioural aspects involved in investment decision-making. Prospect theory forms the basis of the concept of behavioural finance. It is therefore reviewed to clarify the differences between prospect theory and the normative approach, prospect theory's significance as a decision-making model and its application to financial decision-making.

This discussion of the prospect theory is followed by a review of behavioural finance from a psychological perspective and of the way in which behavioural finance developed as a decision-making model in the field of finance. The behavioural aspects of heuristic-driven bias, frame dependence and the inefficiency of the market are examined from a financial decision-making point of view. This is undertaken to enhance an understanding of these concepts which was essential for evaluating their applicability in the context of property investment decision-making.

## 3.2 THE PROSPECT THEORY

Normative theories such as the expected utility theory state that sensible (reasonable) people act in a certain way. The principles of descriptive or positive theories of choice, such as the prospect theory, rely on observations of what people actually do. Kahneman and Tversky (1979:263) developed a descriptive model of choice − prospect theory − which is based on empirical evidence that people do not behave in accordance with the normative models when it comes either to decision-making or choice.

Chen and Tsao (2010:8) note four basic elements of the prospect theory:

- gains and losses are assessed relative to a particular reference point;
- despondency with regard to losses is higher than despondency towards gains;
- a value function replaces the utility function of the expected utility theory; and
- decision weights replace the expected utility model's use of simple probabilities as a weighting function.

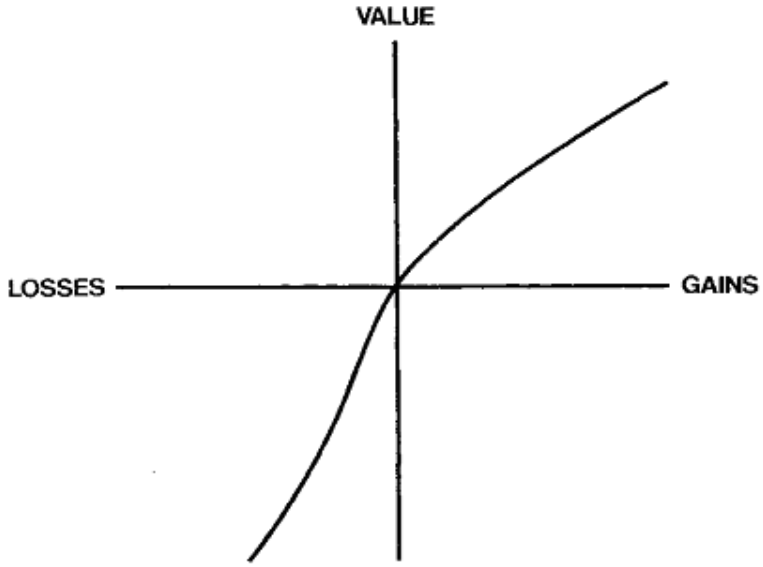
Along similar lines, Ackert and Deaves (2010:39) identify three key aspects of observed decision-making that violate the expected utility theory and that constitute the foundation on which the prospect theory was constructed:

- risk aversion (or conversely, risk-seeking tendencies) applies, depending on the nature of the expectation;
- the status quo is the reference point for the valuation of expectations; and
- the despondency towards losses is higher than the despondency towards gains because losses are more predominant than gains.

A recent book on the research of Daniel Kahneman (2011:13) argues that the expected utility theory makes logical assumptions, but that these do not reflect investors' actual choices, because the expected utility theory does not take into account the influence of behavioural biases in the decision-making process.

As indicated above, the value function replaces the utility function of the expected utility theory. Value is not measured in terms of level of wealth, but of gains and losses relative to a reference point, as depicted in Figure 3**,** below.

**Figure 3: A typical value function in the prospect theory**

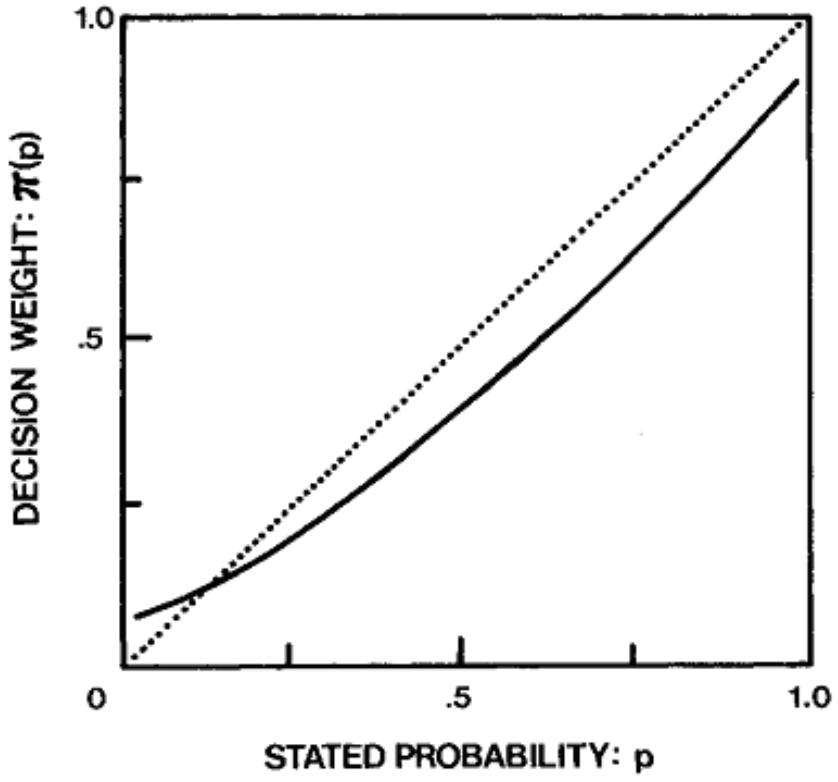



Source: Adapted from Kahneman and Tversky (1979:279)

Kahneman and Tversky (1979:279) describe the value function in terms of empirical evidence. Digressions in respect of gains and losses are in relation to the reference point which, in turn, indicates changes in wealth. The function is concave for profits and convex for losses, which shows that risk-seeking coincides with losses while risk aversion coincides with gains. The fact that the slope is steeper for losses than for gains confirms that people are more averse to losses in relation to gains (this is also referred as the disposition effect).

Shiller (1999:1309) clarifies the disposition effect when he states that, in fact, the prospect theory corresponds with the expected utility theory in that people prefer to maximise a weighted sum of utilities. However, the concept of weighting in the two theories differs: weighting in the prospect theory is not the same as probabilities in the expected utility theory, and in the prospect theory utilities are measured through the value function rather than through the utility function, as in the expected utility theory. Shiller (1999:1309) summarises the prospect theory weighting function as a function of true probabilities with zero weighting to low probabilities and a weighting of close to one to extremely high probabilities – see Figure 4, below.

**Figure 4: A typical weighting function in the prospect theory**




Source: Adapted from Tversky and Kahneman (1986:264)

Tverksy and Kahneman (1986:251) affirm that there is considerable support for normative models and their explanation and prediction of human behaviour. These authors list the following arguments in favour of accepting a normative explanation of decision behaviour:

- it explains choice as a process of maximisation, because people have both motives and opportunities to learn from experience in pursuing their goals;
- it allows rational investors and business firms to increase their chance of survival, and even impose rationality on the market through healthy competition; and
- the axioms of normative theories and their insightful appeal provide acceptable norms for choice behaviour.

However, Tverksy and Kahneman (1986:252) conclude that normative theories do not provide a solid base for the logic of choice, arguing that “the deviations from actual behaviour from the normative model are too widespread to be ignored, too systematic to be dismissed as random error and too fundamental to be accommodated by relaxing the normative system”.

In addition, Tverksy and Kahneman (1986:252) identify four essential assumptions underpinning the axioms of Von Neumann and Morgenstern’s (1947:6) expected utility theory which Tversky and Kahneman use to substantiate their argument. These assumptions are

- cancellation;
- transitivity;
- dominance; and
- invariance.

Tversky and Kahneman (1986:252) deduce that the principal condition of **cancellation** is that, if two outcomes are the same, only one condition will be realised, which makes it possible to assess the outcomes for each condition separately. This assumption is important, as it leads to preferences in terms of prospects in the maximisation of utility theorem. Hence, it may be deduced that, for people to choose between two alternatives, the outcomes should differ.

**Transitivity** as an assumption is crucial in explaining a preference for one option as opposed to another. Tversky and Kahneman (1986:252) explain that transitivity may hold as an assumption when two alternatives are evaluated independently, but not when the alternatives are mutually exclusive.

The most significant assumption is that of **dominance**, which states that, if one alternative is better than the other, under the same conditions, then that alternative should be chosen. Dominance is the anchor of normative theories.

**Invariance**, according to Tversky and Kahneman (1986:253), is the assumption that, if variations of form occur but do not affect alternatives' actual outcomes, these variations should not affect rational investors' choices. These authors conclude that invariance and dominance are indispensable for normative theories, but that transitivity is questionable and cancellation should be rejected.

According to the prospect theory, people perceive improbable occurrences as impossible, and highly probable occurrences as certain. The weighting model depicted in Figure 4, above, reveals inconsistencies with first order stochastic dominance. Hence, Tversky and Kahneman (1992:297) amended the model by developing the cumulative prospect theory, in which cumulative distribution functions replace the weighting of probabilities (Chen & Tsao, 2010:10).

Prospect theory constitutes the foundation on which the subject field of behavioural finance is based. An understanding of prospect theory facilitates the observation of human behaviour, more importantly, the effects of human behaviour on financial decision-making and, ultimately, on the decision-making of property fund managers.

## 3.3 THE CONCEPT OF BEHAVIOURAL FINANCE

In order to understand the concept of financial decision-making, and to move closer to the associated investment decision-making problem as possibly influenced by behavioural aspects, it is important to review psychology and its relation to the world of finance.

Shefrin (2002:4) divides the field of behavioural finance into three main categories:

- heuristic-driven bias, which includes representativeness, overconfidence, anchoring-and-adjustment, conservatism, herding, aversion to ambiguity and emotion;
- frame dependence, which includes loss aversion and mental accounting; and
- market inefficiencies such as the mispricing of assets because of a lack of information.

The concept of behavioural finance can be described in terms of these three categories. The discussion below highlights the behavioural aspects listed above in the light of the errors people make when making decisions under conditions of uncertainty, the way in which the presentation of a problem may affect their decisions and the influence of their decisions on market outcomes,

the concurrent effect of human behaviour on market efficiency, and, ultimately, on financial decision-making. The influence of the behavioural aspects on financial decision-making discussed in this section is of particular importance later in this study when decision-making in relation to property fund managers is addressed and empirically tested.

Below, heuristic-driven bias, frame dependence and market inefficiencies are discussed.

### 3.3.1 Heuristic-driven bias

As indicated in Section 1.6, heuristic-driven bias refers to the "principles underlying rules of thumb and the systematic errors associated with them" (Shefrin 2002:13). In his description of heuristic-driven bias as a behavioural aspect, Shefrin (2002:14) lists the following four major axioms:

- through the formulation of ideas, people come to conclusions about things by themselves;
- people ascertain these ideas by using the information at their disposal and anticipating heuristics or rules of thumb to arrive at conclusions;
- the admissibility of these heuristics renders people vulnerable to committing errors in arriving at their conclusions; and
- people do commit errors in specific circumstances.

**Representativeness** is the first heuristic-driven bias discussed for the purposes of this study. The representativeness heuristic enables people to assess the occurrence of uncertain outcomes by the degree of similarity in properties to the sample to which the occurrence belongs. The ranking of occurrences of uncertain outcomes enables people to perceive the possibility that the more

representative the occurrence is, the more likely the occurrence, even if the occurrence is not likely at all. This perception may lead, in turn, to errors in judgement and decision-making (Kahneman & Tversky, 1972:430).

De Bondt and Thaler (1985:797) investigated the representativeness heuristic and applied it to finance. They used monthly return data supplied by the Centre for Research in Security Prices at the University of Chicago on the New York Stock Exchange common stocks for the period from January 1926 to December 1982, to test the representativeness heuristic. These authors found that stocks labelled “losers” by the market over a historical period of three years outperformed in the following three years those stocks labelled “winners” over the same historical time period. The authors also found that analysts tend to rely on recent success rather than future implications, thus making judgement errors because of their reliance on the most likely outcome based on past performance.

**Overconfidence** is the second heuristic-driven bias which leads decision-makers to act overconfidently in their predictions, resulting in errors of judgement. In a case-study that focused on legal judges, Oskamp (1982:287) assertively increased the amount of information upon which the judges were to base their decisions. In his study, Oskamp (1982:289) formulated the following hypotheses (cited *verbatim*):

> “1. Beyond some early point in the information-gathering process, predictive accuracy reaches a ceiling.
> 2. Nevertheless, confidence in one’s decisions continues to climb steadily as more information is obtained.
> 3. Thus, toward the end of the information-gathering process, most judges are overconfident about their judgements.”

In his study, Oskamp (1982) concluded that, notwithstanding the fact that the case material was of an unusual nature legally, the judges became more confident of their own increasing grasp of the case at hand and, as the information at their disposal increased, they became so (over)confident of their own decisions that their confidence in the factual correctness of these decisions was entirely out of proportion to the actual final decision reached.

In the field of finance, several studies have been conducted into overconfidence as a factor or influence on financial decision-making, for example, Daniel, Hirshleifer and Subrahmanyam (2001:921) addressed the influence of overconfidence on both arbitrage and asset pricing, whilst Kyle and Wang (1997:2073) focused on the effect of overconfidence on speculation.

In a basic model on overconfident traders, Ackert and Deaves (2010:152) concur with a model developed by Odean (1998:1887) on noise trading. Odean's model suggests that traders receive noisy signals on the future value of a stock. Their overconfidence is evident in the fact that, even upon receiving imperfect information, they still believe that their decisions are correct when, in fact, the decisions are not. Referring to Odean's model, Ackert and Deaves (2010:157), in their example, concluded that, as the volume of trading increases, so does the overconfidence of traders, with a consequent increase in price volatility. Ackert and Deaves (2010:157) also concluded that, as a result of the presence of overconfidence, the quality of prices decreased, thus impinging on the accuracy of value estimation, with overconfident traders exhibiting a lower expected utility because of their apparent errors in judgement.

In a recent behavioural study on the Taiwanese stock market, Lin (2011:1639) statistically related the three stages of rational decision-making with the behavioural aspects of overconfidence, herding and the disposition effect. On the aspect of overconfidence, he found that “demand identification” and the “evaluation of alternatives” have a statistically significant relation with the overconfidence heuristic-driven bias. Lin (2011:1639) concluded that, when an investor adopts a risk-seeking attitude and then believes that, as an investor, he or she understands the relationship between risk and return, this attitude and belief strengthen the investor’s expectations regarding the investment and subsequently leads to an overconfident decision.

In analysing the occurrence of behavioural aspects in the recent financial crisis, Szyszka (2010:126) found that market optimism and prosperity in the years preceding the 2008 financial crisis led to overconfident investors who underestimated risk and the subsequent warning signals. Investors took on high risk investments because their confidence levels were high. The result was an extrapolation error, where the investment decisions of investors depended heavily on past trends without the proper extension of such trends into the future.

**Anchoring and adjustment**, the third heuristic-driven bias, is best described by Tversky and Kahneman (1974:1124), who used an eight-number multiplication test to show that people make approximations starting from an initial value, and then adjust this initial value to generate a final approximation. These authors found that this type of adjustment is often insufficient. In their experiment, the initial value was the anchor value and people made adjustments without taking into account the length of the number set used in the experiment.

Shefrin (2002:20) used an example designed by Edwards (1982:361) to illustrate the anchoring heuristic. He set an anchoring value, then introduced new information to his sample. This led to over- and under-reaction, but with a greater tendency towards under-reaction, that is, standing by the initial value. Hence, out of the anchoring and adjustment heuristic, **conservatism** as the fourth heuristic-driven bias arises, as people do not understand the new information introduced and then adopt a conservative strategy. Shefrin (2002:20) concludes that, as a result of the anchoring and adjustment and conservatism biases, analysts do not revise their earnings estimates when new information is published. This, in turn, leads to positive earnings surprises, which are then followed by more positive earnings surprises and vice versa.

Cen, Hilary and Wei (2010:34) argue that the anchoring bias exists in decisions made by sell-side analysts and investors. These authors observe that when such market participants estimate the future profitability of a business firm by forecasting the earnings per share (EPS) of the firm, they tend to anchor their forecasts in the industry median. This behaviour results in higher optimism for firms with a low forecast EPS relative to the industry median than for similar firms with a high and much more positive future EPS outlook.

In investigating the anchoring heuristic-driven bias, Kudryavtsev and Cohen (2010:171) applied a questionnaire to MBA students who have pre-existing knowledge regarding economic and financial settings. They found evidence of a stronger anchoring bias for difficult questions than for easy questions. These authors conclude that this kind of behaviour may have significant implications in a decision-making environment, as it seems that the less people know about the subject in question, the stronger the anchor becomes.

In the financial world, the anchoring and adjustment bias is closely related to the conservatism heuristic-driven bias, as well as **herding behaviour**, the fifth heuristic.

Herding behaviour refers to investors following the crowd in making investment decisions. To explain the behavioural influence of herding behaviour, Ackert and Deaves (2010:147) maintain that financial analysts, in applying their trade (by estimating prices, making predictions on earnings and recommending the buying or selling of securities) often, in fact, anchor or herd. Referring to prior studies conducted by Welch (2000:369) and Jegadeesh and Kim (2010:901), Ackert and Deaves (2010:147) noted that **herding behaviour** amongst analysts is significant if the analysts exhibit a lagged reaction in respect of changing their initial opinions. Analysts also tend to herd if they are influenced by the recommendations made by other analysts.

Szyszka (2010:128) shows that the presence of herding behaviour contributed to the 2008 financial crisis. He explains that because of an increase in prices, the common belief was that people were investing in these assets, and, because everyone was buying, the expectation was that prices would increase even more. Therefore, it was thought that it was a safe reaction to join the market, and that buying would ensure profit, because of the anticipated growth trend in prices.

Lin (2011:1640) suggests that herding behaviour among investors forms part of market itself rather than being part of the personal decision-making process. He concludes that although herding behaviour exists, there could be other behavioural biases that may lead to the formation of herding behaviour.

**Aversion to ambiguity** is the sixth heuristic-driven bias. It implies that people tend to prefer the known to the unknown. This, in turn, may mean that the rewards offered by either the uncertain or the unfamiliar may be unclaimed. French and Poterba (1991:226) found evidence for the above statement when they conducted empirical testing on investors from the United States (US), Japan and the United Kingdom (UK). They found that most of these investors invested in local securities rather than offshore securities, because the local securities markets were known to them and they were optimistic about them.

Finally, **emotion**, the seventh heuristic-driven bias, has been widely researched from a psychology perspective. Ackert and Deaves (2010:121) use Elster's (1998:48) definition of an emotion, which states that people have "cognitive antecedents, intentional objects, physiological arousal, physiological expressions, and valence and action tendencies".

The financial implications of emotions and their influence on decision-making have been well documented and widely debated. Various factors can affect emotions. Kamstra, Kramer and Levi (2002:1005) point out that, without a good night's rest, the level of efficiency of traders decreases, while Hirshleifer and Shumway (2003:1009) argue that sunny days have a positive effect on traders' perceptions of the market.

Even more significant in terms of the important role that emotion plays in financial decision-making is the "fear of regret" (Singh, 2009:90). Kahneman and Tversky (1979:269) were the first to show the role of "regret" as an emotion through their empirical testing of reports of losses. They concluded that regret as a negative emotion is more prominent than the positive emotion of pride.

### 3.3.2 Frame dependence

The concept of frame dependence as a behavioural aspect implies that problems in respect of decisions may be modelled in different ways to that of the decision-maker (Barberis & Thaler 2003:1073). A decision frame refers to the tendency to make present decisions within the framework the decision problem is presented. A decision frame relies on how a decision problem is posed, as well as on how it is perceived by the decision-maker. A decision frame also includes the personal characteristics of the decision-maker.

The effects of frame dependence on people's decisions as well as the influence of frame dependence on financial decision-making have been extensively investigated by Tverksy and Kahneman (1981:458). One of their key findings was that people want to act in terms of their preferences and independently of the frame, but uncertainty (difficulty) in resolving inconsistencies within that frame render them dependent on the frame.

Shefrin (2002:23) indicates that the construct of frame dependence contradicts the expected utility theory, as well as the arguments put forward by the advocates of traditional finance who assume that it is essential that people's decisions be consistent and/or transparent, regardless of the way in which the decision problem is presented.

It emerges from the review of prospect theory that one of the key building blocks of prospect theory is the assumption that people's despondency regarding losses is higher than their despondency regarding gains. The disposition effect is based on this notion. The value-function, as explained above (see Section 3.2), also reveals that people are more pessimistic towards

their losses in relation to their gains – hence the steeper slope of the value function in Figure 3 (see Section 3.2). Rabin (1998:46) confirms this notion when he claims that people prefer the *status quo* when changes to decisions may result in losses, in turn resulting in frame dependence. This aspect is also known as **loss aversion**.

Godoi *et al*. (2005:50) conducted a qualitative study in which they investigated the factor of loss aversion in an investor environment. The results showed that the feeling of loss is socially constructed and that it manifests in life experiences through familiarity, guilt, risks and losses, rationalisation, fear, anguish and, most significantly, loss aversion.

Fogel and Berry (2006:116) conducted a study to investigate the disposition effect and individual investor decisions. They found that the majority of respondents display an *a posteriori* awareness of the long-term consequences of the disposition effect.

Chen, Kim, Nofsinger and Rui (2007:448) conducted a study of behavioural biases and emerging market investors, with special reference to Chinese investors. They established that the disposition effect is indeed present. Chinese investors are not eager to realise losses, leading to the aversion of regret. In comparing their results with those of the US investor environment, these authors found that Chinese and US investors are both equally subject to the disposition effect.

Benartzi and Thaler (2007:94) examined loss aversion and found that myopic loss aversion occurs when portfolios are reviewed too often. In an earlier study,

Brown and Lewis (1981:359) also investigated myopic behaviour by modulating topologies through the space of consumption plans of economic agents.

The disposition effect and subsequent loss aversion can also be illustrated in the recent financial crisis. Szyszka (2010:132) explains that, because of the disposition effect, the market stagnated, with the emotion of fear preventing investors from entering the market. The market then experienced a further price drop, causing further fear and a state of risk aversion.

Decision-makers are also confronted by how to think about the problem before formulating the decision problem. This is referred to as the behavioural aspect of **mental accounting** (Barberis & Thaler, 2003:1073). In an earlier study conducted by Thaler (1985:212), the process of mental accounting was described using consumer behaviour as an example. It emerged from this study that consumers who code profits and losses by means of segregation tend to assess extra income in terms of its transaction utility. These consumers apply stricter control regarding spending patterns relating to any extra income, resulting in frame dependence.

In their study of the behaviour of US residents in respect of savings, Benartzi and Thaler (2007:92) investigated the decision of changing from a “defined benefit” to a “defined contribution” retirement plan. With regard to the reality of mental accounting, they concluded that the separate mental accounts used in the sample made a clear distinction between “defined benefit” and “defined contribution” and that the respondents were far more careful about reallocating funds already saved than they were about allocating any new funds. This finding relates directly to the fear of regret where decision-makers prefer to

maintain concerns of locked-in profits or assets that they already have to opting for the uncertainty unknown investments.

Shefrin (2002:27) has provided further concrete examples of frame dependence that stems from the process of hedonic editing, in terms of which some decision frames are preferred to others. Shefrin (2002:27) summarises his findings as follows: “Framing is about form. In short, frame dependence holds that differences in form may also be substantive. It reflects a mix of cognitive and emotional elements.”

Cognitively, people organise information in different ways, for example, the coding of outcomes into profits and losses. However, in respect of emotions, people have a more intense experience of losses than profits, which, in turn, results in loss aversion. As a result, people depend on those decision frames which employ hedonic editing. The result of a loss through an error in decision-making leads to the emotion of regret that may eventually culminate in a loss of self-control. However, framing may assist in dealing with this emotional consequence (Shefrin, 2002:32).

### 3.3.3 Market inefficiencies

In efficient markets, investors are perceived as making rational choices according to well-defined preferences. However, if the rational choice is empirically difficult to prove or if it relies on doubtful assumptions to substantiate it, then an anomaly with regard to the concept of rationalisation arises. Such anomalies counter the theories of efficient markets (Thaler, 1990:193).

Ackert and Deaves (2010:61) maintain that such anomalies include cautious reactions to earnings announcements. According to Shefrin (2002:20), these anomalies also reflect the conservatism heuristic-driven bias, value versus growth and momentum and reversal. Ackert and Deaves (2010:61) suggest that, although anomalies may occur, they are difficult to assess if markets are inefficient, because, in order to test for market inefficiencies, an asset pricing model must be used for risk adjustments which, in turn, results in joint hypotheses tests. Citing Shleifer (2000:7), Ackert and Deaves (2010:61) maintain that there is theoretical proof that both rationality itself and its validation are weak. This is reflected in the fact that arbitrage opportunities are limited if assets are mispriced, which then, in turn, results in risk-free earnings (Bodie *et al*., 2000:253). For example, if an asset trades at different prices in two markets, it can be sold short in the high-priced market and then bought in the low-priced market, resulting in a positive, risk-free net profit.

Pagliari (1995:145) suggests that the location of such assets is imposed on the systematic factors themselves, rather than on the market portfolio. However, Brown and Matysiak (2000:183) argue that the application of arbitrage in property investments is problematic in terms of estimating these systematic factors and determining the sensitivities of property to these systematic factors.

As noted above, if a market is to be efficient, then investors should always be rational, mistakes in the market should not be correlated and there should be no limit to arbitrage opportunities. The literature in this section indicates that investors do not always react to all the relevant information in the same way as they react to noise in the market; thus, they may trade on future expectations that are not relevant to the information needed to price assets correctly.

Singh (2009:93) argues that investors tend to trade on either sentiment or noise, which results in short-term investment horizons rather than long-term investment horizons. He adds that selling often takes place too soon as a result of the fear of short-term losses, rather than waiting to capitalise on the long-term investment horizon. The result is noise-trader risk, which can limit arbitrage opportunities.

The problem of arbitrage opportunities arises not so much from perpetually mispriced assets than from those mispricings that are not perpetual over the longer term. The problem arises if an investor buys such assets too early. This, in turn, increases the risk of losses and, in particular, the loss of all capital (Ritter, 2003:433). Singh (2009:92) maintains that, even in the event of substituting the asset by selling short, it is impossible to remove all the fundamental risk involved because of the imperfection of substitute assets. This constitutes yet another limiting factor to arbitrage opportunities.

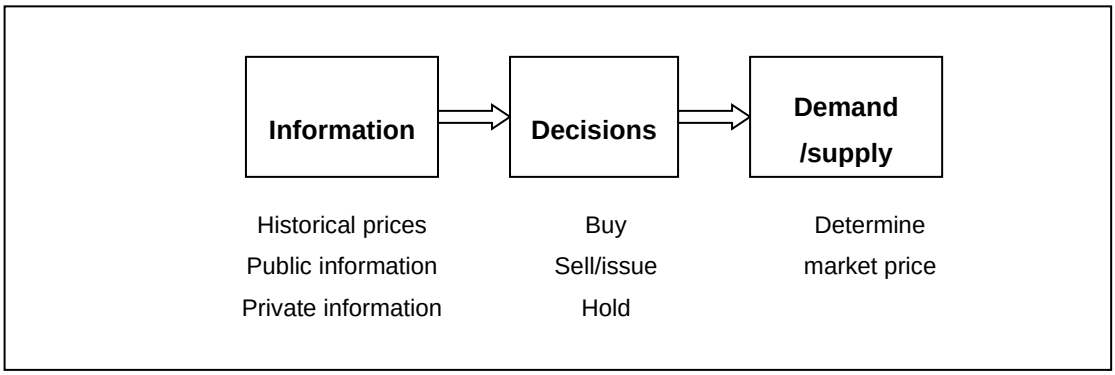
Bodie *et al*. (2000:253) are of the opinion that it is essential that the profit which results from an arbitrage opportunity exceed the transaction costs. Generic costs such as market impact costs, commissions and the loss of interest may, in some cases, nullify profits and thus pose a limit to the arbitrage opportunity.

Mullainathan and Thaler (2000:2) also show these limitations when they point out that market information are not the basis for rational decision-making investors. Ritter (2003:436), in explaining market efficiency, divides significant events into high frequency events and low frequency events. He found that high-frequency events, such as mutual funds, support market efficiency. By contrast, he argues, low-frequency events may include huge mispricings, such

as the undervaluation of the world stock markets from 1974 to 1982 and the technology, media and telecom bubble of 2000. Ritter (2003:436) explains that "[m]ost of these short sellers, who were right in the long run, were wiped out before the misevaluations started to disappear. Thus, the forces of arbitrage, which work well for high frequency events, work very poorly for low-frequency events".

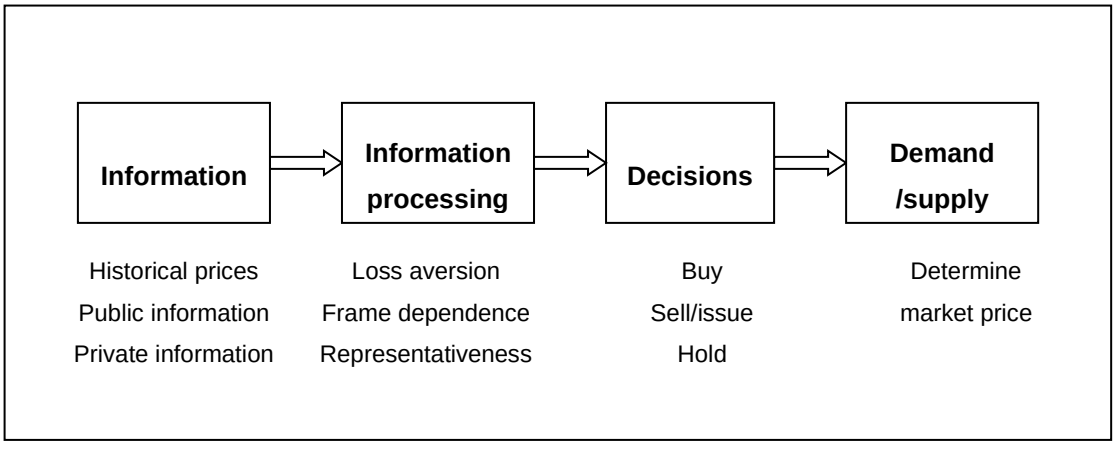
Smith (2008:51) uses diagrams to describe the process of moving from an efficient market hypothesis to a behavioural market hypothesis in determining the price of assets (see Figures 5 and 6, below).

**Figure 5: Traditional exposition of the efficient market hypothesis**




Source: Adapted from Smith (2008:51)

**Figure 6: The behavioural finance perspective**




Source: Adapted from Smith (2008:51)

Figure 5 depicts the sequence of pricing an asset on the basis of the efficient market model, whilst Figure 6 depicts the sequence of price determination on the basis of the behavioural approach.

In defence of the EMH, Fama (1998:303) states clearly that long-term anomalies fade away with realistic changes in investment technique, turning anomalies into illusions. However, Frankfurter and McGoun (2002:387) maintain that "change may be coming, if for no other reason than that traditional finance has exhausted itself as a progressive research program".

Shefrin (2002:10) concludes: "With respect to Fama's specific concerns about market inefficiency and behavioural finance, I suggest that the weight of the evidence favours the behavioural point of view […] neither practitioners nor scholars can afford to ignore heuristic-driven bias and frame dependence. The mistakes are too expensive."

## 3.4 SUMMARY

The objective of this chapter was to describe how the theory of behavioural finance developed and to identify and review the behavioural aspects involved in investment decision-making. In order to broaden understanding of this process, this chapter focused on the prospect theory as the foundation for the field of behavioural finance and on the study behavioural aspects that evolved from the prospect theory. The focus is also on the way in which the behavioural aspects identified in this chapter influence decision-making on the part of individuals and, ultimately, financial decision-making.

It became evident with regard to the prospect theory and its foundations that there are definite differences between this model and the normative models discussed in Chapter 2. The reasons for these differences have been explained. In addition, the behavioural aspects of heuristic-driven bias(es), and frame dependence present in decision-making scenarios were identified and explained, and their influence on market efficiency, especially in respect of the limits of arbitrage opportunities, was discussed. A clear understanding was formed of the fact that human behaviour influences the decisions people make, especially financial decisions. The literature also shows that these behavioural aspects may render markets inefficient.

On the basis of the literature reviewed in this chapter, the study's focus can now shift towards property investments, and in particular to how property fund managers see the decision-making process and how it may be influenced by their behaviour.

# CHAPTER 4:
# BEHAVIOURAL FINANCE AND
# PROPERTY INVESTMENT DECISION-MAKING

## 4.1 INTRODUCTION

The influence of human behaviour on decision-making is still a relatively new concept in property investment. Roulac and Distad (2004:261) suggest that most of the literature available on property from an educational paradigm focuses on law and brokerage, and they conclude that it is likely that the probability of wrong calculations and decisions that rely on textbook material may well lead to market inefficiency.

In 2006, Kishore (2006:11) predicted that behavioural research on the property market was imminent, given the increasing amount of research on human behaviour in the stock market, which is a more predictive market. The property market, according to him, is sectioned, has a high frequency of unavailable, quality data, and is more inefficient and less informed than the stock market. The property market also has a high level of human interaction, and thus warrants research about the influence of human behaviour on property market decision-making.

In reflecting on possible directions for behavioural research on the property market, Kishore (2006:12) suggested the following crucial research areas:

- Behavioural research on pricing anomalies in stock markets may be applied to an investigation of pricing anomalies in listed property markets.
- Volatility puzzles in listed property markets may be investigated by testing the applicability of aversion to ambiguity bias.
- The holding periods relating to property should be properly researched, as they may reflect overconfident investors, as well as the human emotions of fear or regret.
- The fact that over- and under-reaction occur in the stock market may shed some light on the same phenomena in the property valuation process. Applying the constructs of heuristic-driven bias, as well as frame dependence, may solve some of the mysteries of the valuation smoothing process.
- Herding behaviour, as a direct outflow of anchoring and adjustment bias, as well as emotional bias, may be empirically assessed by means of questionnaire surveys to establish buyer behaviour in the property markets.

Bearing in mind the possible areas of research proposed by Kishore (2006:12), this study researched property holding periods, as well as herding behaviour, anchoring and adjustment and emotional bias.

The main aim of this chapter is to review the property investor's perspective on the decision-making process and how the behavioural aspects identified in the previous chapter, in the final analysis, may influence decisions made by property investors.

Wofford and Troilo (2011:379), in a study on cognitive risk, suggest that in order to maximise the effectiveness of behavioural real estate research, an

examination of cognitive risk and its related areas should be conducted in a non-decisive manner. By implementing such an approach, useful knowledge can be created to add to the field of behavioural real estate research.

This chapter on decision-making on the part of property investors firstly reviews the literature on property holding periods, and decisions based on property holding periods. It also discusses the literature relating to the property holding periods and the presence of behavioural aspects that may influence property holding decisions. Suggestions on changes in property holding periods are also referred to.

The following section addresses property investment decision-making and its relation to heuristic-driven bias and frame dependence by means of a literature review. The focus of the literature review then shifts to the use, availability and quality of information, as it is the one of the axioms on which normative theories are based. Information bias and the resultant market inefficiencies are then reviewed and discussed.

Finally, the literature on property investment decision-making as perceived by property fund managers is reviewed. The literature suggests that, in view of the influence of human behaviour, the application of normative methods to decision-making is far from desirable. The chapter concludes with some final remarks, after which the research methodology applied in this study is discussed.

## 4.2 HOLDING PERIODS AND PROPERTY INVESTMENT DECISION-MAKING

MacCowan and Orr (2008:343) investigated holding periods as part of a study aimed at determining the behavioural influences on the selling decisions of property fund managers in the UK property fund market. MacCowan and Orr (2008:344) argue that the investigation of property holding periods should shed light on the influence of changes in economic conditions and on changes in the investment strategies adopted by property fund managers.

Collett, Lizieri and Ward (2003:205) maintain that the decision to invest in property requires an investor to engage in an appraisal of the expected return from the property investment. This decision may also be influenced by the transaction costs involved, because high transaction costs and/or illiquidity could force relatively longer holding periods. In their study, Collett *et al*. (2003:221) came to the following conclusions:

- the holding period for property is longer than that for equities, because of the influence of the high transaction costs and the illiquidity involved;
- holding periods fluctuate in terms of the property type – larger properties such as shopping centres tend to have longer holding periods because of the rental income received and the amortisation of expenses; and
- the average holding period is declining, with a greater tendency to sell when greater returns apply, thus resulting in shorter holding periods.

The study by Collett *et al*. (2003:222) shows that property, as an asset class, differs significantly from other asset classes and that specific investor behaviour is evident in the buying and selling decisions made by property investors.

Holding periods are also often longer than investors claim them to be and it was confirmed that selling at a loss is also unlikely.

A study by Gardner and Matysiak (2005:3) analysing the holding periods for office properties in the UK, over a 20-year period showed that properties that exhibit accelerated growth in the first five years are the most likely to be sold. The evidence points to the improbability that these properties will outperform the market in the long term. Gardner and Matysiak (2005:17) also deduce that high transaction costs and underperformance in relation to a benchmark return engenders a feeling of loss and regret in a property decision-maker.

In another study, Fisher and Young (2000:327) compared holding periods in the US to holding periods in the UK. They found that there are similarities with regard to holding periods, which were the same in both countries. Furthermore, they deduced that longer holding periods may be influenced by future global economic trends in respect of differences in the nature or liquidity of different properties. They note that declining holding periods may be the result of both changing market conditions and structural changes in the management of the property asset class.

In a bootstrap analysis conducted in order to estimate confidence intervals, Ziobrowski, Caines and Ziobrowski (1999:144) found that longer holding periods brought stability to all levels of investor risk. They also demonstrated narrower confidence intervals if the holding period was extended from one year or less to five years. Nevertheless, they also deduced that performance portfolios including property with average growth over the long term do not outperform portfolios with average growth over the long term, excluding property.

In a case study on German open-ended property funds, Maurer, Reiner and Rogalla (2004:233) ascertained that long-term holding periods, like direct property investments, apply to German open-ended property funds rather than short-term horizons.

Liquidity and the decision to sell a property were investigated by Crosby and McAllister (2004:22), who found that the main reason for selling is selection bias, based on a fair price in a reasonable amount of time. Thus, the probability of a sale depends on the seller's motivation and ability to sell rather than on the actual liquidity of the asset.

Fisher, Gatzlaff, Geltner and Haurin (2004:362) explain that the sale of commercial grade property relates, first, to market conditions connected to the strength of the market and legalities. Second, owners' investment strategies, (especially when a property starts either to outperform the market or transaction values start to exceed the appraisers' valuation) have a considerable influence on the decision to sell, thus indicating a form of loss aversion. Thirdly, the characteristics of the property concerned influence the decision to sell – larger properties have a lower transaction frequency (Collett *et al*., 2003:222).

Holding periods also influence the calculation of the worth of a property. Baum and Crosby (1995:1) explored the estimation of cash flows pertaining to property as a way of calculating value. They found that the intentions of the owner were the overriding factor in terms of the choice of whether or not to hold property. If no intention to sell is evident, the holding period becomes irrelevant. These authors argue that it is only if the intention to sell is clear that, when the holding period is stipulated, cash flows can be estimated.

Hutchison and Nanthakumaran (2000:46) recommend shorter holding periods of up to five years in the determination of value, as they found a positive correlation between uncertainty and longer time investment horizons. Poor forecasting and economic shocks may influence cash flow estimation over the long term which, in turn, may influence the value of a property. Hutchison and Nanthakumaran (2000:46) used both Monte Carlo simulation and a sensitivity analysis to support this argument. They concluded that the identification of the risks involved in estimating the variables to determine value should lead to more informed property investment decisions.

As indicated at the start of this section, MacCowan and Orr (2008:344) investigated holding periods as part of a study aimed at determining behavioural influences in the selling decisions of property fund managers. Some of the studies discussed above (Fisher & Young, 2000; Gardner & Matysiak, 2005) provide evidence of declining holding periods. Concurring with this view, MacCowan and Orr (2008:350) maintain that insistence on performance promotes increases activity amongst property fund managers which, in turn, results in shorter investment horizons. The potential for excessive trading increases; the properties selected tend to be those whose value may be significantly increased in a short time.

MacCowan and Orr (2008:350) have shown that fund managers tend to move away from investing in shopping centres and retail properties in favour of office investments. Their study was conducted at a time when market fundamentals suggested that the office sector would perform better. They also suggest that behavioural factors such as over-confidence in the office sector and herding behaviour moving out of the retail sector in favour of the office sector are

obviously present. A need to restructure property portfolios has been identified as a key factor in the drive towards property disposals, but other significant factors such as underperformance, exposure to risk and offers to purchase have also been identified.

It is clear that normative approaches to the holding of property do apply in respect of decision-making in this regard. However, there is also evidence from the literature reviewed in this section that behavioural aspects such as loss aversion, overconfidence, herding and pressure to perform exert a significant influence on property investors' decision-making framework.

It also emerged from the above literature that holding periods are declining and that property fund managers are exploiting properties with shorter holding time horizons, possibly exposing themselves to behavioural aspects. This and the uncertainty about the long-term value of property warrants empirical investigation in a South African context. Hence, Hypothesis 1 (that the holding period of property as an investment is influenced by behavioural aspects) was investigated and analysed (see Chapter 6 for the results of this investigation).

## 4.3 HEURISTIC-DRIVEN BIAS IN PROPERTY INVESTMENT DECISION-MAKING

Investment in property is one of various types of investment vehicles available to investors. However, other than with the equity and bond investment markets, where shares and bonds are traded both primarily and secondarily, the property market is more complex than most other markets. The property market consists of separate developments which create investor and rental markets, resulting in capital gain and/or fixed rental income streams (Hoesli & MacGregor, 2000:9).

Jaffe and Sirmans (1984:382), in an earlier study, explained that financial decision-making in property investments is hampered by unresolved issues such as the definition of property as an investment, investors' objectives, the way the market is analysed, the legal and financing environment that surrounds property investments, tax issues, and the role of specialised agents that facilitate property transactions.

According to Wurtzebach and Miles (1994:551), it is essential that property investors evaluate the benefits of a property investment before coming to a final decision. These benefits include the realisation of capital gains, a cash flow stream, the creation of tax shelters and the possibility of non-physical gains, such as self-esteem and a sense of security. Wurtzebach and Miles (1994:551) imply that a property investor, in making an investment decision, should estimate the expected benefits relating to the investment in order to derive the correct investment value. The creation of value is generally accepted as the main objective in property investments.

A lack of understanding of the concept of value in a property market constitutes an investor constraint to entering the property investment market and limits the free flow of capital (Roulac, Adair, McGreal, Berry & Allen, 2006:475). Roulac *et al*. (2006:476) explain that the value of property is created, altered and destroyed by four main factors:

- physical factors, such as climate conditions, water and its availability, and the geographical location of the investment;
- political factors, such as building regulations, taxes, rent control and the availability of credit;

- economic factors, including labour issues such as employment and wages; and
- social factors such as demographics and the tendency to lifestyle changes.

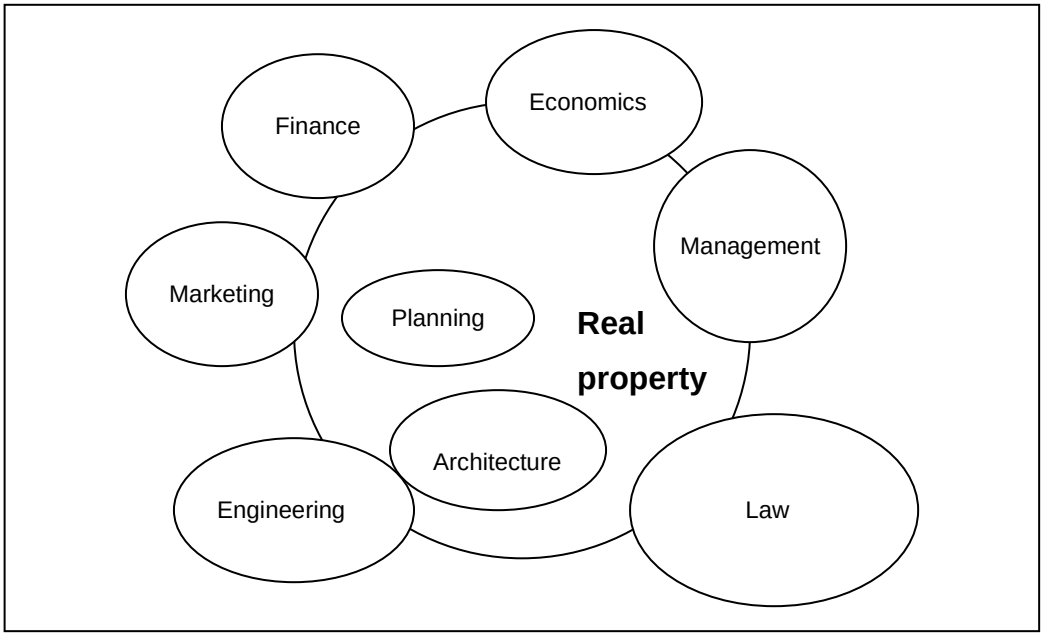
Wurtzebach and Miles (1994:552) are of the opinion that the intention of property investment should be to choose amongst alternative investments, based on a determination and analysis of the investment value, and measurement of the rate of return on the investment. By implication, investors should be able to evaluate the expected rate of return and to make a decision depending on the level of risk they are willing to take.

In light of the above it is clear that the success of an investment decision in property depends on the correct appraisal of value, despite the numerous challenges in applying the relevant valuation process and models.

Hardin (1999:333) claims that acceptance of behavioural theory in studying decision-making in property investments has been slow. Newell and Simon (1972:1) and Diaz (1987:1) pioneered the property investment study field with regard to decision-making. They also identified behavioural influences in the property decision-making process.

Black *et al*. (2003:85) argue that research on property as an asset class has relied heavily on research on finance, pointing out that much knowledge on the property market comes from disciplines other than finance, and call for real property to become a research focus area in its own right, because of the human aspects involved in the decision-making process. Figure 7, overleaf, illustrates the real property position proposed by Black *et al*. (2003:85).

**Figure 7: The real property position**




Source: Adapted from Black *et al*. (2003:86)

Black *et al*. (2003:85) explain Figure 7 as follows:

> … humans needing space to reside make decisions that generate cash flows. The space is subjected to a management process that involves both owners and renters. Owners make marketing decisions upon the needs of renters, thus human needs, to make the property productive and society must place the necessary boundaries to this human behaviour. An understanding of human interaction within the space is crucial for architects and engineers to efficiently design and construct a profitable space.

They therefore propose that all the disciplines involved in the final analysis should draw on human behaviour studies.

Diaz (1990:533) has shown that, as a result of the valuation methods applied by US residential valuators, deviation in the property market from normative models was significant. It was also found that experienced valuators use less

valuation information and, thus, potentially infer biased results when they use the comparable sales residential valuation approach.

Diaz, Gallimore and Levy (2002:325) expanded on the 1990 study by Diaz (1990:533) by examining appraisers in the UK and New Zealand who follow a normative approach in the valuation process. The studies of Diaz (1990:533) and Diaz *et al*. (2002:325) specifically show the presence of the representativeness heuristic-driven bias. Diaz and Hansz (1997:259), in an earlier study, found that appraisers who value property in areas unfamiliar to them are more vulnerable to the influences of reference points, thus concurring with the prospect theory.

The findings of these studies relate to heuristic-driven bias being present in property investment decision-making. Hardin (1999:346) confirms that heuristic-driven bias exists as a result of the process of processing information. He concludes that research in heuristic-driven bias as it applies to property should follow the direction taken by consumer behaviour in showing the effects of decision-making.

In a study conducted by Gallimore *et al*. (2000:612), the impact of behavioural approaches on property investment decision-making was investigated in order to highlight the importance of this relation. Gallimore *et al*. (2000:612) identified the following behavioural aspects relevant to property investment decision-making in their study:

- loss aversion;
- overreaction to information, resulting in overconfidence as well as over-optimism; and

- subjective bias in terms of which property investment managers act and take decisions on expectations that they are certain may happen, resulting in noise trading behaviour.

Gallimore and Gray (2002:114) surveyed 983 individuals who participated actively in the UK property market in order to determine the influence of market sentiment and its relation to noise trading in the market. In order to come to viable conclusions, the questionnaire included a survey on the use of public information bought from private databases, as well as public information that was widely used by property investment decision-makers. Private information purchased from private databases, as well as in-house generated private information, was also included as information sources that could prove a stronger reliance on market sentiment. Finally, private information generated by the individuals themselves was included.

Gallimore and Gray (2002:114) concluded that investor sentiment was apparent in property investment decision-making. They also concluded that sentiment was used together with fundamental data in a property decision-making environment to cope with the problem of insufficient information sources. They argue that this differs from the financial markets, where investor sentiment is defined as noise that replaces fundamental data.

Northcraft and Neale (1987:84) identified the presence of the anchoring and adjustment heuristic-driven bias in a study in which estate agents and students were surveyed in respect of the listing of prices for a specific property. They found that a definite anchor in the listing price of the property existed and that adjustments relating to the levels of expertise of those surveyed were made,

both upwards and downwards from this listing price, and, consequently, they concluded that herding behaviour was present.

Leung and Tsang (2011:13) investigated the effects of anchoring and loss aversion in the Hong Kong housing market. Their findings show that, using a sample of repeated sales, it was clear that anchoring and loss aversion were present. More importantly, they found a positive correlation between price dispersion and trading volume, if anchoring and loss aversion are present. As the anchoring effect declines, so do price dispersion and volume traded. They concluded that the presence of these behavioural aspects plays an important role in the cyclical movement of house prices in the Hong Kong housing market.

## 4.4 FRAME DEPENDENCE IN PROPERTY INVESTMENT DECISION-MAKING

In testing the invariance axiom of the expected utility theory among UK property professionals, the isolation effect – in terms of which rationality leads to consistency without framing dependence – was tested in a study conducted by Ye and Dent (2009:68), who found that, as a result of isolation and inconsistent risk preferences, the rationality amongst the group investigated was both questionable and in conflict with the expected utility theory.

The approaches for determining value and the allocation of assets under normative assumptions have already been discussed earlier in this study (see Chapter 2, Section 2.4). The main conclusion drawn was that these approaches do not incorporate the psychological aspects of decision-making (see Chapter 2, Section 2.4), because the MPT, EMH and CAPM focus on the way in which decisions should be made normatively.

French and French (1997:227) maintain that descriptive models should be implemented in order to help understand the way in which people make decisions, especially under uncertain conditions. Furthermore, they are of the opinion that the various decision-making models use different interpretations of risks, given the levels of uncertainty. They suggest that these differences may be best presented by applying mean variance analysis in terms of which the role of risk in decision-making is handled in isolation. Mean variance analysis would assist with the inconsistencies which arise from the application of the expected utility model, for example.

Further studies by French and Gabrielli (2005:76, 2006:49) and Atherton, French and Gabrielli (2008:162) were based on the uncertainty involved in the decision-making process in both property valuations and a feasibility analysis of property investments. Atherton *et al*. (2008:162) suggest that decision-makers should form part of the decision-making model in order to make it possible to assess the risks involved in property decision-making better. They propose a two-dimensional model based on the Crystal Ball model, a leading predictive model, where the outcome of a decision forms part of the process of applying the model, rather than that the outcome of a decision forms part of the model itself. This would assist in understanding the up- and downside risks associated with the decision-making process, as well as empirically accommodate behaviour in the outcome of the decision.

Property investment decision-making is also influenced by the investment style classification. Haran, McGreal, Adair and Webb (2008:191) found that property fund managers in the UK push the boundaries set by the fund's investment

policies on an ongoing basis in order to outperform their peers by means of investment style classification.

The discussion above has shed light on the fact that property investment decision-making is not a straightforward process involving the application of normative models which rely on market fundamentals. Evidence of the psychological influences on decision-making was presented and warrants further investigation.

The significance of heuristic-driven bias and frame dependence as behavioural aspects is identified and influences property investment decision-making. Further empirical investigation through statistical testing may show the influence, or not, of these behavioural aspects on property investment decision-making in South Africa. Hence, Hypotheses 2 and 3, which states that listed property fund managers in South Africa are influenced by heuristic-driven bias and frame dependence in investment decision-making respectively, were empirically investigated and statistically tested (see Chapter 6 for the results of this investigation).

More specifically, heuristic-driven bias as a behavioural aspect was tested by investigating the existence of representativeness, overconfidence, anchoring and adjustment, conservatism, herding, aversion to ambiguity and emotion.

Frame dependence as a behavioural aspect was tested by exploring the presence or absence of loss aversion, the disposition effect and mental accounting.

## 4.5 MARKET SENTIMENT AND PERSONAL EXPERIENCE IN PROPERTY INVESTMENT DECISION-MAKING

The concept of information and its influence on market efficiency have been discussed in broad terms above (see Chapter 3, Section 3.3.3). In addition, the literature revealed that difficulties may be experienced in respect of obtaining and using information in the property investment decision-making process – a notion that is not accommodated by the theories of normative financial decision-making.

The literature also revealed that factors such as the cost of information, the existence of cognitive biases in the use of information, obstructing accounting disclosures, over- and under-reaction to the publication of new information, as well as a lack of available information in relation to property, all impede market efficiency.

If all this is indeed the case, it implies market inefficiencies that would place the concept of rationality in decision-making in serious doubt. It is therefore pertinent to examine the literature published on the information issue from the perspective of the information issue and its influence on property investment decision-making in greater detail.

Brown, Harlow and Tinic (1989:46) stress that, on the basis of the EMH, which assumes that all information is known and that prices respond quickly to new information as a result of the random walk, it is believed that investors do tend to overreact, but they also learn from their mistakes. However, these authors reason that, given observable investor behaviour, it seems that investors do not learn from past mistakes, because they misread information. Hence, investors

overreact and greater price adjustments are often the most significant result of such an overreaction by investors.

Clapp, Dolde and Tirtiroglu (1995:261) explain that an investigation into housing markets is a unique way to test for information and its influence on prices, as the source of price information is not centralised and the learning process is delayed by price resistance from buyers and sellers in the housing market.

Case and Shiller (1989:135) conducted an investigation into the efficiency of the market in respect of single family homes and found inefficiencies as a result of the fact that new information based on real interest rates is not included in prices. In addition, they found that the influence of noise in the market nullifies any ability to forecast future house prices. Clayton (1997:359) also found, in a study of Vancouver condominium prices, that inefficiency does prevail in this market and that irrational expectations through noise traders have an immense influence on these prices.

In further research, Clayton (1998:41) provided additional evidence of inefficient housing markets and showed that, because prices are ultimately anchored by market fundamentals, future corrections are eminent as a result of the fact that noise trading and its influence on appraisals cause prices to increase dramatically. Noise trading results from preliminary information introduced to the market with trading on the information that follows.

In testing the semi-strong form of the EMH, which posits that prices change swiftly in response to publicly available information which affects the value of property, Clayton (1996:467), in an earlier study, rejected the semi-strong form of market efficiency through empirical testing in the housing market. He also

observed irrational expectations and deviations of property prices from the valuation, based on market fundamentals.

In their investigation into the influence of appraisal smoothing and its influence on the true level of property prices, McAllister, Baum, Crosby, Gallimore and Gray (2003:261) adopted a qualitative interview survey method with a sample that included property fund managers and property appraisers. Their empirical analysis used data derived from the Investment Property Databank's (IPD) Monthly Index. Their aim was to prove that, due to the anchoring heuristic-driven bias in appraisal-based prices, actual trading prices display low volatility. McAllister *et al*. (2003:261) ascertained that a substantial number of appraisals remain "sticky" as a result of a lack of new information, as well as the failure to search for such information. The influence of institutional investors places stress on appraisers, which tends to limit their ability to react to other types of price-sensitive information.

It was revealed earlier that property fund managers are under pressure to perform, which results in both increased activity and shorter investment horizons. McAllister *et al*. (2003:279) argue that, because of this increase in trading frequency, appraisers undertake appraisals based on restricted information, which, in turn, results in anchoring in the price determination of the asset.

Gallimore *et al*. (2000:609) have demonstrated that UK property investors rely heavily on personal information and that they rate such information much higher than the information which is available in the public domain. This leads to both heuristic-driven bias and overall overreaction in the property market.

MacCowan and Orr (2008:356) state that "[t]he quantity and quality of market information available can affect the decision-making process of investors". In their study they established that 70% of their respondents used in-house research departments to analyse information for property investment decision-making purposes. In addition, they maintain that, as a result of property market inefficiencies and the lack of information, measures such as in-house research departments became essential if property fund managers are to make proper decisions in respect of the assets under their control. However, such in-house research departments come at a high cost.

MacCowan and Orr (2008:357) argue that, for fund managers to sell a property asset in a rational market, decision-making information used by fund managers should be constant and trustworthy. If information in a specific market is unavailable, according to these authors, investors tend to base their property investment decisions on personal networks and experience, while overreacting to existing information.

Referring to a study conducted by Black *et al*. (2003:85), MacCowan and Orr (2008:357) explain that fund managers use information from indices that are appraisal-based. However, MacCowan and Orr (2008:357) stress that pressure from institutional investors often results in the tendency on the part of appraisers to display cognitive bias behaviour, which, in turn, results in price forecasts based on appraisals that are both biased and heuristic-driven in respect of the input data – ultimately leading to inappropriate investment decisions.

According to the literature discussed in this section, it seems that property fund managers often rely on personal contacts and judgements, as well as on valuation-based indices, in order to make property investment decisions. The result is that heuristic-driven biases are present which lead to errors in judgement and the mispricing of property assets in the market.

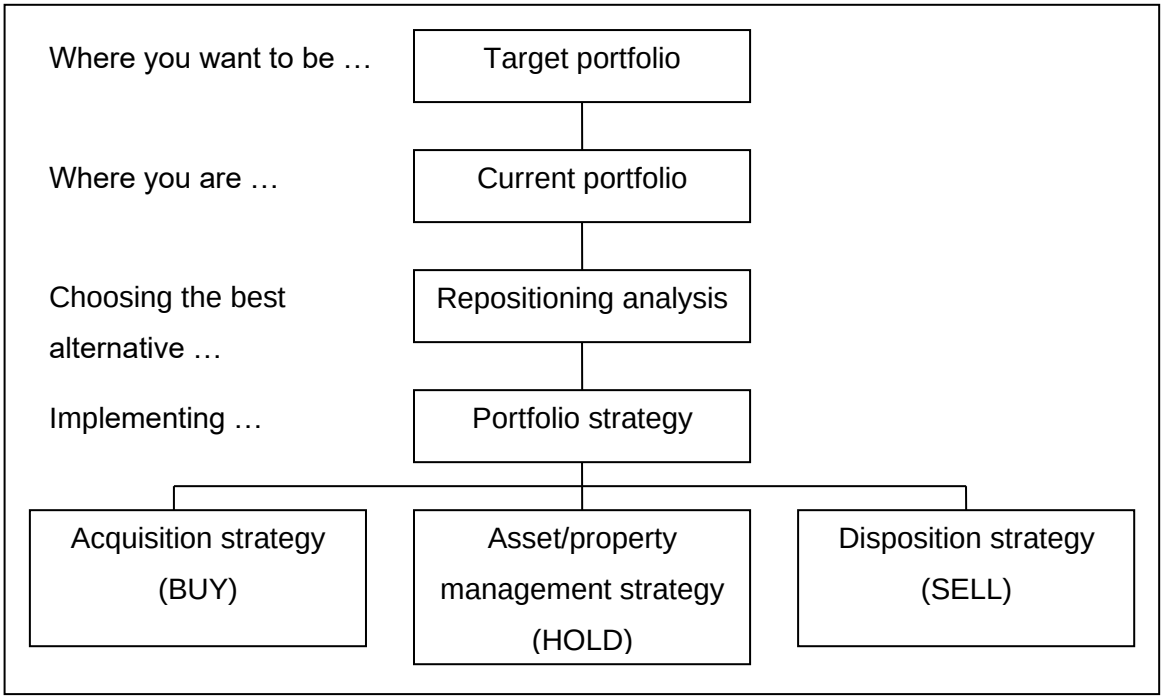
The literature discussed in this section therefore provides a sound reason for an empirical investigation into the factors that influence decision-making in the South African property fund market. This investigation includes the importance of the use of market sentiment, as well as personal networks and experience as investment decision-making sources, rather than the use of market fundamentals only. This is in accordance with Hypothesis 4, that states that listed property fund managers in South Africa base their investment decisions on factors such as market sentiment and personal experience, rather than market fundamentals in making property investment decisions.

## 4.6 PROPERTY FUND MANAGERS AND PROPERTY DECISION-MAKING

The aim of this study was to investigate the influence of behavioural aspects on the investment decisions made by listed property fund managers in South Africa. It was thus appropriate to examine the literature relating to property fund management and fund managers.

Pagliari (1995:1045) depicts the property portfolio strategy determination process, which is presented in an adapted form in Figure 8 (overleaf).

**Figure 8: Property portfolio strategy determination process**




Source: Adapted from Pagliari (1995:1045)

Pagliari used the diagram adapted in Figure 8 (above) to explain that fund managers should develop an investment strategy consistent with both the allocation boundaries of the fund and the expected conditions of the properties in the portfolio. By employing the approach outlined in the diagram above, a fund manager would use all the expertise available in order to arrive at the best diversification policy.

According to Lee (2001:159), the correct identification of the property type on the part of fund managers would increase the performance of the portfolio and that should be the point of departure in both constructing and managing a property portfolio. Newell, Lee and Stevenson (2003:2) argue that a fund manager's performance depends, to a large degree, on both his/her skill in aligning a portfolio in anticipation of general market conditions, and his/her ability to identify and capitalise on undervalued assets.

In portfolio management, the identification and management of risk follows from the investment strategies employed. Blundell, Fairchild and Goodchild (2005:128) clarify the importance of risk management in the arena of property portfolios, explaining that the yields of property portfolios are low and the potential for losses high. This, in turn, places enormous pressure on fund managers to surpass the benchmark, often resulting in their taking higher risk exposure positions.

In their study, Blundell *et al*. (2005:117) identified a selection of risk factors which may be attributable to risky property portfolios:

- too much focus on, and subsequent over-investment in large value assets;
- too high an emphasis on specific tenants across the portfolio;
- too much focus on, and subsequent over-investment in specific property types;
- exposure to vacancies and, subsequently, negating portfolios;
- concentrating on specific markets which only increases volatility;
- depreciation; and
- the value outweighing the indifferent income stream.

A study conducted by Byrne and Lee (2003:191) investigated the issues of portfolio size, diversification and risk. Property portfolios in the UK comprised the sample. The study revealed inconsistencies with MPT, and it found that systematic and specific risk affect portfolio size. The study revealed no association between large portfolios and their variance. Byrne and Lee (2003:191) concluded that both the investment style of and specialisation by

property fund managers should be controlled because, in such an environment, it may be possible both to eliminate systematic risk and to improve specific risk.

In mixed-asset portfolios, the introduction of property as an asset class may also have risk implications. Byrne and Lee (2005:144) established that, if property were to replace bonds in a portfolio, the terminal wealth of the overall portfolio increases. Conversely, replacing equities with property reduces the terminal wealth of the portfolio. Nevertheless, on average, the introduction of property tends to improve the terminal wealth of the overall portfolio.

Stevenson (2004:22) found that, even if property is included in an international mixed-asset portfolio, this does not necessarily lead to significant improvements in overall return, although it does have positive diversification properties which allow the portfolio to perform better.

French (2001:405) maintains that the perception of risk is the main consideration to be taken into account in making property investment decisions. He ascertained that fund managers are not influenced by historical data and predictive forecasts based on normative models only. It is, moreover, not possible to capture behavioural aspects such as herding behaviour and overconfidence through normative models. French (2001:405) thus argues the case for the implementation of descriptive models with which to judge the decision-making process and its normative consistency.

It may be safely deduced at this stage both that property portfolio management is risky and that the normative approach does not entirely account for the total risk involved. The pressure on fund managers to outperform the market leads to

the inclusion of behavioural influences in final decisions, thus increasing the risk exposure.

Brown and Matysiak (1995:38) warn that, despite the fact that the performance of property portfolios is extremely important, the systems used for measuring this performance may be highly inconsistent. Bias will exist in abnormal returns, except if the benchmark index and the portfolio itself are not correlated.

Henneberry and Roberts (2008:1234) confirm that portfolio benchmarking is both uncertain and conservative in nature and that the behaviour of fund managers' acting within this framework exacerbates the problem. Nevertheless, Henneberry and Roberts (2008:1234) note that, although fund managers are free to choose between properties, their choices must be in line with the benchmark. If not, penalties such as demotion and loss of employment (as a fund manager), as well as a loss in rankings and, consequently, losses in terms of contracts, are very real.

It should be noted in considering the prior studies that the studies in this section relate mostly to developed economies, while the focus of the current study is South Africa, which is an emerging economy. One prior study conducted by Olaleye, Aluko and Ajayi (2007:23) focuses on Nigerian data. The researchers examined the causes of property fund managers using unsophisticated techniques in evaluating risk in respect of property portfolios in Nigeria, which is also an emerging economy, like South Africa. Olaleye *et al*. (2007:41) reported the following results in the Nigerian property portfolio market:

- deficiencies in terms of the free flow of information, recognised market information and liquidity levels render the property market inefficient;

- there is little or no theoretical knowledge available on the use of quantitative techniques on the part of property fund managers;
- in this market, simple qualitative techniques are used in preference to the mathematically complex quantitative models; and
- there is some reluctance to apply new developments in the profession.

It is clear from the study of Olaleye *et al*. (2007:41) that, aside from the fact that heuristic-driven biases exist, property fund managers in the Nigerian economy are at a further disadvantage. Their decision-making framework lacks sophistication, they have to rely on inadequate data and there are deficiencies in the education of property fund managers. This, almost inevitably, results in unprofitable decisions.

## 4.7 SUMMARY

This chapter focused on property investments and, in particular, on the way in which property fund managers perceive the decision-making process. The aim of this chapter was to review the literature on decision-making in a property investment context. A definite relationship between human behaviour and decision-making in terms of property as an investment became evident in the literature that was reviewed.

According to the literature, property holding periods are changing because of the behavioural aspects that are present. The literature also suggests that in some cases, property fund managers strive to outperform the market, while depending on personal networks and experience as an information source, as well as other costly information sources, on which to base their property investment decisions. Furthermore, the literature shows that indices which are

used as benchmarks for property investment decisions are biased, because appraisers are under enormous pressure from institutional investors to value property at the price expected by institutional investors. Such valuations lead to mispricing in the property market, as the price is predetermined.

The dependence by property fund managers on investor sentiment and personal judgement rather than fundamental data to make investment decisions, together with the apparent mispricing in property assets, may lead to market inefficiency. Property portfolio management is, to a large extent, the management of risk. However, in a recent study, Baum and Farrelly (2009:232) found that, although fund managers often take on additional risk, there is no evidence that they outperform the market. There are also inefficiencies in applying normative models in the evaluation of property portfolios, as these models do not capture the risk of present behavioural aspects.

In emerging markets, property fund managers have to cope with additional difficulties in making final decisions. MacCowan and Orr (2008:357) conclude that, as a result of information biases and the pressure to perform, fund managers must use personal judgement in making property investment decisions. The respondents in their test sample admitted to doing so. MacCowan and Orr (2008:358) add that “[a]cknowledging this happens is the major difference between neo-classic economics and behavioural economics”.

The review of the relevant literature conducted in Chapters 2, 3 and 4 has identified a range of issues regarding behavioural aspects and their influence on property investment decision-making:

- Property holding periods and their relation to buying and selling decisions may indicate the presence of behavioural aspects, which in turn influence the property industry. A knowledge gap exists, in that there is no prior study on how the South African listed property fund industry views property holding periods in its decision-making framework. No published data could be found on the influence of behavioural aspects on these holding periods in the South African listed property fund industry.
- The influence of heuristic-driven bias and frame dependence on property investment decision-making has not previously been investigated in a South African context. The literature clearly explains the presence, importance and influence of these two behavioural aspects on property investment decision-making in other countries. It will therefore add to the existing knowledge if the impact and presence of heuristic-driven bias and frame dependence is empirically investigated and statistically tested in the South African property context, especially since South Africa is considered to be an emerging market.
- It seems from the literature that property fund managers rely heavily on investor sentiment, as well as personal networks and experience, as information sources on which to base their investment decisions. Although fund managers do take fundamental data into account in making property investment decisions, it seems that the sources of sentiment and personal networks and experience serve as a substitute for the lack of quality of the fundamental data used. This may in turn render property markets more inefficient. A knowledge gap therefore exists, as no known data has been published on the use of information, market sentiment and market

fundamentals in property investment decision-making in the South African listed property fund industry.

It is through the identification of these three central issues that this study proposed the hypotheses (see Sections 1.3 and 5.1) that were investigated and on which data were statistically analysed.

The research methodology employed to conduct the statistical analysis on the data relating to the study's hypotheses is discussed in the next chapter.

# CHAPTER 5:
# RESEARCH METHODOLOGY

## 5.1 INTRODUCTION

Having outlined the theory of normative decision-making models, behavioural finance and its influence on decision-making in a property investment context, the research methodology used in this study is outlined in this chapter.

The research problem to be addressed in this study involves the influence of behavioural aspects on the decision-making of listed property fund managers in South Africa. Accordingly, this study investigated the following hypotheses (repeated from Section 1.3 for the reader's convenience):

Hypothesis 1: The holding period of property as an investment is influenced by behavioural aspects.

Hypothesis 2: Listed property fund managers in South Africa are influenced by heuristic-driven bias in investment decision-making.

Hypothesis 3: Listed property fund managers in South Africa are influenced by frame dependence in investment decision-making.

Hypothesis 4: Listed property fund managers in South Africa base their investment decisions on factors such as market sentiment and personal experience rather than market fundamentals.

In this chapter, the research design, the research method (including an explanation of the research instrument), and the data and data gathering, the data analysis, anticipated limitations and ethical considerations are discussed.

## 5.2 RESEARCH DESIGN

The study focuses on the influence of behavioural aspects on property investment decision-making. It follows from the theory discussed in Chapters 2, 3 and 4 that there are no indices, databanks or statistics available with which to measure behavioural aspects in property investment decision-making.

According to Burns and Bush (2010:241), the collection of primary data for academic purposes is achieved through experiments, observations and surveys. Unlike in experiments or observations where the characteristics under observation are known in advance, a survey focuses on the unknown characteristics of a particular population.

Saunders, Lewis and Thornhill (2007:244) explain that the use of questionnaires in descriptive research that investigates attitudes, opinions and the decisions that humans make enables a researcher to identify and describe important variations in human behaviour in different settings.

Hofstee (2006:122) explains that survey-based research may be authoritative in determining the influences of human actions and also test for human actions. Consequently, the empirical research conducted in this study took the form of a survey aimed at listed property fund managers in South Africa. The survey was conducted by means of a questionnaire that was designed to test the hypotheses set out above, guided by the gap in the knowledge of decision-

making in the South African property market identified through the literature study.

Kahneman and Tversky (1979:263) developed the prospect theory by using surveys as a research tool. According to Manning and Roulac (2001:16), in the period from 1989 to 2001, no fewer than 59 studies were conducted on corporate property. This total included 19 studies that were either inductive or deductive in nature and that relied on survey data in order to draw conclusions.

In the property investment paradigm, which focuses on decision-making, French (2001:399) and Gallimore and Gray (2002:111) conducted studies using survey-based techniques as a basis for obtaining the necessary data. MacCowan and Orr (2008:342) also founded their deductions on the behavioural factors which influence the disposal decisions of property fund managers on survey data.

From the conclusions drawn by the researchers mentioned above, it is clear that research into human behaviour and property investments is still mainly in an inductive phase. Nevertheless, deductive studies relying on primary data, such as the work of MacCowan and Orr (2008:357), have drawn significant and relevant conclusions in respect of the attitudes and opinions of property fund managers and also on the detection of investor behaviour.

The current study was survey-based and used survey-based data from which conclusions was drawn. The successful application of this technique in previous studies, together with the fact that little if any secondary data on human behaviour exists, made the application of this technique a logical choice for the purposes of this study.

## 5.3 RESEARCH METHOD

The exposition below focuses on the research instrument used to collect the data and the development of the questionnaire used in this study. The focus then shifts to a discussion of the content of the questionnaire, and the data and data-gathering techniques used in this study. Finally, the representativity of the response is reflected upon and some remarks on the data analysis are made.

### 5.3.1 Research instrument

The research instrument used in this study was a questionnaire. A questionnaire was selected in the light of both the applicability of this kind of instrument to gather information on human behaviour and the fact that, as already noted in Section 5.2, above, the usefulness of questionnaires in property investment decision-making has been widely and successfully tested. Important deductions in respect of property holding periods, heuristic-driven bias, frame dependence, market inefficiency and market sentiment, as explained in the review of the relevant literature have been investigated using questionnaires as instruments to gather data.

The purpose of the questionnaire in the current study was to determine whether behavioural aspects influence the investment decisions of listed property fund managers in South Africa. Specifically, information was gathered on the following aspects:

- holding periods relating to property;
- the presence or absence of heuristic-driven bias in the form of representativeness, overconfidence, anchoring and adjustment, conservatism, herding, aversion to ambiguity and emotion;

- the presence or absence of frame dependence through loss aversion and the disposition effect, as well as the process of mental accounting and their influence on property decision-making; and
- the use of market sentiment and personal experience, in relation to the listed property fund managers' use of market fundamentals in making investment decisions.

### 5.3.2 Questionnaire development

A preliminary questionnaire was designed to obtain sufficient information to draw proper conclusions in respect of the possible influence of behavioural aspects in property fund managers' investment decision-making. The questionnaire formed the basis of a pilot study, which was conducted to test the effectiveness of the questionnaire in gathering the required information so that it did not become too long. Aspects such as the time needed to complete the questionnaire, the clarity of both the instructions and the questions, possible omissions with regard to topics, as well as questions that the pilot group felt uneasy about answering, were addressed and identified though the pilot study.

The questions aimed to gather information on the following topics:

- personal (demographic) information (identifying information was kept confidential);
- fund information;
- property acquisitions;
- property disposals;
- decision-making information; and
- the use of information.

The pilot questionnaire was sent to four participants via email. The participants in the pilot study were selected from listed property funds that are regarded as industry leaders. The pilot study was performed to enhance the robustness of the questionnaire, as these participants have a very good understanding of the composition of the South African listed property fund industry. The selected fund managers made no changes to the pilot questionnaire and approved it as an instrument that would elicit the information required. The questionnaire was finalised after the completion of the pilot study, and a detailed consultation with the study leaders and the Department of Statistics: Research Support at the University of Pretoria. This process was followed in order to enhance the clarity, coding and layout of the questionnaire and to ensure that it would be possible to process and analyse the results obtained from the survey successfully in order to attain the objectives of the study.

### 5.3.3 Contents of the questionnaire

As mentioned in Section 5.3.2, above, the questionnaire was designed to be as brief and as practically possible to complete in view of the amount of information needed for the study (see Appendix 1).

The **first section** of the questionnaire required participants to supply demographic information to be used in the final analysis. It included both open-ended and closed-ended questions on the gender, age, number of years of the property fund manager in the listed property fund industry, the number of years working at the current fund, highest academic qualification obtained, and any professional affiliations of the respondent. The demographic information was

needed to measure the possible presence of behavioural aspects in the listed property fund managers' investment decision-making process.

The **second section** of the questionnaire requested participants to provide vital fund information against which the possible presence of behavioural aspects in the listed property fund managers' investment decision-making process is measured. The approximate size of the fund, the geographical market that the fund invests in, the percentage invested in the South African market, the property type invested in, the approximate number of properties in the fund, and the average return on 31 December 2011 were surveyed. The questions on the percentage invested in the South African market and the geographical market invested in specifically assisted in the detection of the possible presence of aversion to ambiguity as a heuristic-driven bias.

The **third section** of the questionnaire considered the total purchases of property as a Rand value, the average holding period of the total property portfolio (in months), as well as the number of properties bought in 2011.

The **fourth section** of the questionnaire established the total sales of property assets as a Rand value, the number of properties sold during 2011 and the holding period (in months) of the last three properties sold in 2011.

Both the third and fourth sections of the questionnaire were central to the measurement of possible behavioural aspects present that might have an impact on the holding period of property by listed property fund managers.

The **fifth section** consisted of 26 questions that examined the possible presence of behavioural aspects in the decision-making process of listed

property fund managers. Of the 26 questions, 25 questions were closed-ended, but one question was set using Likert scales.

Question 21 addressed the **representativeness heuristic-driven bias**. This bias reflects the fact that, because people can rank occurrences, it makes it possible for them to perceive the possibility that the more representative the occurrence, the more likely the outcome, even if this perception is false.

Questions 22 to 25 addressed the **overconfidence heuristic-driven bias**. In overconfident behaviour, people tend to overestimate the accuracy of their knowledge, which may lead to decision errors. These questions were based on work conducted by Gort (2009:69).

Questions 26 and 27 tested the **anchoring and adjustment heuristic-driven bias** as well as the **conservatism bias**. The participants were asked to choose a reference point (anchor) in Question 26. Question 27 tested whether the decision is insufficiently adjusted or not adjusted at all from the anchor with the introduction of new information, as Property A should be the better choice. This should also reveal if the respondent acts conservatively towards the new information and stays with his or her initial choice. These questions were based on similar work done by Shefrin (2002:19).

Questions 28 to 31 addressed the concept of **herding behaviour**. Herding behaviour is closely related to anchoring, and for that reason these questions were designed to use the decisions made in the previous two questions. Question 28 referred to irrational herding, where a decision is made by blindly following the pack, irrespective of the participant's own beliefs. Questions 29 and 30 referred to rational herding, where participants imitate each other.

Question 31 showed the absence of any herding behaviour if the participant answered “Yes”.

Questions 32 to 35 tested the **aversion to ambiguity heuristic-driven bias** (also known as “**home bias**”), where people tend to prefer the familiar to the unfamiliar. People tend to play safe when the odds are unknown and may then lose out on unclaimed rewards that may be offered by the uncertain or unfamiliar, which in this case may be higher returns from investing in offshore property.

Questions 36 to 39 were designed to test the **emotional heuristic-driven bias**, especially the **feeling of regret** rather than satisfaction, whilst Questions 40 to 43 referred to **frame dependence**, especially **loss aversion** (the fact that people hate to lose) and **the disposition effect**, where participants hold on to losers and sell winners. This refers directly to the value function of the prospect theory and people’s desire to avoid regret. Questions 36 to 43 were based on work done by Fogel and Berry (2006:107).

Questions 44 to 46 addressed **frame dependence** through the process of **mental accounting**. In mental accounting, a decision-maker is initially confronted by the way to think about the stated problem before there is time to actually formulate the decision problem. In these questions, the two decision problems together formed a concurrent package. The response showed whether a respondent actually took cognizance of the package, or divided the choices into mental accounts. The latter may lead then to frame dependence. These questions were based on work done by Shefrin (2002:25).

The **sixth section** of the questionnaire was directed towards addressing Hypothesis 4. In this section of the questionnaire, participants were asked to indicate the levels of importance in the use of market fundamentals, as well as market sentiment in making investment decisions. These were closed-ended questions. The extent to which selected information types and sources are used by participants was surveyed, as well as the use of normative techniques in making investment decisions. This topic was based on a study by Gallimore and Gray (2002:117) and the questions were designed using Likert scaling.

The sixth section concluded by asking participants to indicate on a Likert scale the extent to which local, provincial, and national government influenced their investment decision-making, as well as how they experienced these influences.

Finally, respondents were asked a question about further areas of possible research in the listed property fund industry.

The questionnaire was distributed and administered using Survey Monkey Ltd.

### 5.3.4 Data and data gathering

The listed property industry in South Africa includes residential, retail, commercial, industrial, leisure and mixed-use sectors in which a variety of property professionals operate. It was decided to limit the scope of this study to listed property fund managers in South Africa in order to ascertain the possible influence of behavioural factors on their investment decision-making.

Property fund managers are experts in the field of investment. Thus their skills set, together with their technical knowledge, means that they constitute a reliable, homogenous sample. This choice also ensured a specified population

that was clearly defined. The inclusion of other investment sectors might have skewed results and placed the study at risk of becoming too general.

All property funds listed on the Johannesburg Securities Exchange (JSE) on 31 December 2011 were initially included in the original sample. At the time, a total of 30 listed property funds were listed on the JSE, of which 27 were South African-based listed property funds. In order to ensure that only South African-based listed property funds were included, the three overseas-based funds listed on the JSE were excluded, bringing the total number of South African-based listed property funds included in the study to 27 (see Appendix 4 for a list of these funds).

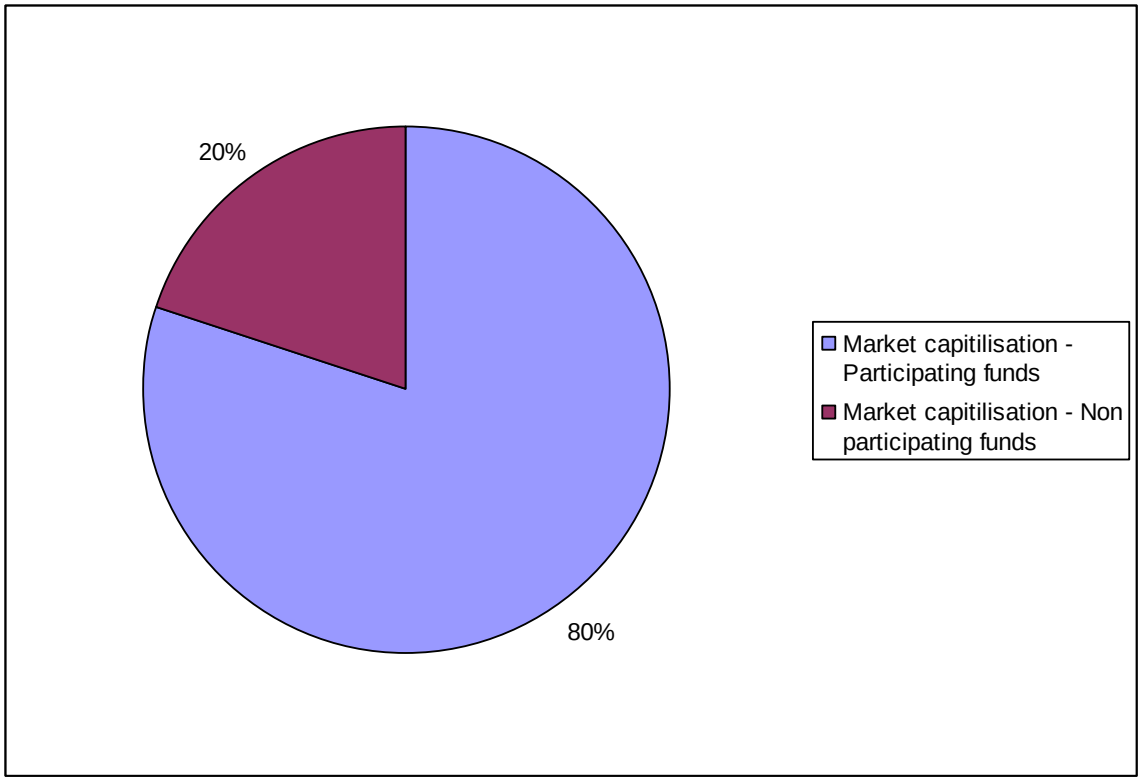
A covering letter explaining the purpose of the study (see Appendix 2), as well as an appropriate letter requesting permission for the manager to complete the survey (see Appendix 3), was sent via e-mail to the individual property fund managers of the 27 listed funds. The target group involved the individual heads/managers of the sectors that these listed funds invested in. In the case of the smaller funds, the Chief Executive Officer (CEO) or Chief Financial Officer (CFO) was approached to participate. The total number of listed property fund managers who were sent emails was 29, and 17 responses were received, constituting a response rate of 59%.

A follow-up e-mail was sent, and a telephone call was made to those managers who did not respond. The majority of these managers indicated that they were not willing to participate, due to tight time schedules. This limited the responses.

The 17 listed property fund managers who responded represented 16 of the 27 South African-based listed property funds. The total market capitalisation of the

27 South African-based listed property funds was R167.061 billion on 30 June 2012. The 16 listed property funds that participated in the survey constituted R133.672 billion (80%) in market capitalisation of the South African listed property fund market, as illustrated in Figure 9 (below). Note that one of the limitations of the study is that the sample size is relatively small because of the limited number of listed property funds in South Africa.

**Figure 9: Market capitalisation of funds participating in the survey versus the market capitalisation of funds that did not participate**




Source: McGregor BFA (30 June 2012:n.p.)

A questionnaire, developed through Survey Monkey Ltd., was presented to the total population of 29 listed property fund managers via e-mail invitation. As indicated above, 17 listed property fund managers responded to the questionnaire. The questionnaire included a covering letter with a short description of the research that was conducted, as well as a letter requesting

informed consent from the individual participants. This was to ensure that the data were collected in a uniform, ethical way, and that the questions were asked and answered in the same way in order to render the data reliable, accurate and acceptably representative of the sample.

### 5.3.5 Representativity of the response

All 17 participants responded with fully completed questionnaires, except for question 15, where 15 of the 17 participants responded. Furthermore, there is no reason to believe that the questions contained in the questionnaire would cause bias in the answers received, because every single respondent was asked the same questions in the same manner. The response was therefore considered to be acceptably representative of the sample.

### 5.3.6 Data analysis

It is sometimes possible to obtain limited amounts of data only, especially if, as in this case, the sample tested was extremely small. The problem with small samples is that there is no guarantee that the distribution of the variable in the total population is a normal distribution. Therefore, this study was limited to the use of non-parametric statistics in analysing the data that were obtained.

To date, various methods have been developed and introduced regarding non-parametric data analysis. For the purposes of this study, the following non-parametric statistical techniques were used to test the statistical relevance of the variables:

- Cronbach's alpha;
- Fisher's exact test;

- the Mann-Whitney U test;
- Spearman's correlation coefficient; and
- Wilcoxon matched-pair signed ranked test.

The individual techniques are explained in Sections 5.4 to 5.8, below.

## 5.4 CRONBACH'S ALPHA

Cronbach's alpha measures the internal consistency of a list of items of a specific group, in other words, how closely related the list of items within the group are. Tavakol and Dennick (2011:53) explain that internal consistency must be calculated for validity purposes. Cronbach's alpha is a coefficient of reliability and validates the use of a list of items as a group. Cronbach's alpha can be expressed using the following formula:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}} \qquad \text{(Equation 5.1)}$$

Where:

N = Number of items

c-bar = Average inter-item correlation

v-bar = Average variance

If the number of items is increased, it results in a subsequent increase in Cronbach's alpha, but if the average inter-item correlation is low, Cronbach's alpha is also low. The higher the correlation between the number of items within a group, the higher the inter-item correlation and the higher Cronbach's alpha.

As shown above, the number of items in a group, their inter-relatedness, and their dimensionality, affects the alpha value. Tavakol and Dennick (2011:54) argue that the values acceptable for Cronbach's alpha lie between 0.70 and 0.95, but acceptability may be obtained from alphas close to 0.6. If, for example, Cronbach's alpha is 0.65, it shows that there is reliability within the items of a specific group and therefore these items are valid for statistical interpretation.

Gliem and Gliem (2003:88) posit that the calculation and interpretation of the Cronbach's alpha coefficient is crucial where research contains Likert-type scale groups. The Cronbach's alpha coefficient validates the use of Likert-type scale data by measuring the reliability of the items listed in a given group. In the current study, Likert-type scale data were used in the final data analysis and therefore the Cronbach's alpha coefficient was calculated.

## 5.5 FISHER'S EXACT TEST

When there are few numbers in a table, it may be best to compute exact probabilities rather than one-sided alternatives for either a probability model or for a situation in which all the marginal totals are fixed (Steel & Torrie, 1980:504). The statistical test used in such calculations is Fisher's exact test. It determines whether probabilities are statistically significant. In this type of test, a comparison or standard against which the answer (p) may be tested is required.

The interpretation of Fisher's (p) is relatively easy. If, for example, p equals 0.157, it means that there is a 15.7% chance that, given the sample size and the distribution of the relevant table, the result would obtain a table as strong or stronger by chance sampling alone. Since scientists ordinarily consider 0.05, or

5%, to be the cut-off point for the acceptability of significant levels, it may be concluded that it is not possible to say that the distribution derived from the observed table which yielded 0.157 is statistically different from chance and, therefore, the hypothesis would be rejected.

## 5.6 THE MANN-WHITNEY U TEST

The Mann-Whitney U test is used in ordinal data sets where, for example, the data are ranked. The Mann-Whitney U test is an alternative to the independent t-test. The Mann-Whitney U test assumes random samples from the population, with an ordinal, interval or ratio value as the dependent variable. The data do not have to be normally distributed, as can be derived from the hypotheses below.

As the test is used to compare two independent groups of sample data, the hypotheses for the two independent groups are the following:

H0: The two samples come from identical populations.

H1: The two samples come from different populations.

The test statistic for the Mann-Whitney test is “U”, which is compared to a table of critical values for “U” based on the sample size of each group. If “U” then exceeds the critical value for “U” at the normal statistically significant level of 0.05, it means that there is evidence to reject the null hypothesis in favour of the alternative hypothesis, proving that the two samples come from different populations.

## 5.7 SPEARMAN'S CORRELATION COEFFICIENT

The Spearman correlation, expressed as rho, is used when one variable tested or both of the variables being tested are not assumed to be normally distributed and interval, but is or are assumed to be ordinal. The Spearman correlation therefore evaluates the degree to which cases with high rankings on one variable were observed to have similar rankings on another variable.

The first step in calculating Spearman's correlation coefficient is to assign ranks. A rank with the highest value is assigned a rank of 1 and ranks are assigned separately for each variable. A solution matrix is then created once ranks have been assigned to each case on both the variables under consideration. Tied scores are then ranked, which means that each of the tied scores is assigned a rank equal to the average of all the tied positions.

In interpreting Spearman's correlation coefficient, the sign indicates the direction of the association between the two variables tested. To establish statistical significance between the two variables, they are related with the critical value for Spearman's rho at the 0.05 level of statistical significance.

## 5.8 THE WILCOXON MATCHED-PAIR SIGNED RANK TEST

In order to calculate whether two samples with ordinal data differ from each other when a typical relationship exists between the two samples, the Wilcoxon matched-pair signed rank test is used. This test is conducted under the assumptions that the variable is either ordinal, interval or a ratio as value, and that there is one independent variable that consists of one group or two matched pairs groups, as is the case with some of the data in this study.

The Wilcoxon matched-pair signed rank test in effect tests the null hypothesis that there are no systematic differences within pairs against alternatives that do show systematic differences. The result is measured as the statistic W+, which is the sum of the ranks of the positive or negative differences between the two groups ranked as absolute values.

The p value is based on the sampling distribution of the statistic W+ when the null hypothesis is true. This assumes 0.05 to be the statistically significant level.

The objective of ascertaining which behavioural aspects (if any) influence investment decisions made by listed property fund managers was addressed by identifying and validating these aspects by means of statistical testing.

## 5.9 LIMITATIONS

The main limitation to the empirical analysis conducted in this study is the fact that the final sample (n=17) analysed in the study was small. South Africa is an emerging economy and the number of listed property funds is limited. Therefore, the size of the sample may lead to criticism in respect of the viability of the results. Nevertheless, the fact that the sample represents 80% of the market in market capitalisation, as well as the response rate of 59%, and the fact that the sample was tested through the application of scientific techniques, renders the data both presentable and reliable. The small sample size does, however, render the statistical measures applied less powerful, and caution was therefore applied in interpreting some of the results. This ultimately led to fewer conclusions being drawn than had initially been hoped for.

Although the small sample might have been extended by including neighbouring countries, the difficulty, cost and time involved in gathering such data by means of personal responses would have made this an almost impossible task. It would also defeat one of the main objectives of this study, which was to conduct the research in South Africa and receive results from South African participants.

It is impossible to identify all known heuristic-driven biases and other factors that may influence the decision-making patterns of an individual. Nevertheless, the factors derived from this study did indicate the influence of human behaviour on property investment decision-making in line with the factors identified in the literature review.

## 5.10 ETHICAL CONSIDERATIONS

In this study, every effort was made not to disclose the personal information of the property fund managers who participated. Accordingly, the study was conducted on an anonymous basis, and the names of the respondents were treated confidentially. The name of the property funds themselves were not disclosed in relation to the data and sensitive information on the size of a fund and the types of properties included in the funds were stored via encryption and are not disclosed.

The final draft of the questionnaire, the covering letter and the data collection process were discussed and considered by an ethical committee of the University of Pretoria, South Africa, in order to obtain ethics final approval before the commencement of the data collection process.

## 5.11 CONCLUSION

In this chapter, the method of research adopted in the empirical study was discussed, with special focus on the research design, the research instrument, the data, the data collection and analysis, the anticipated limitations as well as ethical concerns.

The specific topics included in the questionnaire as well as the statistical techniques used were explained to clarify the statistical significance of the outcomes.

It is clear from the research methodology discussed in this chapter that the research method was applicable to conduct the analysis. The results obtained by applying the research method, as discussed above, led to proper conclusions and recommendations from this study. These results are discussed in the next chapter, Chapter 6.

# CHAPTER 6:
# EMPIRICAL ANALYSIS

## 6.1 INTRODUCTION

The research methodology discussed in Chapter 5 was followed in this study to elicit the data used in the statistical analysis discussed in this chapter. The chapter reports on the data collected, as well as the results obtained from the analysis of the data.

As explained in the previous chapter, a questionnaire (see Appendix 1) was constructed consisting of both closed-ended and open-ended questions relating to the issues mentioned, as well as demographic and fund information.

As stated in Chapter 5, Section 5.3.4, a total of 17 responses were received, which constituted a response rate of 59%. The 17 respondents managed 16 listed property funds that represented 80% in total market capitalisation. The respondents were predominantly male (94%), with only one female respondent. The average age of respondents was 45 years. They were well educated, with 75% holding a post-graduate qualification. Of the participants, 71% are professionally affiliated in some way. They have, on average, spent nine years in the listed property fund industry in South Africa, and, on average, six years at the fund that they currently work at.

The approximate fund size as indicated by the respondents is illustrated in Figure 10 (overleaf). The majority of the funds had a fund size greater than

R1 billion, but smaller or equal to R5 billion. The three largest South African listed property funds, which all participated, have an approximate value of above R15 billion each. All the funds invest in South African properties, with two funds indicating that they invest in other African countries as well. Only one fund specified investments in the rest of the world. The funds invest mainly in commercial, retail and industrial properties, with a small number of respondents indicating investments in residential, leisure and mixed-use properties. The average total return (capital and income growth) of the funds for 2011 was 8%, with a minimum of 11% and a maximum of 16%.

**Figure 10: Approximate fund size of South African listed property funds**

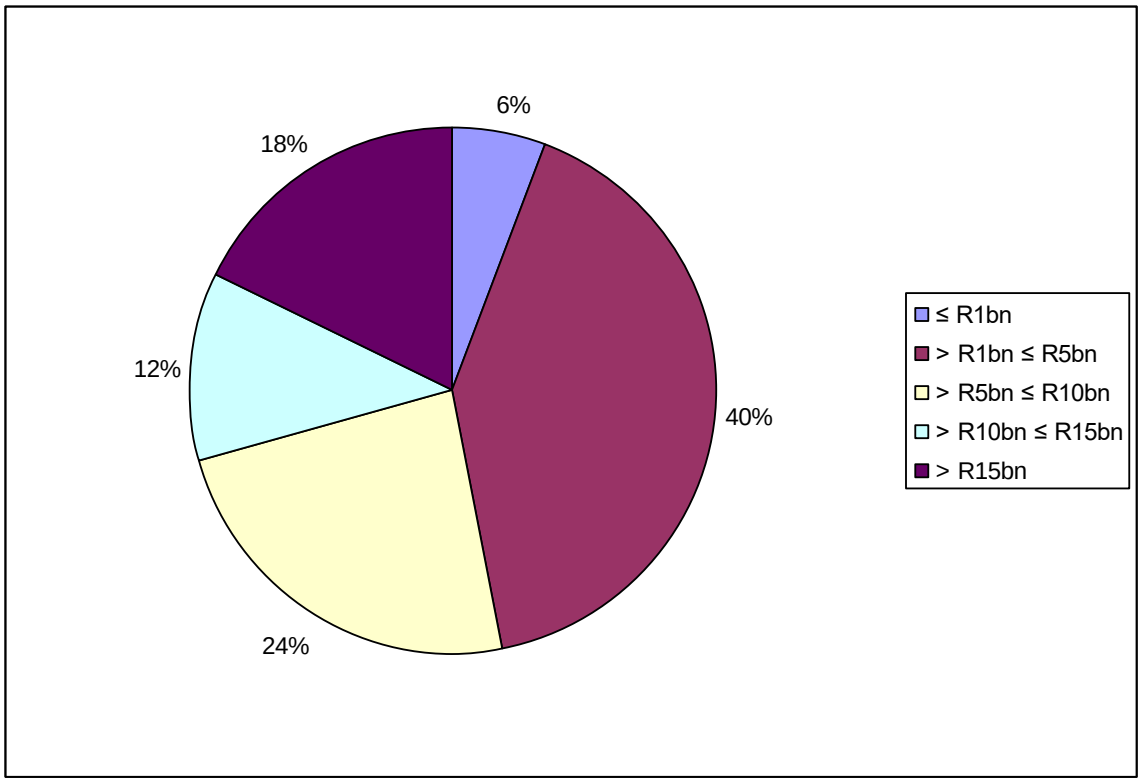



Figure 11 (overleaf) shows that 34% of the funds that participated in the survey recorded total purchases of property assets in 2011 of between R300 million and R600 million. Figure 12 (overleaf) shows that 80% of the funds that

participated sold property assets worth less than R300 million in total in 2011. On average, each of the listed property funds that participated in this study bought 13 properties in 2011 and sold six properties in the same period.

**Figure 11: Listed property funds' total property assets purchases in 2011**

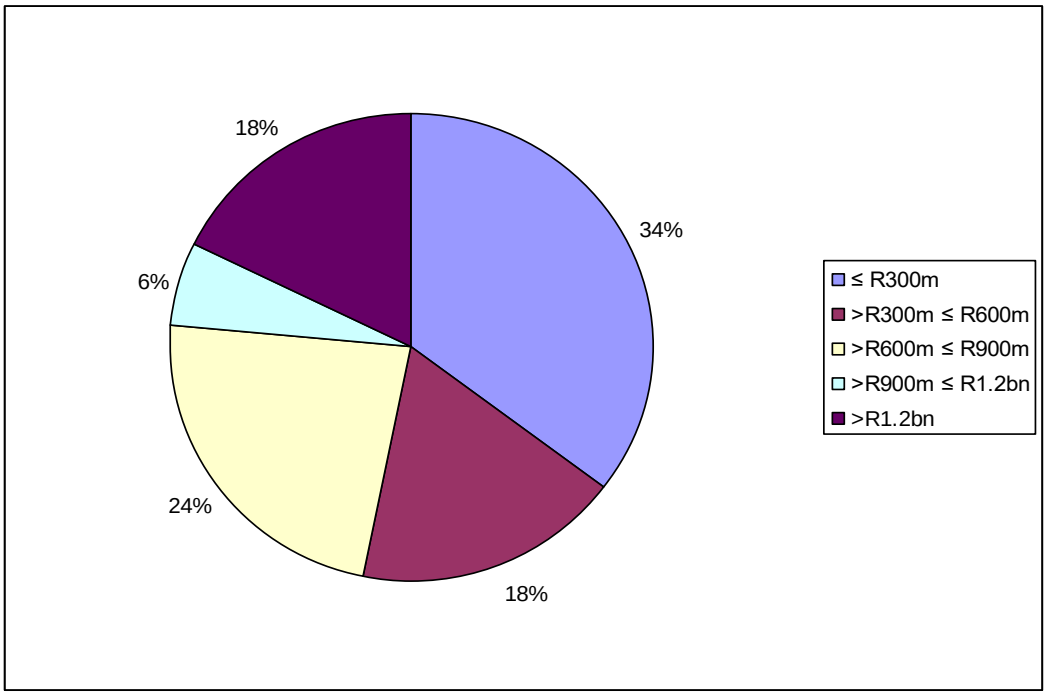
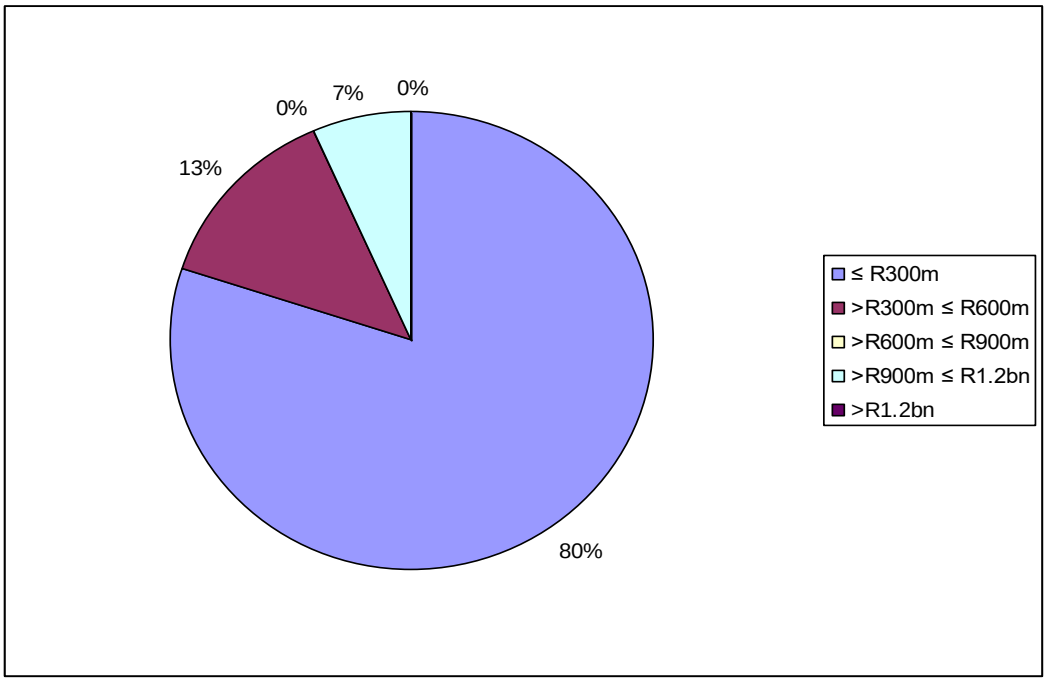



**Figure 12: Listed property funds' total sales of property assets in 2011**



## 6.2 TOPICS OF THE STATISTICAL ANALYSIS OF THE RESULTS

In this section, the results as obtained through applying the statistical techniques discussed in Chapter 5 are reported, analysed and discussed.

The table below provides a summary of the topic analysed, to which hypothesis it relates, the tables in this chapter with the results relating to the topic analysed and the reference to the related section in the literature review that discussed the topic analysed. The statistical analysis covers the topics set out in Table 1 (below).

**Table 1: Topics covered in the statistical analysis**

| TOPIC | RELATED HYPOTHESIS | RELATED TABLE | RELATED LITERATURE IN THIS STUDY |
|---|---|---|---|
| Property holding periods and behavioural aspects | Hypothesis 1 | Table 2<br>Table 3<br>Table 4<br>Table 5 | Section 4.2 |
| The representativeness heuristic-driven bias | Hypothesis 2 | Table 6 | Section 3.3.1<br>Section 4.3.2 |
| The overconfidence heuristic-driven bias | Hypothesis 2 | Table 7 to Table 12 | Section 3.3.1<br>Section 4.3.2 |
| The anchoring and adjustment heuristic-driven bias together with the conservatism bias | Hypothesis 2 | Table 13<br>Table 14 | Section 3.3.1<br>Section 4.3.2 |
| The concept of herding behaviour | Hypothesis 2 | Table 15 to Table 18 | Section 3.3.1<br>Section 4.3.2 |
| The aversion to ambiguity heuristic-driven bias | Hypothesis 2 | Table 19 to Table 21 | Section 3.3.1<br>Section 4.3.2 |
| Emotion | Hypothesis 2 | Table 22 to Table 27 | Section 3.3.1<br>Section 4.3.2 |
| Frame dependence, the disposition effect and loss aversion | Hypothesis 3 | Table 28 to Table 31 | Section 3.3.2<br>Section 4.3.3 |
| Frame dependence through the process of mental accounting | Hypothesis 3 | Table 32<br>Table 33 | Section 3.3.2<br>Section 4.3.3 |
| Market fundamentals versus market sentiment in | Hypothesis 4 | Table 34<br>Table 35 | Section 3.3.3<br>Section 4.4 |

| TOPIC | RELATED HYPOTHESIS | RELATED TABLE | RELATED LITERATURE IN THIS STUDY |
|---|---|---|---|
| property investment decision-making | | | Section 4.5 |
| The use of types and sources of information as well as the use of techniques by listed property fund managers in South Africa | Hypothesis 4 | Table 36 to Table 43 | Section 3.3.3<br>Section 4.4<br>Section 4.5 |
| The extent and influence of government entities on the investment decisions made by listed property fund managers in South Africa | Hypothesis 4 | Table 44 to Table 46 | Section 3.3.3<br>Sections 4.4<br>Section 4.5 |

## 6.3 PROPERTY HOLDING PERIODS AND BEHAVIOURAL ASPECTS

### 6.3.1 Introduction

The questions in this section relate to the first hypothesis, as presented in Sections 1.3 and 5.1. These questions were asked to determine whether property holding periods are influenced by behavioural aspects. Firstly, respondents had to indicate their overall average holding period of property. Thereafter, respondents were asked to indicate the holding period of the last three properties sold in 2011. In a third question, respondents were asked to indicate whether the reasons for selling the last three properties in 2011 were typical for the fund or not.

The length of the average holding period was compared to the presence of the representativeness heuristic-driven bias and the concept of herding behaviour respectively, to identify whether these behavioural aspects might have any possible influence on the average holding period of properties. The reason for statistically testing the possible influence of the representativeness heuristic-

driven bias and the concept of herding behaviour only was that, because of the small sample size, it was statistically not possible to test the other heuristic-driven biases and frame dependence discussed in the literature review.

### 6.3.2 The analysis and discussion of the results

The first two questions were asked to detect whether the property holding periods of the participants might be changing. MacCowan and Orr (2008:357) found that property holding periods were changing – indeed that they are declining across property sectors in the UK. This continuing tendency is speculated to be a result of constantly changing market conditions and pressures on fund managers to outperform the market. These authors also found that the type of property invested in and high transaction costs influence the declining trend of property holding periods in the UK. These factors may bring about behavioural aspects in fund managers' decision-making framework in a South African context.

Table 2, below, presents the results when the answers to the first two questions in this study are compared, using the Wilcoxon matched-pair signed rank test.

**Table 2: The mean of the average holding period in months (Mean 1) in relation to the mean of the holding period of the last three properties sold in 2011 (Mean 2)**

| | N | Mean (months) | Std Dev (months) | Minimum (months) | Maximum (months) |
|---|---|---|---|---|---|
| Average holding period (Mean 1) | 15 | 78.5 | 61.1 | 11 | 240 |
| Holding period of the last three properties sold in 2011 (Mean 2) | 13 | 74.5 | 52 | 0 | 240 |
| Difference | | 3.9 | 41.2 | | |
| Wilcoxon test: p = 0.9594 | | | | | |

Table 2, above, compares the mean of the average holding period in months (Mean 1), which is 78.5 months, with the mean of the holding period of the last three properties sold in 2011 (Mean 2), which is 74.5 months. The difference between the two means, as indicated in the above table, is equal to 3.9 months. The high standard deviations from both means reflect a small sample, where the minimum holding period is 11 months and the maximum holding period 240 months. In terms of Mean 1, there were 15 respondents, whereas the average respondents in terms of Mean 2 were 13. We also rely on the respondents' understanding of this questions involved in this part of the analysis in answering these questions.

It is clear that Mean 1 and Mean 2 are close when expressed in months, with a very small difference between each other when the data points of the two variables are paired. Consequently, the Wilcoxon test confirms this result by indicating that there is no statistically significant relationship when the two variables are paired ($p>0.05$).

The results in Table 2, above, suggest that the average holding period for property and the holding period of the last three properties sold in 2011 by the respondents were very similar in length. This indicates that there were no significant changes in South African listed property fund managers' property holding periods.

Fisher and Young (2000:327) and Gardner and Matysiak (2005:17) have shown that holding periods have been declining. The findings of MacCowan and Orr (2008:350) show that the average holding period in the UK was 62.61 months

and the holding period for the last property sold was 80.37. As mentioned above, MacCowan and Orr (2008:350), in a study that included property fund managers in the UK, suggest that the insistence on outperforming the market results in a short-term investment outlook amongst property fund managers in the UK. In this regard, it should be noted that, in an earlier study, Hutchison and Nanthakumaran (2000:46) recommended holding periods of up to 60 months because of the uncertainty attached to longer property investment periods.

The average holding period in this study was 78.5 months, with the average holding period on the last three properties sold in 2011 at 74.5 months. Interestingly, the difference between these two variables showed a decline of four months, but this difference could not be statistically proven.

The property holding period by listed property fund managers in South Africa indicates very few deviations from the average holding period, and the holding period of the last three properties sold in 2011, given the results in Table 2, above. This result is confirmed by the Wilcoxon test, which found no statistically significant relationship between the average property holding period and the holding period of the last three properties sold in 2011. Therefore, in contrast to the UK findings of MacCowan and Orr (2008:350), it cannot be concluded that the property holding periods of listed property fund managers in South Africa are changing or indeed declining.

MacCowan and Orr (2008:350) state that “the pressure to perform well is encouraging fund managers to increase their activity in managing funds and take a short-term perspective for investments”. The average South African listed property holding period (78.5 months) seems to be in the same general range

as those found in the studies of Gardner and Matysiak (2005:17) (50 months to 80 months) and MacCowan and Orr (2008:350) (62.61 months). It is therefore safe to conclude that, as in relation to the study of MacCowan and Orr (2008:350), South African listed property fund managers may also have a short-term view regarding property investments.

In a later question that also relates to this section, Table 29, below (see Section 6.5.2) shows the most important reason indicated by the respondents in this study for selling a property is the desire to cut losses (35.2%). The second most important reason was indicated as the end of the property/fund life (23.5%), followed closely by the anticipated direction of the market (17.6%).

Although South African listed property fund managers may have a short-term view in property investments, as explained above, this short-term view also seems to be an established view. This may be because 23.5% of South African listed property fund managers do indicate the end of the property/fund life as an important reason to sell. It also seems that South African property fund managers do take changes in market conditions – as suggested in respect of the UK by MacCowan and Orr (2008:357) – into account in their selling decisions, because 17.6% of the respondents reported that the anticipated direction of the market was most important disposal factor.

It seems that the main reasons for shorter property holding periods in South Africa is not mainly pressures to outperform the market as MacCowan and Orr (2008:357) found in their study. The fact that fund managers' main reason for disposal of property is the desire to cut losses may suggest a form of uncertainty in the South African listed property market. This may be suggested

as a reason for the short term investment views of South African listed property fund managers.

The response on the third question, where respondents had to indicate whether the reasons for selling the last three properties were typical for their fund, is presented in Table 3, below. The frequencies set out in the table clearly indicate that the majority of respondents stated that their disposal reasons for the last three properties sold in 2011 were in line with the fund's strategy. The results in Table 3 suggest that the short-term investment view of listed property fund managers in South Africa, along with unchanged holding periods as noted, is in line with the funds' strategies. However, a survey of the management strategies of the funds that the respondents are employed at (such as active, pro-active, and passive management strategies) was beyond the scope of this study.

**Table 3: Reasons for disposal of the last three properties (2011)**

| Are the reasons for disposal of the last three properties sold (2011) typical for the fund? | Yes frequency | No frequency |
|---|---|---|
| Property 1 | 11 | 1 |
| Property 2 | 9 | 0 |
| Property 3 | 9 | 0 |

To link the length of property holding periods with the possible influence of behavioural aspects, Table 4, overleaf, examines the average holding period in months to determine the possible presence of the representativeness heuristic-driven bias. In the question posed to determine the possible presence of the representativeness heuristic-driven bias (see Section 6.4, below), respondents had to choose one of two possible investment scenarios:

A. Invest in a property because of its recent good performance feeling that the performance of the property is most likely to be repeated in future, or

B. Invest in a property that recently performed badly, but your feeling is that it will perform well in future.

The results of this question are set out in Table 6 (in Section 6.4, below), where the presence of representativeness heuristic-driven bias in South African listed property fund managers' property investment decision-making is analysed.

**Table 4: The average holding period in months in relation to the possible presence of the representativeness heuristic-driven bias**

| Investment scenario | N = Investment scenarios | N = Average holding periods | Mean | Std Dev | Median |
|---|---|---|---|---|---|
| A | 13 (76.4%) | 11 (73.3%) | 61.63 | 30.14 | 64 |
| B | 4 (23.5%) | 4 (26.6%) | 125 | 102.46 | 120 |
| Mann-Whitney U test: p = 0.5120 | | | | | |

As Table 4 (above) shows, 13 respondents (76.4%) chose Scenario A and four respondents (23.5%) chose Scenario B. However, 11 respondents (73.3%) held property for periods up to 72 months and four respondents (26.6%) held property for periods longer than 72 months.

To apply the Mann-Whitney U test, the respondents that chose Scenario A were grouped with the respondents that held property for periods up to 72 months (Group A) and the mean was then calculated. The respondents that chose Scenario B were grouped with the respondents that held property for periods longer than 72 months (Group B) and the mean was then calculated.

The result of the Mann-Whitney U test shows no statistical significance between the average holding period in months in relation to the possible presence of the representativeness heuristic-driven bias ($p>0.05$). This result means that, statistically, the representativeness heuristic-driven bias does not influence the length of property holding periods.

To establish a link between the length of property holding periods and the possible influence of behavioural aspects, Table 5, below, examined the average holding period in months to determine the possible presence of herding behaviour among listed property fund managers in South Africa.

The question on herding behaviour formed part of a set of questions to identify the possible presence of such behaviour in the decision-making realm of listed property managers in South Africa. In this particular question, respondents had to indicate by either answering yes or no whether they normally make decisions based on their own views (see Section 6.4.5 below).

On the same premise as above, Table 5, below, presents the results of the relationship between the average holding period of property in months and the possible presence of herding behaviour. In response, almost half of those surveyed (47%) answered “yes”, whereas 52.9% answered “no” this question.

**Table 5: The average holding period in months in relation to the possible presence of herding behaviour**

| Decisions normally based on own views | N = Decisions are normally based on own viewpoint | N = Average holding periods | Mean | Std Dev | Median |
|---|---|---|---|---|---|
| Yes | 8 (47%) | 8 (53.3%) | 71.38 | 24.62 | 67 |
| No | 9 (52.9%) | 7 (46.6%) | 86.71 | 88.74 | 60 |
| Mann-Whitney U test: p = 0.6009 | | | | | |

Approximately half of those surveyed (53.3%) held property on average for up to 72 months, and the remaining 46.6% held property for periods longer than 72 months. Subsequently, those respondents that answered “yes” were grouped with those respondents that held property for up to 72 months (Group A), and the respondents that answered “no” were grouped with those respondents that held property for longer than 72 months (Group B). Comparisons between the two groups were made using the Mann-Whitney test. It showed no statistically significant relationship between the two groups, as $p>0.05$, meaning that herding behaviour does not appear to influence the length of property holding periods by listed property fund managers in South Africa.

It is interesting that the majority of the participating listed property fund managers in South Africa answered that their desire to cut losses is the single most important reason for selling property. The whole sample indicated in Table 28 (see Section 6.5.2, below) that they regret not selling a losing property soon enough more than regretting selling a winning property too soon, resulting in the disposition effect.

An earlier observation in this section was that listed property fund managers in South Africa may have short-term investment views in investing in property. The findings of Fisher *et al*. (2004:362) show that shorter investment horizons may indicate loss aversion. Gardner and Matysiak (2005:17) deduced that factors such as the under-performance of assets leads to feelings of loss and regret to the investor.

It may be possible that the listed property fund managers’ desire to cut losses may result from the presence of the disposition effect, as well as properties’

under-performing. Together with a short-term investment view, listed property fund managers in South Africa may be susceptible to behavioural aspects such as loss aversion and feelings of loss and regret that influence their property investment decision-making. It was, however, not possible to test this premise statistically in this study.

### 6.3.3 Summary

This section investigated the possible influence of behavioural aspects on property holding periods. In order to do so, the average property holding period was related to the holding period of the last three properties sold. The Wilcoxon test showed no statistically significant relationship between the two variables, which indicates that property holding periods have not changed significantly.

The length of the average holding period was also related to the representativeness heuristic-driven bias and herding behaviour respectively, to determine whether they have an influence on the length of the holding periods. No statistically significant relationships between the length of the average holding period and the representativeness heuristic-driven bias and herding behaviour, respectively, were found by using the Mann-Whitney U test. Therefore, statistically, these two heuristic-driven biases did not influence property holding periods.

Although the statistical measures did not prove that property holding periods are influenced by behaviour aspects, it could be safely deduced in accordance with previous research that listed property fund managers in South Africa may have short-term investment views.

Short-term investment views and the possible influence of the disposition effect, as well as loss aversion and feelings of regret, as shown in previous studies, were implicated as possibly affecting the length of the property holding periods of listed property fund managers in South Africa. It was not possible, though, to test this influence statistically, because of the small sample size and the fact that the response to the question on the disposition effect (see Table 28 in Section 6.5.2, below) was 100%, and was thus one-sided.

It was also suggested, on the other hand, that the short-term view in property investments by listed property fund managers in South Africa may be an established view. It is argued that the reason for this is that the listed property fund managers indicated the end of the property life as the second-most important reason to sell.

According to the results of this section of the study, behavioural aspects do not influence the property holding periods chosen by listed property fund managers in South Africa. The first hypothesis was therefore rejected, as no statistically significant relationships were found in this section of the study.

## 6.4 ANALYSIS OF THE PRESENCE OF HEURISTIC-DRIVEN BIAS IN PROPERTY INVESTMENT DECISION-MAKING

### 6.4.1 Introduction

In this section, the possible influence of heuristic-driven bias in listed property fund managers in South Africa's decision framework, as indicted in Hypothesis 2 in Sections 1.3 and 5.1, was investigated. It is imperative to determine the influence of heuristic-driven bias in listed property fund managers

in South Africa's decision framework in reaching the overall objective of identifying behavioural aspects that influence investment decisions made by listed property fund managers in South Africa in order to address the research problem. The following heuristic-driven biases formed part of the survey and are discussed in subsections below:

- representativeness;
- overconfidence;
- anchoring and adjustment;
- herding behaviour;
- aversion to ambiguity; and
- emotion.

### 6.4.2 The representativeness heuristic-driven bias

In the representativeness heuristic-driven bias involves that if occurrences are ranked, people believe that the more representative the occurrence is, the more likely it is that the occurrence will realise, even if this is not the case. The influence of the representativity heuristic-driven bias on property investment decisions is that it may lead to judgement errors, because listed property fund managers may possibly invest in the wrong property. In order to detect representativity, the respondents were asked to choose one of two possible investment scenarios:

A. Invest in a property because of its recent good performance, feeling that the performance of the property is most likely to be repeated in future, or
B. Invest in a property that recently performed badly, but your feeling is that it will perform well in future.

The questions were designed on the basis of the work of De Bondt and Thaler (1985:797), who determined that, in a financial environment, analysts tend to rely on recent success rather than future implications, therefore making judgement errors because of their reliance on the most likely outcome.

In this question, Scenario A was coded as the more representative occurrence, because it stated that the property has recently performed well. The frequency analysis on the choice of the investment scenarios is depicted in Table 6, below. In response to the question, most (76.4%) of those surveyed indicated that they would choose Scenario A. The other four respondents to this question chose Scenario B.

**Table 6: The choice of investment scenarios**

| Investment scenario | Frequency | Percentage |
|---|---|---|
| A | 13 | 76.4 |
| B | 4 | 23.5 |

Similar to the research of De Bondt and Thaler (1985:797), the majority of respondents seem to recognise recent success and cognitively categorise it as the most likely positive outcome. Only a small percentage of respondents recognise that if a property recently performed badly, that is not to say that it will perform badly in future. De Bondt and Thaler (1985:797) also empirically illustrate this phenomenon by finding that stocks labelled as “losers” over a historical period of three years outperformed the same past “winners” in the following three years.

The answers to the question in this section showed that listed property fund managers in South Africa may be biased towards the more representative

investment scenario of an asset that recently performed well. However, caution should be applied when analysing the results of this question, as the prior work by De Bondt and Thaler (1985:797) was based on financial analysts as subjects and not on listed property fund managers, as in this study. The findings of De Bondt and Thaler (1985:797) also used secondary data to arrive at conclusions empirically, which was not possible in this study. Further research needs to be done to establish the influence of the representativeness heuristic-driven bias in property investment decisions made by property fund managers.

### 6.4.3 The overconfidence heuristic-driven bias

Overconfidence manifests itself as a heuristic-driven bias when people overreact to information at their disposal, making them feel confident, subsequently leading to possible errors of judgement. In this section of the questionnaire, the influence of the overconfidence heuristic-driven bias was tested by asking the respondents to provide information regarding their own fund and their own performance in relation to the other respondents in the sample. More concretely, the questions were constructed to determine

- how well listed property fund managers are informed about their competitors;
- the likelihood that the listed property fund managers' fund will achieve an above average risk-adjusted return in future;
- the chances that listed property fund managers will outperform other fund managers in future; and
- whether listed property fund managers achieved an above average job performance during 2011.

All the respondents in this sample indicated that they were well informed of their competitors (see Table 7, below). This question was asked to create a possible link between listed property fund managers in South Africa's knowledge of competitors and the overconfidence heuristic-driven bias.

**Table 7: Information on competitors**

| Are you well informed about your competitors? | Frequency | Percentage |
|---|---|---|
| Yes | 17 | 100 |
| No | 0 | 100 |

The questions regarding the second and third points above were asked on a Likert-type scale ranging from 1 (far below average) through 3 (average) to 5 (far above average). Fisher's exact test was used to analyse the relationship between the respondents' age in years and their perception that their fund will achieve an above average risk-adjusted return in future, as well as their perception that they will outperform other fund managers, respectively. The results are presented in Table 8, below, and Table 9, on p. 128.

**Table 8: Respondents' age in years in relation to their views on the likelihood of their fund achieving above-average risk-adjusted future returns**

| Age in years | The likelihood of the fund achieving above-average risk-adjusted future returns | | |
|---|---|---|---|
| | Far below average to average | Above to far above average | Total % |
| 20 – 40 | **1** | **5** | **35.2** |
| 41 - 60 | **5** | **6** | **64.7** |
| Total N = 17 | **6** | **11** | **100** |
| Fisher's exact test: p=0.33 | | | |

Interestingly, five of the six respondents between the ages of 20 to 40 indicated that the likelihood that their fund would achieve above average risk-adjusted future returns was above or far above average. The responses of the 41- to 60-year age group were more evenly spread, with six of the 11 respondents in this age group reporting that the likelihood that their fund would achieve above average risk-adjusted future returns was above or far above average.

Although no statistically significant relationships were found between the respondents' age in years and their perception of their funds' achieving above average risk-adjusted future returns (Fisher's $p>0.05$), the results in Table 8 (above) do suggest that the younger age group (20-40 years) were more confident than the older age group (41-60 years) regarding future returns. Overall, 64.7% of the respondents expected their fund to achieve above average future returns.

These findings are contrary to the results of Gort (2009:75), who demonstrated through an investigation of active pension fund managers in Switzerland that managers would rather state their funds chances as "average", with the majority of them rating their funds' chances as "average to slightly above average". It must be noted that his study was conducted amidst the recent financial crisis and had pension fund managers as respondents, as opposed to the current study's listed property fund managers as respondents.

**Table 9: Respondents' age in years in relation to their views on their chances to outperform the other fund managers in future**

| Age in years | Chances that the fund manager will outperform the other fund managers in future | | |
|---|---|---|---|
| | Far below average to average | Above to far above average | Total % |
| 20 - 40 | **2** | **4** | **35.2** |
| 41 - 60 | **5** | **6** | **64.7** |
| Total N = 17 | **7** | **10** | **100** |
| Fisher's exact test: p=0.999 | | | |

It is apparent from Table 9 (above) that the respondents in both age groups felt the same on their chances to outperform the other fund managers, as the responses are almost evenly spread. Of the 20- to 40-year age group, 67% did report that their views on their chances of outperforming other fund managers in future are "average to above average". Overall, the majority of respondents (58.8%) indicated an "above to far above average" rating on their chance to outperform the other fund managers in future.

In his findings, Gort (2009:76) also shows that the majority (72.1%) of respondents chose an "average too slightly above average" chance to outperform the other fund managers in future. It might indicate that listed property fund managers in South Africa are overconfident regarding their chances to outperform other fund managers. Fisher's exact test confirmed a p value of 0.999, which suggests that there is no statistically significant relationship between the respondents' age in years and their views on their chances of outperforming the other fund managers in future ($p>0.05$).

On the same premise as the results in Tables 9 (above) and 10 (below), Fisher's exact test was applied to analyse the relationship between the

respondents' fund sizes and their views that their funds will achieve an above average risk-adjusted return in future, as well as their view of the chances that they will outperform other fund managers, respectively. The results are shown in Table 10, below, and Table 11, overleaf.

**Table 10: Respondents' fund size in relation to their views on the likelihood of their fund achieving above-average risk-adjusted future returns**

| Approximate size of the fund (R billion) | The likelihood of the fund achieving above-average risk-adjusted future returns | | |
|---|---|---|---|
| | Far below average to average | Above to far above average | Total % |
| ≤ R5bn | **2** | **6** | **47** |
| > R5bn | **4** | **5** | **52.9** |
| Total N = 17 | **6** | **11** | **100** |
| Fisher's exact test: p=0.62 | | | |

Again, it is interesting to note that the data from the above table showed a similar pattern to the data in Table 8. The majority of the respondents (six) whose fund size was equal to or smaller than R5 billion expected an above to far above average risk-adjusted future return, in contrast to a more even distribution of responses regarding those funds with a size greater than R5 billion. It seems from this result that the fund managers of the smaller funds feel more confidence regarding their funds' chances of outperform those of their competitors. However, no statistically significant relationship was found by applying Fisher's exact test, as $p>0.05$.

**Table 11: Respondents' fund size in relation to their views their views on their chances of outperforming other fund managers in future**

| Approximate size of the fund (R billion) | Chances that the fund manager will outperform the other fund managers in future | | |
|---|---|---|---|
| | Far below average to average | Above to far above average | Total % |
| ≤ R5bn | **4** | **4** | **47** |
| > R5bn | **3** | **6** | **52.9** |
| Total N = 17 | **7** | **10** | **100** |
| Fisher's exact test: p=0.64 | | | |

The data in Table 11, above, show that respondents with a fund size smaller or equal to R5 billion are exactly evenly distributed between the two options, but for a fund size above R5 billion, 52.9% of the respondents felt that their chances of outperforming other fund managers in future was average to above average. It seems that the managers at the relatively larger funds were more confident about outperforming other fund managers in future. Again, no statistically significant relationship was found between the two variables ($p>0.05$).

Although similarities were found with the findings of Gort (2009:69) and the data presented in Tables 8 to 11, above, caution should be exercised in interpreting the data, because the sample size in this study was much smaller than that of Gort (2009:69). Gort also elaborated on and extended his study to include return forecasts and performance based on active management in pension funds, and not only over-confidence as a heuristic-driven bias, as surveyed in the current study.

On the final question to gauge the influence of the overconfidence heuristic-driven bias on property investment decision-making, respondents were asked to

indicate whether they felt that they had achieved an overall above average job performance in 2011. As can be noted in Table 12, below, all the respondents (except for one) felt that they had, overall, achieved above average job performance in 2011.

**Table 12: Overall above average job performance in 2011**

| Did you achieve an overall above average job performance in 2011? | Frequency | Percentage |
|---|---|---|
| Yes | 16 | 94.1 |
| No | 1 | 5.8 |

This may indicate to some extent that listed property fund managers in South Africa are overconfident, but this argument is only speculative, and further research is required to establish the accuracy of this view.

### 6.4.4 The anchoring and adjustment heuristic-driven bias with the conservatism bias

Anchoring and adjustment forms part of the heuristics to be analysed in order to support or reject the second hypothesis, namely that heuristic-driven bias influences the investment decisions made by listed property fund managers in South Africa. The core of anchoring and adjustment heuristic-driven bias is the notion that people tend to anchor their beliefs on a specific outcome. As new, far better information is released, people tend to stay with their anchor and do not adjust to the new information, because they do not understand the new information introduced to them. The influence of the anchoring and adjustment heuristic-driven bias on listed property fund managers is that they may be too conservative in their property investment decisions, resulting in judgement errors.

Respondents were requested to choose one of three possible properties, each with its own financial characteristics (thus representing the anchor), to invest in:

- Property A: Average return with low risk;
- Property B: Average return with high risk; and
- Property C: Above average return with moderate risk.

The frequencies of the chosen properties are shown in Table 13, below. The majority of the respondents (76.4%) chose Property C, none chose Property B, and a minority of respondents (23.5%) chose Property A.

**Table 13: The choice of property (anchoring)**

| Property | Frequency | Percentage |
|---|---|---|
| Property A | **4** | **23.5** |
| Property B | **0** | **0** |
| Property C | **13** | **76.4** |

In the next question, after new information on the same three properties was revealed to the respondents, thus representing the adjustment, they were asked whether they would change the investment decision they had made in the previous question, or if they would stay with their original decision. The results of this question are shown in Table 14, below.

**Table 14: The choice of property after new information was introduced (adjustment)**

| Property choice | Frequency | Percentage |
|---|---|---|
| Yes, Property A | **4** | **23.5** |
| Yes, Property B | **1** | **5.8** |
| Yes, Property C | **1** | **5.8** |
| No, my decision stays the same | **11** | **64.7** |

When the respondents were introduced to the new information, 84.6% of respondents that had chosen Property C indicated that they would not deviate from this original decision. Only six respondents changed their original decision, with four respondents selecting Property A, one respondent changing to Property B and one respondent changing to Property C. It is clear that Property A is the best option, as the new information introduced on Property A is more favourable than the new information introduced on Property B and Property C.

The findings in this section produced results which corroborate the findings of a great deal of previous work on the anchoring and adjustment heuristic-driven bias. Both Edwards (1982:361), who developed the question set here, and Shefrin (2002:20) in principle applied the same question set to their subjects. Shefrin (2002:20) found that regarding the first question on selecting the anchor, the majority of respondents chose the most favourable option, which was Property C. Similar to the study done by Shefrin (2002:20), in this study the most favourable option is Property C, and 76.4% of the respondents did indeed choose Property C.

Once the new information in the second question was introduced, it was interesting to note that 84.6% of the respondents who had selected Property C in the preceding question indicated that their decision stayed the same, thus not changing from their original decision or possible anchor. This result is consistent with the work of Northcraft and Neale (1987:84), Shefrin (2002:20), Kudryavtsev and Cohen (2010:171) and Leung and Tsang (2011:13). These authors all illustrated in different financial and property settings that their subjects tend to anchor on the most obvious choice. As new information is introduced, the majority of subjects do not know how to incorporate the new information.

Although the new information is positive, as is the case with the new information introduced to respondents in this study on Property A above, the subjects tend to stay with their original decision or possible anchor, thus under-reacting. This then leads to conservatism and possible judgement errors.

The results in this section of the study are consistent with those of prior studies and suggest that there might be a bias towards anchoring and adjustment in the decision-making framework of listed property fund managers in South Africa.

### 6.4.5 The behavioural aspect of herding behaviour

Herding behaviour relates to people's following the other decision-makers and is related to the anchoring heuristic-driven bias. The influence of herding behaviour, in a property context, is that listed property fund managers may make errors in their investment decisions by following other decision-makers. The other decision-makers in the listed property fund industry may, however, make wrong decisions.

Therefore, the last question from the previous section, Section 6.4.4, where respondents had to indicate whether they would change their original investment decision due to the introduction of new information, is included in the empirical analysis of the data in this section. Apart from the initial question as asked in Section 6.4.4 above, respondents were also asked to provide information on how they would react to their competitors' decisions under different circumstances. The questions that illustrate herding behaviour gave respondents the following options:

- changing their initial investment decision to that of their competitors, even if they know that the competitors' **reasons for investing** may be the wrong decision;
- changing their initial investment decision to that of their competitors because their competitors are **better informed** than themselves on this specific investment; or
- changing their initial investment decision to that of their competitors because the respondents know that there is **a degree of uncertainty** in the information at their disposal.

The respondents had the option of either answering yes, no or that they are not sure regarding the questions as explained above.

**Table 15: Change to the investment decision of the competitors knowing that the competitors invest for the wrong reasons**

| Decision made | Frequency | Percentage |
|---|---|---|
| Yes, I would change my decision to that of my competitors. | 0 | 0 |
| No, I would continue with my original investment. | 17 | 100 |
| Not sure | 0 | 0 |

From Table 15 (above) it is clear that all the respondents (17) felt that they would not change their investment decision initially made to that of their competitors, if they knew that their competitors were making the wrong decision.

Devenow and Welch (1996:603) argue that investors who display behaviour such as that tested in the question that relates to the data in Table 15, above, herd in an irrational manner. However, it is clear from the result above that the

respondents in this study do not blindly follow their competitors. This should be the case, as the sample that participated in this study is highly skilled and competent.

Different responses were recorded for the following two questions as depicted in Tables 16 and 17, below. Table 16 presents the results from respondents to the question of a change in an initial decision in relation to a better informed competitors' investment decision.

**Table 16: Change to better informed competitors' investment decision in relation to the change in the initial investment decision**

| Change to the better informed competitors' investment decision | Change in the initial investment decision | | |
|---|---|---|---|
| | No | Yes | Total % |
| Yes | **4** | **3** | **41.1** |
| No | **6** | **3** | **52.9** |
| Not sure | **1** | **0** | **5.8** |
| Total N = 17 | **11** | **6** | **100** |
| Fisher's exact test: p=0.999 | | | |

In Table 16, above, six respondents who showed that they will not change their initial investment decision to that of the better informed competitors' investment decision also indicated that they will not change the original investment decision they made. They represent 66.6% of the respondents that decided not to change to the better informed competitors' investment decision. Fisher's exact test showed no statistically significant relationship between a change to better informed competitors' investment decision in relation to the change in the initial investment decision of listed property fund managers in South Africa, as p>0.05.

Although there is absolutely no statistically significant relationship between the change to better informed competitors' investment decision in relation to the change in the initial investment decision of listed property fund managers in South Africa, as shown through Fisher's exact test in Table 16, above, it is interesting to note that a slightly larger number of respondents (52.9%) answered that they would not change their original decisions to their competitors' decisions, even if the latter was better informed.

Avery and Zemsky (1998:724) argue that behaviour where respondents do change their initial investment decisions to that of their competitors because their competitors are better informed, are indicative of herding of a rational nature, where investors imitate each other. This seems not to be the case in this study, given the results in Table 16, above.

Table 17, below, presents the results when a decision is changed in line with competitors' investment decision due to a degree of uncertainty in relation to a change in the initial investment decision.

**Table 17: Change to competitors' investment decision because of a degree of uncertainty in relation to the change in the investment decision due to new information**

| Change to competitors' investment decision because of a degree of uncertainty | Change in investment decision due to new information | | |
|---|---|---|---|
| | No | Yes | Total % |
| Yes | **0** | **2** | **11.7** |
| No | **8** | **3** | **64.7** |
| Not sure | **3** | **1** | **23.5** |
| Total N = 17 | **11** | **6** | **100** |
| Fisher's exact test: p=0.24 | | | |

Given that eight respondents answered that they would not change to their competitors' investment decision (see Table 17, above) because of a degree of uncertainty, 72.7% (8 out of 11) of them also indicated that they would not change their initial investment decision. This response is slightly higher in comparison to the same type of response in Table 16, above.

Again there may be no presence of rational herding, as indicated by Table 16, above, because 72.7% of the respondents indicated that they would not change their original investment decision. However, there is no statistical significance in the respondents' changes to the competitors' investment decision, because of a degree of uncertainty in relation to the change in the initial investment decision (Fisher's exact test $p>0.05$).

In the last question in this section, listed property fund managers in South Africa were asked to indicate by answering either "yes" or "no", if they normally base their investment decisions on their own viewpoint, assuming that they are the only decision-maker. As Table 18, below, shows, of a total of 17 respondents, eight answered "yes" and the other nine indicated "no".

**Table 18: Frequency analysis on decisions based on the fund manager's own viewpoint**

| Do you make decisions based on your own viewpoint? | Frequency | Percentage |
|---|---|---|
| Yes | 8 | 47.06 |
| No | 9 | 52.94 |

The distribution of the results is basically equal. The question attempts to establish whether the respondents are prone to herding behaviour. If respondents answer "no" to this question, it may reveal that they do take other

viewpoints, outside of the funds that they are employed with, into consideration when deliberating on an investment decision. A “yes” answer is a possible indication that the respondent takes only his/her own views into account and is therefore not prone to herding behaviour, as the respondent does not consider the decisions his/her competitors make. This finding supports the results on the same area investigated by Ackert and Deaves (2010:147), who demonstrate this phenomenon and deduce that financial analysts herd if they are influenced by the recommendations of other analysts.

Although there is some suggestion that listed property fund managers in South Africa do exhibit signs of the anchoring and adjustment heuristic-driven bias, as discussed in Section 6.4.4, above, there is no evidence that the sample in this study does actually exhibit herding behaviour. This might not have been the case in a bigger sample, where the statistics would probably have been more powerful. In contradiction to this study, Northcraft and Neale (1987:84) and Lin (2011:1640) have illustrated the existence of herding behaviour to a more significant degree, suggesting that other behavioural biases such as the anchoring and adjustment heuristic-driven bias are closely related to herding behaviour.

### 6.4.6 The aversion to ambiguity heuristic-driven bias

Aversion to ambiguity, or the home bias, implies that people prefer the known to the unknown, although the unknown may render higher returns. The question set in this section requested the respondents to rate their knowledge of the South African property market and that of the offshore property market, respectively.

The results may indicate that if listed property fund managers in South Africa think they have a better knowledge of the South African property market than of the offshore property market, this could influence them in their investment decisions. The two questions were set using a Likert-type scale ranging from 1 ("poor") through 3 ("good") to 5 ("excellent"). The results of the data of these two questions are depicted in Table 19, below.

**Table 19: Knowledge rating of South African property market versus the knowledge rating of offshore property market**

| Knowledge rating of South African property market | Knowledge rating of offshore property market | | | | |
|---|---|---|---|---|---|
| | Poor | Average | Good | Very good | Total % |
| Good | **2** | **1** | **0** | **0** | **17.6** |
| Very good | **3** | **4** | **1** | **0** | **47** |
| Excellent | **2** | **1** | **0** | **3** | **35.2** |
| Total N = 17 | **7** | **6** | **1** | **3** | **100** |
| Fisher's exact test: p=0.31 | | | | | |

It is apparent that only one respondent rated his/her knowledge of the offshore property market as good, and only three respondents rated their knowledge of the offshore property market as very good. By contrast, all the respondents indicated that their knowledge of the South African market is good to excellent. No statistically significant relationship could be established between the two variables, as Fisher's exact test yielded a $p>0.05$. Therefore, based on this result, it cannot be deduced that listed property fund managers have superior knowledge of the South African property market but lack knowledge of the offshore property market.

The following two questions asked the respondents, firstly, to choose between either a South African property or an offshore property, for both of which the risk profiles are nearly unknown. Secondly, they had to choose between the same two properties if both properties' risk profiles are well known. The responses are presented in Tables 20 and 21, overleaf.

**Table 20: The choice between a South African and offshore property if both properties' risk profiles are nearly unknown**

| Property choice | Frequency | Percentage |
|---|---|---|
| South African property | 17 | 100 |
| Offshore property | 0 | 0 |

All the respondents stated that they would invest in the South African property if they had a choice between a South African property and an offshore property where both properties' risk profiles are nearly unknown.

It may be safely deduced that, as market players in an emerging economy, South African listed property fund managers would rather invest in a market known to them to initiate growth than take a risk on the unknown. This may indicate that South African listed property fund managers are not willing to take risks in markets that are not known to them.

**Table 21: The choice between a South African and offshore property if both properties' risk profiles are well known**

| Property choice | Frequency | Percentage |
|---|---|---|
| South African property | 16 | 94.1 |
| Offshore property | 1 | 5.8 |

In Table 21, above, 16 of the 17 respondents chose to invest in a South African property rather than an offshore property if both properties' risk profiles are well

known. This result suggests that South African property fund managers prefer to stay with what they know and not invest in properties that are in markets unknown to them. This may imply that there are unclaimed rewards in offshore markets.

The findings in this section are comparable with the findings of French and Poterba (1991:226), who illustrated through empirical testing that investors in the UK, the US and Japan invest more in local securities markets than offshore markets, as the local securities markets were known to them and they were optimistic about them.

Although the sample size in this study is small and the results above are not statistically significant, the findings of this section do suggest that South African listed property fund managers show a tendency to continue to invest largely in a South African investment base, as they understand this market and feel comfortable with this market. The offshore market is perceived as unknown ground, unfamiliar territory, and therefore as too risky to invest in, although it might hold unclaimed rewards in capital and income growth. These findings in general support the findings of French and Poterba (1991:226). However, it may also be possible that the fund managers' unwillingness to invest in offshore markets is due to the investment strategy that the fund adopts. The investment strategies of the listed property funds in South Africa were not investigated because they fall outside the scope of this study.

### 6.4.2 Emotion

Emotion manifests negatively as a feeling of regret and positively as a feeling of pride or satisfaction. The influence of emotion on a listed property fund

manager's investment decision-making may be indicated as positive or negative. In both cases, it may lead to listed property fund managers' making the wrong property investment decision.

The possibility of emotion being part of the fund manager's decision framework was assessed by creating four fictional investment scenarios that ultimately lead to an investment decision. The respondents then had to indicate their feeling towards the decision that was made. A Likert-type scale was used to articulate the different feelings, ranging from 1 ("regret very much") through 3 ("satisfied") to 5 ("very satisfied"). A 100% response rate was achieved.

This analysis follows the work of Fogel and Berry (2006:107), who investigated the disposition effect and individual investor behaviour through the roles of regret. The limitation to the results below is that this study did not venture into the investigation of counterfactual alternatives as Fogel and Berry (2006:107) did. However, the results of the current study may show that emotion does influence the investment decisions of listed property fund managers in South Africa in either a positive or a negative way. Fogel and Berry (2006:107) tested their hypothesis on a sample on individual investors in the USA. The study is thus adapted for the South African property market and the results did show some consistency with Fogel and Berry's (2006:107) research.

The investment scenarios were set as follows:

**Scenario 1:**

Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you decided to **sell** the office block. You found out

this morning (2011) that, after a commercial valuation was done, the value of the office block **escalated to R20m** and is fully let.

A feeling of regret should accompany this scenario, as the decision to sell ultimately led to the fund manager's losing out on higher returns, also interpreted as a missed gain.

**Scenario 2:**

Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you thought about selling but decided to **hold** the property. You discovered this morning (2011) that, after a commercial valuation, the value of the office block **escalated to R20m** and is fully let.

A feeling of satisfaction should be evident here, as the decision to hold the property led to capital growth, also interpreted as a real gain.

**Scenario 3:**

Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you decided to **sell** the office block. You found out this morning (2011) that, after a commercial valuation, the value of the office block **dropped to R10m** due to declining vacancy rates.

A feeling of satisfaction should be evident here, as the decision to sell the property led to the avoidance of a financial loss, also interpreted as a missed loss.

**Scenario 4:**

Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you thought about selling the office block, but decided to **hold**. You found out this morning (2011) that, after a commercial valuation was done, the value of the office block **dropped to R10m** because of the declining vacancy rate.

A feeling of regret should accompany this scenario as the decision to hold the property ultimately led to the property's achieving negative growth, thus underperforming. This scenario is also interpreted as a real loss.

Of the four scenarios, the results obtained from Scenario 1 and Scenario 4 were statistically measurable, but the results obtained from Scenario 2 and Scenario 3 were too one sided in response for any statistical measure to apply. Therefore the data presented in Tables 22 to 25 relate to Scenarios 1 and 4 only. Fisher's exact test was used to measure Scenarios 1 and 4 against the age of the respondents and the respondents' fund size, respectively. This analysis was performed to measure the influence of emotion (positive or negative) on listed property fund managers in South Africa's investment decision-making. Thereafter a frequency analysis on Scenarios 2 and 3 as recorded in Tables 26 and 27, overleaf, is discussed.

**Table 22: Respondents' age in years in relation to Scenario 1 (missed gain)**

| Age in years | Scenario 1 – Rating of the feeling of satisfaction/regret with the decision | | |
|---|---|---|---|
| | Regret very much to regret to some extent | Satisfied to very satisfied | Total % |
| 20 – 40 | **4** | **2** | **35.2** |
| 41 – 60 | **6** | **5** | **64.7** |
| Total N = 17 | **10** | **7** | **100** |
| Fisher's exact test: p=0.999 | | | |

Table 22, above, looks at the respondents' age in years in relation to Scenario 1, which reflects a missed gain. The responses over both age groups were almost similar, with a slight majority in each age group indicating the decision to sell as a feeling of "regret very much to regret to some extent". Fisher's exact test, at p=0.999, suggests no statistically significant relationship between the two variables, and therefore no statistical deduction could be made regarding the respondents' feelings towards the missed gain presented in investment Scenario 1.

**Table 23: Respondents' fund size in relation to Scenario 1 (missed gain)**

| Approximate size of the fund (R billion) | Scenario 1 – Rating of the feeling of satisfaction/regret with the decision | | |
|---|---|---|---|
| | Regret very much to regret to some extent | Satisfied to very satisfied | Total % |
| ≤ R5bn | **5** | **3** | **47** |
| > R5bn | **5** | **4** | **52.9** |
| Total N = 17 | **10** | **7** | **100** |
| Fisher's exact test: p=0.62 | | | |

Table 23, above, presents the results of the approximate fund size in comparison to Scenario 1, a missed gain. Fisher's exact test was again applied

to test for a statistically significant relationship between the two variables. A trend can be established if the data from this table is compared to the data of Table 22, which related the respondents' age in years with the missed gain presented in Scenario 1. Note that a similar response pattern between the two tables is evident, with a slight majority of respondents from both sets of fund sizes showing feelings of regret because of the decision made in Scenario 1, the missed gain. No statistically significant relationship between the fund sizes and Scenario 1 could established ($p>0.05$).

The results in Tables 22 and 23, above, do not display any statistical significance. The small sample and the resultant loss in statistical power had an influence on the outcome of this result. However, it is interesting that in both cases a slight majority (58.8%) of the respondents did show feelings of regret towards the selling decision made and the resultant missed gain presented in Scenario 1.

As explained in Section 6.3, above, as well as shown in Section 6.5.2, below, the single most important reason to sell a property for the respondents in this study was a desire to cut losses. The desire to realise profits is not regarded as a priority in making disposal decisions. It is interesting then, if this is the case, that only a slight majority of the respondents showed feelings of regret on losing out on the missed gain as presented in Scenario 1.

**Table 24: Respondents' age in years in relation to Scenario 4 (real loss)**

| Age in years | Scenario 4 – Rating of the feeling of satisfaction/regret with the decision | | |
|---|---|---|---|
| | Regret very much to regret to some extent | Satisfied to very satisfied | Total % |
| 20 - 40 | **5** | **1** | **35.2** |
| 41 - 60 | **7** | **4** | **64.7** |
| Total N = 17 | **12** | **5** | **100** |
| Fisher's exact test: p=0.60 | | | |

In Table 24, above, the respondents' age in years was related to Scenario 4, which presented a real loss. Interestingly, in contrast to the results in Table 22, above, both age groups showed a tendency towards "regret to some extent and regret very much". In the 20- to 40-year age group, five of the six respondents showed feelings of regret on their decision to hold the property, while seven of the 11 respondents in the 41- to 60-year age group regretted the same decision. There is no statistically significant relationship between the two variables, as Fisher's $p>0.05$, which means that the respondents' feelings towards the decision to hold the property as presented in Scenario 4 could not be established statistically.

Table 25, overleaf, provides the results obtained from relating the approximate fund size to Scenario 4, the real loss.

**Table 25: Respondents' fund size in relation to Scenario 4 (real loss)**

| Approximate size of the fund (R billion) | Scenario 4 – Rating of the feeling of satisfaction/regret with the decision | | |
|---|---|---|---|
| | Regret very much to regret to some extent | Satisfied to very satisfied | Total % |
| ≤ R5bn | **6** | **2** | **47** |
| > R5bn | **6** | **3** | **52.9** |
| Total N = 17 | **12** | **5** | **100** |
| Fisher's exact test: p=0.999 | | | |

Another trend could be established between the results listed in Table 25, above, and the results listed in Table 24, which related the respondents' age to the decision to hold the property as presented in Scenario 4. It is apparent that the majority of respondents from both fund sizes, with a total of 12 out of 17 respondents, showed "regret to some extent and regret very much" in respect of the decision made in Scenario 4, the real loss. However, Fisher's exact test indicates that there is no statistically significant relationship between the two variables, as $p>0.05$. This result indicates that no statistical deduction could be made on the respondents' feelings towards the real loss presented in Scenario 4.

In Section 6.3 above, as well as in Section 6.5.2 below, it was discussed and shown that all the respondents in this study demonstrated feelings of regret with holding on to losing properties too long. It is significant, not statistically but practically, and consistent with the study of Fogel and Berry (2006:117) that the results in Table 25 (above) show that the majority of respondents express feelings of regret when a real loss is incurred. Scenario 1 and Scenario 4 both result in negative outcomes in the forms of a missed gain and a sure loss. The

feelings of regret towards the missed gain were slightly less than those associated with the feelings of a sure loss.

The scenario above, however, was not the case in the study of Fogel and Berry (2006:117) where, when the outcome is presented as a missed gain and a real loss, the authors found that there appeared to be no difference in the selling and buying decisions of investors.

Table 26, below, presents the frequency analysis of the feeling of satisfaction/regret regarding Scenario 2, a real gain.

**Table 26: Analysis on Scenario 2 (real gain)**

| Rating of the feeling of satisfaction/regret with the decision | Frequency | Percentage |
|---|---|---|
| Regret very much | **0** | **0** |
| Regret to some extent | **0** | **0** |
| Satisfied | **4** | **23.5** |
| Satisfied to some extent | **7** | **41.1** |
| Very satisfied | **5** | **29.4** |

No statistical measure could be applied, as the answers to this decision were one-sided. Note that there is no form of regret with this decision, and that all the respondents showed feelings of satisfaction with the decision made in Scenario 2, which presented a real gain. It is clear from this result that all the respondents in this study show positive emotions when a real gain is realised. The influence of this positive emotion, as a heuristic-driven bias, on the investment decision-making of listed property fund managers in South Africa could not be statistically measured, as explained above.

In Table 27, below, the frequency analysis of the feeling surrounding the decision made in Scenario 3, which resulted in a missed loss, is shown.

**Table 27: Analysis on Scenario 3 (missed loss)**

| Rating of the feeling of satisfaction/regret with the decision | Frequency | Percentage |
|---|---|---|
| Regret very much | **0** | **0** |
| Regret to some extent | **1** | **5.8** |
| Satisfied | **3** | **17.6** |
| Satisfied to some extent | **8** | **47** |
| Very satisfied | **5** | **29.4** |

The data was one-sided, with only one respondent showing regret to some extent with the decision made in Scenario 3. The rest of the respondents (16) were satisfied with the decision to sell the property, as presented in Scenario 3. The influence of this positive emotion, as heuristic-driven bias, on the investment decision-making of listed property fund managers in South Africa could not be statistically measured. However, it is clear from this result that 92.4% of the respondents in this study showed positive emotions when a real gain is realised as presented in Scenario 3.

The results of Scenario 2, the real gain, and Scenario 3, the missed loss, showed that the respondents have feelings of satisfaction when a real gain or missed loss was the ultimate outcome. Contrary to Fogler and Berry's (2006:117) findings, the results show no difference in holding and selling when the outcome was positive, as in this case.

The influence of emotion, as a heuristic-driven bias, on the investment decisions made by listed property fund managers in South Africa could not be

established statistically in this study. However, both negative and positive emotions were shown through the investment scenarios posed to the respondents. It is more important to note that it is becoming increasingly evident that listed property fund managers do regret holding on too long to properties that underperform. This was evident from the results where negative emotions were reported when a missed gain (Scenario 1) and a real loss (Scenario 4) were presented.

### 6.4.7 Summary

The results in this section focused on Hypothesis 2 of this study, which set out to establish whether heuristic-driven bias influences the investment decisions made by listed property fund managers in South Africa.

The representativeness heuristic-driven bias yielded no significant results and no statistically significant relationship could be found when the respondents were tested for overconfident behaviour. These results suggest that representativeness and overconfidence as heuristic-driven biases do not influence the investment decisions made by listed property fund managers in South Africa. In support of the previous research of Northcraft and Neale (1987:84), Shefrin (2002:20), Kudryavtsev and Cohen (2010:171) and Leung and Tsang (2011:13), this study found that the anchoring and adjustment heuristic-driven bias may be present. Its influence on the investment decisions made by listed property fund managers in South Africa could not be established, as it was statistically not possible to measure it in this study.

In measuring for herding behaviour, no statistically significant evidence was found by applying Fisher's exact test, but aversion to ambiguity seemed to be

present, as listed property fund managers in South Africa tended to invest in South African properties only. They did not show any willingness to invest in potentially more profitable offshore properties. This may illustrate the influence of the aversion to ambiguity heuristic-driven bias on property investment decision-making by listed property fund managers in South Africa.

Although no statistically significant relationships could be established by the analysis, listed property fund managers in South Africa's emotions did play some role in property investment decisions: positive and negative emotions were present. The influence of these emotions on the listed property fund managers' decision-making framework could not be derived through statistical analysis in this study.

The second hypothesis in this study, which was that property fund managers in South Africa are influenced by heuristic-driven bias in their investment decision-making is rejected, as no statistically significant relationship could be found based on the results of this study.

## 6.5 FRAME DEPENDENCE, THE DISPOSITION EFFECT, LOSS AVERSION AND MENTAL ACCOUNTING AS FACTORS THAT COULD INFLUENCE PROPERTY INVESTMENT DECISION-MAKING

### 6.5.1 Introduction

In this section, according to the third hypothesis, the results on the influence of frame dependence on the investment decisions made by listed property fund managers in South Africa were analysed and discussed. The disposition effect (holding "losers" too long and selling "winners" too early) as well as loss aversion and mental accounting as aspects of frame dependence, were

analysed. The results contributed to the solution to the main research problem, which was that behavioural aspects influence the investment decisions made by listed property fund managers in South Africa.

People mentally create frames on decision problems posed to them. Frame dependence refers to decision frames which are dependent on the way a decision problem is posed. These decision frames are also dependent on the way a decision problem is perceived by the decision-maker, by also taking into account the decision-maker's personal characteristics. The main problem, as discussed in the literature review, is that people want to make decisions independent of the decision frame created. In other words, they want to make decisions in terms of their own preferences. However, the difficulty of resolving inconsistencies with the decision frame makes people dependent on that specific frame, thus, makes them unable to see through or beyond the decision frame created.

Frame dependence gives way to the disposition effect, one of the key building blocks of the prospect theory discussed in Chapter 2. The disposition effect states that people's despondency towards financial losses is higher than their despondency towards financial gains. An authoritative study by Tversky and Kahneman (1981:458) shows the effect of frame dependence in an investment realm, and studies by Rabin (1998:46), Shefrin (2002:23), Godoi *et al*. (2005:50), Chen *et al*. (2007:448) and Szyszka (2010:132) illustrate the disposition effect, loss aversion and feelings of regret in respect of investors' selling "winners" and holding on to "losers" as investments.

Loss aversion refers to the *status quo* preferred when a change to a decision may result in losses, in other words, the fear of realising a loss or regret. Loss aversion, as a result of frame dependence, in a property investment context, has an influence on investment decision-making when the decision-maker has a fear of investing in a property and therefore missing out on possible future gains. The decision-maker, in the case of loss aversion, stays dependent on the initial decision frame. This fear is created by the risk of a possible future loss that may be realised by investing in a property.

Mental accounting as a behavioural aspect results when the decision-maker also has to think about the problem before formulating the decision problem. The end result is that people do not perceive the whole problem, or concurrent problem, and separate their choices into mental accounts. The possible influence of mental accounting on the decisions made by listed property fund managers results from the fact that they may make judgement errors in investing in properties that yield lower returns than other similar properties.

### 6.5.2 The analysis and discussion of the data

In this section, a set of questions was asked to gain insight into the possible influence of frame dependence, and in particular, the disposition effect, loss aversion and mental accounting, on the decisions of listed property fund managers in South Africa.

A question on the feeling of regret in selling a property too soon or holding onto a property for too long was put to the respondents. The results for this question are presented in Table 28, overleaf. It is clear that all the respondents felt regret

about not selling a “losing” property soon enough. No respondent showed any regret about selling a “winning” property too soon.

**Table 28: The regret of selling winners and holding on to losers**

| Thinking back to investment decisions that you now regret, which one of the following do you feel more regret for: | Frequency | Percentage |
|---|---|---|
| Selling a “winning” property too soon? | **0** | **0** |
| Not selling a “losing” property soon enough? | **17** | **100** |

This finding is in agreement with Fogel and Berry’s (2006:107) study, which found that 59% of their respondents showed regret at not selling a losing property soon enough. The listed property fund managers in South Africa clearly demonstrate a consciousness of the long-term side effects of the disposition effect. They tend to hold on to properties that do not add value to the fund for too long.

The result in Table 28, above, demonstrates the disposition effect, since the listed property fund managers’ despondency about losses (not selling a “losing” property soon enough) is clearly higher than their despondency about gains (selling a “winning” property too soon). The influence of the disposition effect on the listed property fund managers in South Africa is that the fear of feeling regret may hinder them from investing in properties that may realise positive financial gains in future.

Following the study of Fogel and Berry (2006:107), the second question in this section was directly relevant to the question in Table 28, above, regret about selling winning properties too soon or holding onto losing properties for too long. The respondents had to rate the importance of factors in decisions to sell a

property. A Likert-type scale was used, ranging from 1 (not important at all) through 3 (standard importance) to 5 (Most important). Table 29, below, shows the percentage of respondents who answered "most important" for each factor.

**Table 29: The percentage of the "most important" rating of the factors in decisions to sell a property**

| Sell factor | "Most important" rating | Percentage |
|---|---|---|
| Desire to cut loss | **6** | **35.2** |
| End of fund/property life | **4** | **23.5** |
| Anticipated direction of the market | **3** | **17.6** |
| Need for liquidity | **2** | **11.7** |
| Desire to take profits | **1** | **5.8** |
| Desire to purchase a other property | **1** | **5.8** |
| The value of the property has reached its predetermined target | **0** | **0** |
| Outside the control of the fund manager | **0** | **0** |
| Broker recommendation | **0** | **0** |

(*Note:* Variable (1 to 5 Likert scale: 1=not important at all; 3=standard importance; 5=Most important); N=17)

The outstanding factor that influences selling decisions by listed property fund managers in South Africa seems to be the desire to cut losses. The end of the fund/property life, followed by the anticipated direction of the market and the need for liquidity were the next most important factors to influence the fund managers' selling decisions. The less influential factors appeared to be the desire to take profits and to purchase another property. The value of the property reaching its predetermined target, no control by the fund manager and broker recommendations had no influence on the respondents' selling decisions.

The factors indicated by the respondents in the current study differ from those found in Fogel and Berry's (2006:107) study, where broker recommendations, the asset reaching its predetermined target and the need for liquidity were given as the main factors that influenced selling decisions. The current findings also contradict the observations made by Crosby and McAllister (2004:22), Henneberry and Roberts (2008:1217) and MacCowan and Orr (2008:354), who all found that property fund managers in the UK perceive restructuring at portfolio level as the most important decision factor that initiates property disposal decisions in the UK. Underperformance was the next most important decision factor for property disposal decisions in the UK.

Fogel and Berry (2006:107) suggest that the individual investors do not act strictly normatively, as they indicated dependence on the recommendations of brokers in selling assets. The research by Crosby and McAllister (2004:22), Henneberry and Roberts (2008:1217) and MacCowan and Orr (2008:354), on the other hand, seems to be more in accordance with the normative theory, as the disposal decision of the property fund managers leads to a restructuring at the portfolio level, driven by forecasts on market fundamentals.

It is interesting then that the South African listed property fund managers report a desire to cut losses as the main driving factor to sell property. Their decisions would have been in line with normative behaviour if they kept winning properties, but they indicated doing otherwise by all regretting holding on to underperforming properties for too long. This confirms, in line with similar findings in the UK property market by Gallimore *et al*. (2000:610), that South African listed property fund managers may be loss averse.

The next two questions were designed to test the presence, or absence, of the disposition effect, as well as loss aversion. The first question was whether the listed property fund managers spend more time on buy or sell decisions. The second question asked which decisions (the buy or sell decisions) are more difficult to make.

Tables 30 and 31, below, show the results obtained in response to these questions respectively. These results may further substantiate the disposition effect, as if it is more difficult to decide to sell a property, it may show that respondents display despondency regarding losses. If more difficulty is associated with buying decisions, it may indicate a fear of investing in underperforming properties, suggesting loss aversion.

If it is more difficult to make buy decisions than sell decisions, it may also indicate greater uncertainty in an opaque market. This means that the listed property fund managers may experience difficulties in confirming the market fundamentals of an unfamiliar asset to invest in, whereas the owner of a property has all the market fundamentals of the property available.

**Table 30: Time spent on decisions to buy and sell a property**

| Buy and sell decision | Frequency | Percentage |
|---|---|---|
| More time spent on decisions to buy a property | **15** | **88.2** |
| More time spent on decisions to sell a property | **0** | **0** |
| I spend about the same amount of time on each decision | **2** | **11.7** |

The data from Table 30, above, show that, without a doubt, the majority of respondents (88.2%) spent more time on decisions to **buy** property. No

respondents spent more time on selling property, and 11.7% of respondents spent about the same amount of time on both the buy and the sell decisions.

**Table 31: The difficulty of buy and sell decisions**

| Buy and sell decision | Frequency | Percentage |
|---|---|---|
| Decisions to buy a property are more difficult | **12** | **70.5** |
| Decisions to sell a property are more difficult | **2** | **11.7** |
| The difficulty level is about the same | **3** | **17.6** |

What is interesting from the data provided in Table 31, above, is that the majority of respondents (70.5%) also find it difficult to make property **buying** decisions. Only 11.7% of respondents reported finding it difficult to make property selling decisions, whereas 17.6% of respondents reported the difficulty level of choosing between buy and sell decisions to be about the same.

These findings support the findings of Fogel and Berry (2006:107), indicating that the decision to buy is the most time-consuming, but the results contradicted the findings of Fogel and Berry (2006:107) with regard to selling decisions being the most difficult to make. However, it should be remembered that this section of the study was adapted for the South African property market from the work of Fogel and Berry (2006:107), who focused on individual investors in the US.

The reason that South African listed property fund managers find it difficult to buy property may be that they have learned from past mistakes and now have a fear of investing in underperforming properties. The emotion of fear was also noted by Szyszka (2010:132) in a study on the behavioural anatomy of the financial crisis. He argues that the emotion of fear was caused by the recent financial crisis, resulting in the subsequent appearance of the disposition effect and loss aversion. Chen *et al*. (2007:448) also found that the disposition effect

and subsequent loss aversion were present in emerging markets, referring specifically to Chinese investors.

In order to test the possible inclusion of mental accounting in listed property managers' decision framework, the participants were asked to imagine that they faced a pair of concurrent decisions, as set out in Table 32, below, and Table 33, overleaf. These concurrent decisions were based on an experiment done by Shefrin (2002:27) on a group of MBA students. The results may indicate that the respondents view the set of concurrent decisions independently from each other, thereby choosing the property that shows a smaller gain. Such a result would suggest that mental accounting influences the property investment decisions of listed property fund managers in South Africa.

**Table 32: Frequency analysis of the first decision**

| | First decision – Choose one of the following | Frequency | Percentage |
|---|---|---|---|
| A. | You have a possibility to sell a property and realise a sure profit of R5m, **or** | **16** | **94.1** |
| B. | You have a possibility sell a property with a 25% chance of realising a profit of R20m and a 75% chance of realising no profit at all. | **1** | **5.8** |

The sample of listed property fund managers was instructed first to examine both sets of choices, and then to indicate the option they preferred for each. From Table 32, above, it is clear that all the respondents, expect for one, would rather choose Option A, where they are guaranteed a sure profit of R5 million through selling a property, rather than take a 75% chance to realise no profit at all or a 25% chance to realise a profit of R20 million. This result shows a clear preference for the real gain in Option A presented in Table 32, above.

**Table 33: Frequency analysis of the second decision**

| | Second decision – Choose one of the following | Frequency | Percentage |
|---|---|---|---|
| C. | You have a possibility to sell a property and realise a sure loss of R15m, **or** | **8** | **47** |
| D. | You have a possibility to sell a property with a 75% chance of losing R20m and a 25% chance of losing nothing. | **9** | **52.9** |

Table 33, above, shows that 47% of the respondents would prefer to sell a property at a sure loss of R15m, whereas a small majority of respondents (52.9%) opted for Option D, where they would rather take a 75% chance of losing R20m or a 25% chance of losing nothing at all. The results indicate that the respondents are more or less evenly distributed in their feelings about the real loss presented in Option C and a possible loss in Option D.

In comparing these results with those of Shefrin (2002:27), it is clear that the set of decisions selected in his study was also Options A and D, although 90% of the respondents in his study chose Option D. In the current study, the choices between Options C and D are basically evenly spread. Taking into account that Shefrin's (2002:27) sample consisted of MBA students and that the problem set was different, and that his study preceded the global financial crisis, no clear deduction on mental accounting can be made on the basis of the responses in the corresponding decisions below.

However, it is interesting that the majority of listed property fund managers took a risk averse choice (Option A) in the first decision set, while the expected value in Option B was also R5 million. This effect may be attributed to the fact that the respondents look at the sure gain in Option A independently from the potential

outcome in Option B, whereas Option B has an expected outcome equal to the sure gain in Option A.

In terms of the second decision set, Shefrin (2002:27) argues that people choose Option D because they have a chance to break even, rather than realise the sure loss. In the current study, 47% of respondents indicated that they would accept the sure loss. However, the results are too evenly spread to allow a safe deduction to be made, and therefore these results cannot be claimed to support the work of Shefrin (2002:27). The influence of mental accounting on the property investment decisions made by South African listed property fund managers could thus not be established in this study.

### 6.5.3 Summary

This section dealt with the results on the presence of frame dependence, in particular the disposition effect, loss aversion and mental accounting. It was established that the disposition effect has an influence on the decision-making of listed property fund managers in South Africa, as the respondents all indicated feelings of regret at the notion of holding onto losing properties rather than at that of selling winning properties. This finding also supports the results of previous research.

The main reason for listed property fund managers in South Africa to dispose of property was a desire to cut losses. The anticipated direction of the market did not seem to be as important to them as the desire to purchase another property.

Respondents also showed that it is more difficult and time-consuming to decide to buy properties than to sell them, implying that, together with the strong desire

to cut losses, loss aversion is present. There was no clear evidence on the influence of mental accounting on the decisions made by listed property fund managers. It is therefore deduced that the results in this section suggest that the third hypothesis, namely that frame dependence influences the investment decisions made by listed property fund managers in South Africa, should be accepted.

## 6.6 MARKET FUNDAMENTALS, MARKET SENTIMENT AND INFORMATION SOURCES IN PROPERTY INVESTMENT DECISION-MAKING

### 6.6.1 Introduction

This section of the questionnaire concentrates on the possible presence of market inefficiency in the South African property market. It is argued in the literature review that decision-makers in the property market, including property fund managers, have to rely on market sentiment and personal networks and experience to base their property investment decisions on, because of deficiencies in the accuracy of fundamental market information. Reliance on market sentiment and personal networks and experience as substitutes for factual market data may lead to the mispricing of property assets. According to the literature, property investors in general tend to rely on market sentiment and personal networks and experience to make property investment decisions, and this suggests that behavioural aspects may influence their decision-making capability.

The results in this section address the fourth hypothesis, which relates to listed property fund managers in South Africa's using market sentiment and personal

experience, rather than market fundamentals, in property investment decision-making. In the final analysis, these results assist in addressing the main research problem in this study, namely the influence of behavioural aspects on the investment decisions of listed property fund managers in South Africa.

### 6.6.2 Market fundamentals and market sentiment

This section presents evidence on the use of market fundamentals and market sentiment by listed property fund managers in South Africa. The first question asked the respondents to indicate, by answering “yes” or “no”, whether or not the fund that they are employed at uses an in-house research department that assists them in the decision-making process. The answer (see Table 34, below) was an indication of the level of assistance that listed property fund managers have in making their property investment decisions.

**Table 34: The use of an in-house research department**

| Does your fund have an in-house research department? | Frequency | Percentage |
|---|---|---|
| Yes | **5** | **29.4** |
| No | **12** | **70.5** |

Table 34, above, shows that 12 respondents indicated that their funds did not have an in-house research department, but five respondents’ funds do have one. The results in Table 34 thus show that in the South African listed property market, the majority of property fund managers (70.5%) do not use an in-house research department to assist them with their decision-making. This finding does not support the UK-based findings of MacOwan and Orr (2008:355), who found that 70.4% of the sample of fund managers surveyed in the UK did make use of an in-house research department to assist them in investment decisions.

This finding on the high number of listed property fund managers in South Africa who do not use an in-house research team is also in contrast to the findings of Gallimore and McAllister (2005:1), who deduced from the results of their study that the high number of in-house research teams in the UK showed that property market forecast data plays a fundamental role in strategically allocating property assets. In other words, the property investment decisions that UK fund managers take is supported by forecast data.

It seems then that listed property fund managers in South Africa have to analyse data without the assistance of an in-house research team in their decision-making framework. The respondents did indicate (see Table 43, Section 6.6.3 below) that the second-most important information sources they used in property investment decision-making were private databases. This may suggest that these managers find in-house research teams more expensive than purchasing the data from private databases.

To determine whether listed property fund managers rely more heavily on market fundamentals than on market sentiment in making property investment decisions, respondents were asked to rate the level of importance of the use of both these concepts on a Likert-type scale. The scale ranged from 1 (“not important at all”) through 3 (“of moderate importance”) to 5 (“essential”).

The Wilcoxon matched-pair signed rank test was applied to determine whether or not there is any statistically significant difference between the level of importance of the use of market fundamentals in property investment decision-making and the level of importance of the use of market sentiment in property

investment decision-making by listed property fund managers in South Africa. The results are depicted in Table 35, below.

**Table 35: The level of importance of the use of market fundamentals in property investment decision-making (Mean 1) in relation to the level of importance of the use of market sentiment (Mean 2) in property investment decision-making**

| | N | Mean | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| Market fundamentals Mean 1 | 17 | 4.65 | 0.61 | 3 | 5 |
| Market sentiment Mean 2 | 17 | 3.65 | 0.93 | 2 | 5 |
| Difference | | -1.00 | 0.87 | | |
| Wilcoxon test: p = 0.0005 | | | | | |

(*Note:* Variable (1 to 5 Likert Scale: 1=not important at all; 3=of moderate importance; 5=essential); N=17)

The results reported in Table 35 (above) indicate that the mean of the level of importance of the use of market fundamentals (Mean 1) is 4.65 out of 5, and the mean of the level of importance of the use of market sentiment (Mean 2) is 3.65 out of 5. The difference between the two means is -1.00.

The results for Mean 1 and Mean 2 were compared using the Wilcoxon test. A statistically significant ($p<0.05$) relationship was obtained, with a higher level of importance attached to the use of market fundamentals than to the level of importance attached to the use of market sentiment by listed property fund managers to base their investment decisions on.

According to the results above, listed property fund managers in South Africa view the use of market fundamentals in property investment decision-making as more important than the use of market sentiment for the same decisions. This finding does not support the findings of Gallimore and Gray (2002:115), who demonstrated in a similar study in the UK that 55% of property investors

surveyed rated market sentiment as essential to their investment decision-making. The authors also found that sentiment orientated investors rely also on market fundamentals. This finding is substantiated by the fact that the propensity to place a value on sentiment is also associated as hard market data.

To substantiate the difference found to Gallimore and Gray's (2002:115) findings further, only 17.6% of the South African respondents deemed market sentiment essential in property investment decision-making. However, 70.5% of the South African respondents indicated that market fundamentals are essential in making investment decisions. This may indicate a shift towards normative thinking in the South African context, rather than a descriptive application involving behavioural aspects.

### 6.6.3 The use of types and sources of information as well as the use of techniques by listed property fund managers in South Africa

In this section of the questionnaire, respondents were asked to use a Likert-type scale to rate the extent to which they used different information types as decision-making information to make decisions about property purchases and disposals. The scale ranged from 1 ("not used at all") through 3 ("used to a moderate extent") to 5 ("always used").

The data on the information types may further substantiate the importance of the use of market fundamentals rather than market sentiment. The data on the information sources used by listed property fund managers to assist them in making property investment decisions may indicate whether or not they use their own experience to come to a property investment decision. Therefore the

results in this section further assist in clarifying the fourth hypothesis, namely that listed property fund managers in South Africa use market sentiment and personal experience, rather than market fundamentals, in property investment decision-making.

As Table 36, below, shows, the information types were divided into six "facts" which represent fundamental market information and five "views" which represent viewpoints of the current and future direction of the market. This division was done in accordance with the research of Gallimore and Gray (2002:115). The results of the current study are presented in Table 36, below.

**Table 36: The mean ratings of fundamental market information (facts) and viewpoints of the current and future direction of the market (views) used in investment decision-making**

| Information type | Mean rating | Std Dev |
|---|---|---|
| Facts | | |
| Actual transaction prices/rents/yields | 4.47 | 0.72 |
| Vacancy data | 4.29 | 1.05 |
| Floor-space supply/demand indicators | 4.18 | 1.01 |
| Money market returns/interest rates | 3.76 | 1.15 |
| Property price inflation indicators | 3.18 | 1.19 |
| General price inflation indicators (CPI, CPIX) | 3.06 | 1.20 |
| Views | | |
| Personal "feel" for state of property market, based on experience rather than current data | 4.06 | 0.83 |
| Views of general economic commentators | 3.41 | 1.00 |
| Publicly available forecasts of property market trends | 3.24 | 1.09 |
| Publicly available forecasts of economic trends | 3.06 | 1.09 |
| Views of property market commentators | 2.94 | 1.20 |

(*Note:* Variable (1 to 5 Likert Scale: 1=not used at all; 3=used to a moderate extent; 5=always used); N=17)

According to the results, the main information type used was the prices of actual transactions (4.47 out of 5) completed in the market. This finding is consistent with the findings of Gallimore and Gray (2002:115), who reported a mean rating of 6.28 out of 7 for the prices of actual transactions as the main information type used in their study. The next important factor in the current study was vacancy data (4.29 out of 5) and floor space supply/demand indicators (4.18 out of 5). Rated directly after the latter two was personal feel for the market that is based on experience rather than current market data (4.06 out of 5). The other information types listed under both “facts” and “views” also show frequent use, and their respective mean ratings are closely matched.

The results indicate that listed property fund managers depend strongly on “facts” as information types to use in making property investment decisions. The use of “views” that represent market sentiment seems to be used after the more important “facts” have been taken into consideration. This may be another indication that South African listed property fund managers rely more heavily on market fundamentals (facts) to base their investment decisions on.

In addition, respondents were also asked to rate the use of five financial management techniques that may assist them in making property investment decisions. These techniques are normative in nature, as they are derived from normative theory and use “facts” as input data to arrive at a final answer. The results of this question show whether there is a tendency towards the use of these techniques. If so, it may further substantiate the importance of the use of market fundamentals rather than market sentiment. It may also indicate a tendency towards the application of normative models rather than descriptive

models in their property investment decisions. The results are set out in Table 37, below.

**Table 37: The mean ratings of financial management techniques used in investment decision-making as decision-making criteria**

| Technique | Mean rating | Std Dev |
|---|---|---|
| Internal rate of return (IRR) | 4.12 | 1.05 |
| Net Present Value (NPV) | 3.88 | 0.99 |
| Risk-adjusted discount rates (RADRs) | 2.82 | 1.42 |
| Modified internal rate of return (MIRR) | 2.65 | 1.41 |
| Payback Period | 2.35 | 1.32 |

(*Note:* Variable (1 to 5 Likert Scale: 1=not used at all; 3=used to a moderate extent; 5=always used); N=17)

The techniques are listed in Table 37, above, where respondents had to rate each technique on a Likert-type scale that ranged from 1 ("not used at all") through 3 ("used to a moderate extent") to 5 ("always used"). The table shows that the IRR (4.12 out of 5) and the NPV (3.88 out of 5) are most frequently used. The other techniques are also shown to be useful in assisting in property investment decision-making.

Gallimore *et al*. (2000:161) found similar results in the UK market, but deduced that the reason for the use of the popular NPV and IRR techniques in their market was more to acquire a "gut feeling" for the asset involved rather than to use them as decision-making criteria. In the South African sample, 76.5% indicated that they always use the NPV and the IRR as decision-making criteria in their property investment decisions. Again, this may indicate a tendency to move towards the normative decision-making realm rather than a totally behavioural approach.

To test further whether the respondents rely on market fundamentals or on market sentiment in making investment decisions, each of the two information type classes, “facts” and “views” (see Table 36, above), as well as the financial management techniques (see Table 37, above), was interpreted as a separate group. The three separate groups are presented in Table 38, below, and Tables 39 and 40, overleaf, with “facts” as information types, “views” as information types, and financial management techniques used, respectively. To test how closely related the set of “facts”, “views” and techniques in each group is (thus testing the reliability to use them as a group), the Cronbach’s alpha of each separate group was measured.

It is important to note that at this stage of their study Gallimore and Gray (2002:116) applied factor analysis to test the implications of the facts and views on market fundamentals and market sentiment. The sample in the current study was too small to proceed with a factor analysis and therefore non-parametric measures were used.

**Table 38: Cronbach’s alpha for “facts” as information type**

| Deleted information type: Facts | Correlation with total | Alpha |
|---|---|---|
| Actual transaction prices/rents/yields | 0.20 | 0.65 |
| Vacancy data | 0.24 | 0.64 |
| Floor-space supply/demand indicators | 0.26 | 0.63 |
| General price inflation indicators (CPI, CPIX) | 0.40 | 0.59 |
| Money market returns/interest rates | 0.52 | 0.53 |
| Property price inflation indicators | 0.59 | 0.50 |
| Cronbach’s alpha coefficient = 0.64 | | |

**Table 39: Cronbach's alpha for "views" as information type**

| Deleted information type: Views | Correlation with total | Alpha |
|---|---|---|
| Personal "feel" for state of property market, based on experience rather than current data | 0.58 | 0.90 |
| Views of property market commentators | 0.69 | 0.88 |
| Views of general economic commentators | 0.75 | 0.87 |
| Publicly available forecasts of economic trends | 0.84 | 0.84 |
| Publicly available forecasts of property market trends | 0.86 | 0.84 |
| Cronbach's alpha coefficient = 0.89 | | |

**Table 40: Cronbach's alpha for financial management techniques**

| **Deleted technique** | **Correlation with total** | **Alpha** |
|---|---|---|
| Net Present Value (NPV) | 0.23 | 0.80 |
| Internal rate of return (IRR) | 0.48 | 0.73 |
| Payback Period | 0.54 | 0.71 |
| Risk-adjusted discount rates (RADRs) | 0.67 | 0.66 |
| Modified internal rate of return (MIRR) | 0.73 | 0.63 |
| Cronbach's alpha coefficient = 0.76 | | |

It is clear from Tables 38, 39 and 40, above, that, as the inter-item correlation increases (gets closer to 0), so does Cronbach's alpha. In all three cases (facts = 0.64; views=0.89; techniques=0.76) the Cronbach's alpha was high and above the generally acceptable reliability coefficient of 0.60, thus implying a high internal consistency between the items in each of the three separate cases.

Following the high internal consistency of each of the groups above, the Spearman's correlation coefficients were calculated for each group compared

with market fundamentals and market sentiment respectively. This calculation was done to determine whether or not there is a correlation between market fundamentals and the three groups above, as well as market sentiment and these three groups. If there is a correlation in these cases, it will statistically illustrate that there is a reliance on facts, views and the techniques independently, in relation to the importance of the respective use of market fundamentals and market sentiment. The results are set out in Tables 41 and 42, below.

**Table 41: Variable for measuring Spearman's correlation coefficients**

| Variable | N | Mean | Std Dev |
|---|---|---|---|
| Market fundamentals | 17 | 4.65 | 0.61 |
| Market sentiment | 17 | 3.65 | 0.93 |
| Facts as information type used | 17 | 3.82 | 0.64 |
| Views as information type used | 17 | 3.34 | 0.88 |
| Techniques used | 17 | 3.16 | 0.90 |

**Table 42: Spearman's correlation coefficients**

| Variable | Facts | Views | Techniques |
|---|---|---|---|
| Market fundamentals – correlation | 0.42 | 0.29 | 0.51 |
| Market fundamentals – p value | 0.09 | 0.25 | 0.04 |
| Market sentiment – correlation | -0.008 | 0.25 | 0.63 |
| Market sentiment – p value | 0.98 | 0.34 | 0.007 |

It is clear from the results in Table 42, above, that neither "facts" (p=0.09; p=0.98) nor "views" (p=0.25; p=0.34) as groups of information types are perceived as more important than one another by the respondents in terms of the importance of the use of market fundamentals and market sentiment in investment decision-making respectively, since p>0.05.

However, there is a statistically significant relationship between market fundamentals used in investment decision-making and financial management techniques used investment decision-making (p=0.04). This is also the case for market sentiment used in investment decision-making and financial management techniques used investment decision-making (p=0.007).

The observed statistical significance in both cases above might be a result of reliance on fundamental market data, but also market sentiment, to correctly interpret the final answer of the decision-making criteria in either the NPV or the IRR applied. It also possibly suggests that listed property fund managers in South Africa, in making investment decisions, do take market sentiment into account especially a personal feel for the market based on their own experience. This is evident in Table 42, above, as Spearman's correlation coefficient for market sentiment/techniques (0.63) is higher than that of market fundamentals/techniques (0.51).

It is therefore probable that the listed property fund managers in South Africa, in using financial management techniques, rely more on views of a sentimental nature to arrive at an investment decision than on market fundamentals.

The fourth hypothesis in this study also state that listed property fund managers rely more on their personal experience rather than on market fundamentals to take property investment decisions. To show whether this is the case, respondents were asked to indicate their use of public information, private databases and personal network sources on a Likert-type scale that ranged from 1 ("not used at all") through 3 ("used to a moderate extent") to 5 ("always used"). The answers are set out in Table 43, overleaf.

**Table 43: Mean ranking of information sources used by listed property fund managers**

| Information source | Mean | Std dev |
|---|---|---|
| Private/personal network sources | 4.47 | 0.51 |
| Private database sources | 4.17 | 0.73 |
| Public sources | 3.65 | 1.00 |

(*Note:* N = 17)

Table 43, above, presents the mean rankings, as well as the standard deviations of the three possible sources of information used by listed property managers in South Africa when making investment decisions. It is apparent from this table that respondents have a higher tendency towards the use of private and personal network sources (4.47 out of 5) than the use of private database sources (4.17 out of 5) and the use of public sources (3.65 out of 5).

What is interesting from these results is that the mean difference between the use of private and personal network sources and the use of private database sources was 0.30. This difference is much smaller than the mean difference between private and personal network sources and public sources (0.82) of information used by listed property managers in South Africa to base investment decisions on. This may suggest that there is quite a strong reliance by listed property fund managers in South Africa on the use of private and personal network sources as well as private database sources rather than the use of public sources in investment decision-making. These results are consistent with the findings of Gallimore and Gray (2002:117) in the use of private and personal network sources in the UK.

### 6.6.4 Summary

This section set out the results of the reliance on the use of market sentiment rather than on market fundamentals in listed property fund managers' decision-making framework. This analysis was performed to determine whether, and in accordance with Hypothesis 4 of this study, market sentiment and personal experience rather than market fundamentals are used as information sources.

Firstly, a majority of respondents indicated that they did not use in-house research departments to assist them with their investment decisions. A strong statistically significant difference was found when the importance of the use of market fundamentals was related to the importance of the use of market sentiment in decisions by listed property fund managers in South Africa. The use of market fundamentals seems to be more important than the use of market sentiment when it comes to property investment decisions.

To further investigate this finding, a list of information types used was divided into "facts" (the hard market data) and "views" (comments on the market). These two groups together with a group of financial management techniques used were tested for internal consistency, applying Cronbach's alpha. Thereafter, the correlation between the three groups, and market fundamentals and the correlation between the three groups, and market sentiment was measured using Spearman's correlation coefficient.

Statistically significant relationships were found between both the importance of the use of market fundamentals and the importance of the use of market sentiment when measured against the use of financial management techniques, namely the IRR, the NPV, the payback period, the MIRR and the RADR. It

seemed as if both fundamental data and market sentiment are used to conclude the results of the financial management techniques used as decision-making criteria. A greater tendency towards using the normative approach when listed property fund managers make investment decisions was noted, as they rely more heavily on market fundamentals to use as input data in the application of the financial management techniques than on market sentiment.

It was interesting to note, in the light of the above, that listed property fund managers in South Africa do depend mostly on private and personal network sources for information. This may indicate that data in this market are not all that factual and that private and personal network sources for information serve as a substitute where the fundamental data display deficiencies.

In line with the research of Gallimore and Gray (2002:116), it was found that the actual transaction prices are the most important information type used by listed property fund managers in South Africa. The literature review showed that these prices are derived from valuation-based indices. MacCowan and Orr (2008:357) conclude that heuristic-driven biases have been linked to valuation based indices as information source. South African listed fund managers view the use of fundamental data, especially in the form of actual transaction prices that may however be derived from biased indices, as important.

It may then be suggested that, because of the heuristic-driven biases that do exist in valuation-based indices as suggested by the literature, listed fund managers use their personal experience to substitute other information for this deficiency in the fundamental market data.

Although there may be possible behavioural aspects in valuation-based indices in South Africa, it was not scientifically tested as this was beyond the scope of this study. The hypothesis tested in this section of the study which states that listed property fund managers in South Africa base their investment decisions on factors such as market sentiment and personal experience rather than on market fundamentals is thus rejected.

The decision to reject Hypothesis 4 is based on the statistically significant relationship found between the importance of the use of market fundamentals rather than market sentiment in property investment decisions made by listed property fund managers in South Africa.

## 6.7 THE EXTENT AND INFLUENCE OF GOVERNMENT ENTITIES ON PROPERTY INVESTMENT DECISIONS

### 6.7.1 Introduction

In this section, the influence of government entities on the decision-making of listed property fund managers in South Africa was analysed. This was necessary because the actions and decisions of government may influence the listed property market and its decision-makers in South Africa. This influence may be experienced in a positive or a negative way by the listed property fund managers, which in turn may make them susceptible to behavioural biases.

### 6.7.2 Analysis and discussion of the data

The influence of the tri-level South African government dispensation, which is divided into local, provincial and national government, on listed property fund

managers in South Africa's decision-making, was investigated. The results are set out in Tables 44 to 46, below and on the following pages.

**Table 44: Experience of influence versus extent of influence by the local government**

| Experience (feeling) of influence by local government | Extent of influence by local government | | | |
|---|---|---|---|---|
| | Influenced to no or small extent | Influenced to a moderate extent | Influenced to a high extent and always influenced | Total % |
| No influence | **4** | **0** | **2** | **35.2** |
| Negative influence | **2** | **1** | **8** | **64.7** |
| Total N = 17 | **6** | **1** | **10** | **100** |
| Fisher's exact test: p=0.10 | | | | |

The results presented in Table 44, above, shows how the property fund managers experience the influence of the local government on their investment decision-making. Of the 17 respondents who completed this question, six respondents (35.2%) experienced a "small extent" to "no extent" of influence from the local government, while 64.7% reported such influence to a "moderate extent" to "always". In this sample, 11 respondents (64.7%) experienced the influence of local government as "negative" on their decision-making and a majority of these 11 respondents (72.7% or eight out of 11) indicated that the extent to which the local government influenced their investment decisions ranged from "high" to "always". No respondent experienced the influence by the local government on their investment decision-making as positive.

Fisher's exact test shows that there is no statistically significant relationship between the experience of the influence of local government and the extent of

influence of local government on the listed property fund managers' investment decision-making ($p>0.05$).

The majority of respondents were thus influenced by the decisions and actions of local government in South Africa. The experience of this influence on those that are influenced by the actions of local government seems to be negative. No respondent indicated a positive experience from local government.

As discussed earlier, negative emotions may cause listed property fund managers rather not to invest in property assets. They might therefore miss out on possible future gains because of behavioural aspects such as emotional heuristic-driven biases and loss aversion being created by the actions and decisions of local government.

The experience of the influence of provincial government on the fund managers' investment decision-making in relation to the extent of influence by the provincial government on their investment decision-making is presented in Table 45, below.

**Table 45: Experience of influence versus extent of influence by the provincial government**

| Experience (feeling) of influence by provincial government | Extent of influence by provincial government | | | |
|---|---|---|---|---|
| | Influenced to no or small extent | Influenced to a moderate extent | Influenced to a high extent and always influenced | Total % |
| No influence | **5** | **0** | **3** | **47** |
| Negative influence | **3** | **2** | **4** | **52.9** |
| Total N = 17 | **8** | **2** | **7** | **100** |
| Fisher's exact test: p=0.44 | | | | |

The results are relatively equally spread, with a slight tendency towards a "negative" influence (nine respondents) rather than "no influence at all" (eight respondents). Note that 62.5% of the respondents who experienced no influence from the provincial government also indicated that the extent of the influence by the provincial government is "none" to "small". No respondents experienced the influence by the provincial government on their investment decision-making as positive. There was no statistically significant relationship between the experience of influence in relation to the extent of influence by provincial government, as Fisher's exact test showed that $p>0.05$.

It is interesting to note that, as was the case with local government, no respondent who was influenced by the actions and decisions of provincial government felt positive about these actions and decisions. It seems that provincial government may also create negative feelings and emotions, but to a lesser extent than local government.

The results on national government are presented in Table 46 (below).

**Table 46: Experience of influence versus extent of influence by the national government**

| Experience of influence by national government | Extent of influence by national government | | | |
|---|---|---|---|---|
| | Influenced to no or small extent | Influenced to a moderate extent | Influenced to a high extent and always influenced | Total % |
| No influence | **7** | **0** | **0** | **41.7** |
| Positive influence | **0** | **0** | **3** | **17.6** |
| Negative influence | **1** | **2** | **4** | **41.7** |
| Total N = 17 | **8** | **2** | **7** | **100** |
| Fisher's exact test: $p<0.0001$ | | | | |

The most striking observation from this result is that the same number of respondents (seven) experienced “no influence” to a “small influence” from national government and a “negative influence” from the national government (although more evenly spread), respectively. A small number of respondents (17.6%) experienced the national government’s influence on their investment decision-making as positive.

Unlike the results in Tables 44 and 45, it is clear from Table 46 that all the respondents who experienced “no influence” from the national government also noted that there was “no” influence or influence only to a “small extent’’ from the same entity. Those respondents with a positive experience of the national government’s influence all showed a tendency to be influenced by the national government to a “high” extent or “always”. Therefore a clear statistically significant relationship exists between the experience and extent of influence by national government, as Fisher’s exact test showed that $p<0.05$.

Statistically, this result indicates that national government does influence property fund managers and that the experience of that influence is mainly negative. The majority of respondents who are influenced by the actions and decisions made by national government, express negative feelings. These negative feelings may make them susceptible to behavioural biases such as the emotional heuristic-driven bias and loss aversion.

In contradiction to the findings of Ramabodu *et al*. (2007:20), who argue the unlikely event of negative national government influences in the South African property market, the results from this study illustrate that listed property fund

managers in South Africa do experience the government's influence, at least at the national government level, as negative.

### 6.7.3 Summary

In this section, the influence of the South African government, the provincial governments and the local governments respectively, was statically measured. It was done to establish how listed property fund managers in South Africa are influenced by these government entities and how the listed property fund managers perceive this influence.

At the national government level, a statistically significant relationship was established between the experience and the extent of influence by the national government. It was found that the majority of listed property fund managers in South Africa experience the influence of the national government as negative. This is an important finding and sheds some light on the difficulties listed property fund managers in South Africa are faced with in making investment decisions. The negative experience of listed property fund managers of national government may also lead behavioural aspects such as emotion and loss aversion to creep into their decision-making framework.

## 6.8 CONCLUSION

The areas set out in Section 6.3 relate to the first hypothesis, namely that the holding period of property as an investment is influenced by behavioural aspects.

The findings did not show any significant changes in the property holding periods of listed property fund managers in South Africa. The findings also did

not establish any influence by heuristic-driven bias on property holding periods. They did, however, show, in line with the findings of MacCowan and Orr (2008:350) that the average property holding period by listed property fund managers in South Africa may be a short-term period. This short-term investment view seems to be confirmed by the findings of the current study, as the listed property fund managers showed the end of the property life as the second most important reason to sell.

The desire to cut losses was the single most important reason that the listed property fund managers gave for selling property. It was suggested that, in line with previous studies, this desire to cut losses may be a result of short-term investment views and the possible influence of the disposition effect, as well as loss aversion. However, this suggestion could not be statistically proven in this study.

Hypothesis 1 was therefore rejected based on the results of the study, as no statistically significant relationship between the average property holding periods and the influence of behavioural aspects could be found.

In Sections 6.4.2 to 6.4.7, the data and results analysed and discussed related to the forms of heuristic-driven bias as listed in this Chapter 3 of this study. The influence of heuristic-driven bias on listed property fund managers in South Africa's decision-making framework was hypothesised as the second hypothesis.

In general, it seems that the second hypothesis (apart from some evidence of the consistency with related work on the anchoring and adjustment heuristic driven bias) had to be rejected, based on the results of the study, as no

statistically significant relationship could be derived to show that any of the heuristic-driven biases do have an influence on the property investment decisions of the listed property fund managers.

In Section 6.5, which dealt with the results on the presence of frame dependence, in particular the disposition effect, loss aversion and mental accounting, a number of interesting facts came to light:

- All the respondents indicated that despondency towards losses is higher than their despondency towards gain, implying the existence of the disposition effect.
- The majority of respondents (94%) showed associated difficulties with buying decisions rather than selling decisions, suggesting a fear of investing in new property and the existence of loss aversion.
- The respondents also indicated a desire to cut losses as the most important reason to sell property, which also implies that they do have feelings of regret on holding on to underperforming properties. Associated with this may also be feelings of fear of realising a financial loss.
- The effect of mental accounting could not be established.

It could conceivably be argued, based on the results of this study that the influence of frame dependence, the disposition effect and loss aversion are apparent in the South African listed property sector. Therefore, the third hypothesis, which is that frame dependence influences the investment decisions of property fund managers in South Africa, is accepted.

Based on the results in Section 6.6, statistically significant results showed that the importance of the use of market sentiment plays a smaller role in investment

decision-making by listed property fund managers than the importance of the use of market fundamentals.

Statistically significant relationships were also found between the importance of the use of market fundamentals and the use of financial management techniques, as well as the importance of the use of market sentiment and the use of financial management techniques in investment decision-making. There is a stronger focus on market fundamentals as input data in financial management techniques to arrive at the correct investment decision by decision-makers in South Africa.

It was interesting that the respondents indicated the use of personal networks as their most important information source. They also indicated actual transaction prices as the main information source they used in making property investment decisions. It was suggested that, as also reported in prior research, listed property fund managers in South Africa may use prices from biased valuation-based indices. These biased indices may present a deficiency in the fundamental data used and therefore the listed fund managers have to rely on their own personal experience to substitute for these deficiencies. However, the presence of biased valuation-based indices in South Africa has not been researched in this study and therefore there is no evidence that this may be the case in South Africa.

The fourth hypothesis in this study states that listed property fund managers in South Africa use market sentiment and personal experience, rather than market fundamentals, in investment decision-making. This hypothesis is rejected, as a statistically significant relationship showed the use of market fundamentals as

more important than the use of market sentiment in property investment decision-making by listed property fund managers in South Africa.

In Section 6.7, the extent of the influence of local, provincial and national government on the investment decisions made by listed property fund managers in South Africa was measured. This was done to determine whether the feelings of these decision-makers regarding the influence of these entities render listed property fund managers in South Africa susceptible to possible behavioural influences on in their decision-making.

It was found through a statistically significant relationship that national government has a negative influence on the decisions made by the sampled listed property fund managers in South Africa. It was argued that this negative influence, also in contrast to previous research, may bring about behavioural aspects such as emotional heuristic-driven bias and loss aversion in the investment decisions made by these listed property fund managers.

Having analysed and discussed the empirical research, the next and final chapter presents a summary of the research reported in this study, as well as conclusions on the statistical analysis that was performed, recommendations based on the findings, and areas for further and future research.

# CHAPTER 7:
# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 7.1 INTRODUCTION

This chapter contains a brief summary of what the study set out to achieve, how the research was conducted and what the findings of the survey are. Conclusions are then drawn and recommendations on future research are presented.

## 7.2 SUMMARY

The main objective of this study was to identify whether behavioural aspects influence the investment decisions made by listed property fund managers in South Africa. The hypotheses to achieve this objective were outlined in Sections 1.3 and 5.1, and are repeated here for the convenience of the reader:

Hypothesis 1: The holding period of property as an investment is influenced by behavioural aspects.

Hypothesis 2: Listed property fund managers in South Africa are influenced by heuristic-driven bias in investment decision-making.

Hypothesis 3: Listed property fund managers in South Africa are influenced by frame dependence in investment decision-making.

Hypothesis 4: Listed property fund managers in South Africa base their investment decisions on factors such as market sentiment and personal experience rather than market fundamentals.

A literature study consisting of three chapters investigated aspects of the literature that the hypotheses address. Chapter 2 covered traditional finance theories with specific reference to neoclassical economics and the expected utility theory. The aim of this chapter was to show the evolution of the process of decision-making through the modern finance models, and the relationship of these theories to property investment. The relation of these models and theories to property were therefore highlighted.

The expected utility theory served as a foundation for the development of normative decision models, especially in respect of asset pricing and market efficiency. The associated difficulties, both in the determination of the price of property assets and the efficiency of property markets, were illustrated with reference to relevant studies.

Chapter 3 defined and explained the subject area of behavioural finance with the prospect theory as a foundation. After the subject area had been defined and explained, the most prominent behavioural aspects of heuristic-driven bias, frame dependence and market inefficiencies were discussed.

It was the objective of Chapter 3 to explain the development of the theory of behavioural finance through prospect theory. The heuristic-driven biases discussed included representativeness, overconfidence, anchoring and adjustment, herding behaviour, aversion to ambiguity and emotion. Frame dependence included the disposition effect, loss aversion and mental

accounting. Market inefficiency was addressed by a discussion of market sentiment, personal experience and market fundamentals. All these behavioural aspects were used in the empirical analysis in order to solve the main research problem.

Through the examination of the prospect theory, it became evident that there are definite differences between this model and the normative models. The reasons for these differences were also explained with reference to the relevant literature. In addition, a clear understanding of the fact that human behaviour influences the decisions that people make, especially financial decisions, was formed through the discussion of the literature on the specific behavioural aspects. The literature also showed that these behavioural aspects may render markets inefficient.

The main objective of Chapter 4 was to focus on the interface between behavioural finance and property investment decision-making. Specific attention was paid to the literature that related to the stated hypothesis. A detailed review was conducted on property holding periods, the specific heuristic-driven biases tested in this study, frame dependence and market inefficiency in a property investment environment. A final section on property fund managers and property investment decision-making concluded the chapter, as well as the review of the related literature.

Through the literature reviewed, this chapter established a definite relationship between human behaviour and property investment decision-making. Changes in property holding periods were indicated as a trend, and behavioural aspects were identified in a property decision-making context.

Furthermore, the literature indicated biased benchmark indices and subsequent mispricing in the property market because of predetermined prices. This creates inefficiencies in the property market. The literature also suggested that there is a tendency for property fund managers to be put under pressure to outperform the market, while depending on personal networks and experience as information sources, as well as other costly information sources, because of inefficiencies in the property market. Inefficiencies in applying normative models in the evaluation of property portfolios were also identified in the literature, as these models do not capture the risk of the presence of behavioural aspects.

Chapter 5 set out the methodology followed in the empirical research. The research design was described as survey-based, with survey data used to draw conclusions. The research method was explained, showing the chosen research instrument, the data and data gathering process, the representativity of the response, as well as the data analysis process.

As the study was survey-based, a questionnaire was used as research instrument. The questionnaire was selected because of its wide and successful application in studies on property investment decision-making. The development, as well as the contents, of the questionnaire was also discussed.

The data and data gathering process explained that 27 South African-based listed property funds were listed on the Johannesburg Securities Exchange (JSE) on 31 December 2011. The total number of listed property fund managers was 29, of which 17 responded to the questionnaire. This constituted a response rate of 59%. The funds that these 17 listed property fund managers

were employed at represented 80% of the total market capitalisation of the South African listed property fund industry.

In respect of the representativity of the response, it was explained that all 17 participants responded by completing the questionnaires fully. The information that was obtained was reasonably accurate, and the response was considered to be acceptably representative of the sample.

The fact that the sample was relatively small rendered parametric data analysis techniques in analysing the data non-viable, and therefore this study had to apply non-parametric statistical techniques to conduct the data analysis. This was done through the use of Cronbach's alpha coefficient, together with the Spearman correlation coefficient, to test for group reliability and correlations between variables. Fisher's exact test and the Mann-Whitney U test were applied to analyse the relationships between two groups of variables statistically, and the Wilcoxon matched-pair signed rank test was used to compare two pairs of data by ranking the pairs.

Finally, the anticipated limitations of the research design and method, as well as the ethical considerations and clearance, were considered before presenting an analysis and discussion of the results in Chapter 6. The main limitation of the empirical analysis was the fact that the sample size was small. That said, a response rate of 59% was obtained, and this sample represented 80% in total market capitalisation of the South African listed property fund industry. Together with the fact that the sample was tested through the application of scientific techniques, it rendered the data reliable and presentable.

The analysis and discussion of the results in Chapter 6 showed that the first hypothesis, that the holding period of property as an investment is influenced by behavioural aspects, had to be rejected. There was no statistical evidence that listed property fund managers in South Africa are influenced by heuristic-driven bias in investment decision-making, so the second hypothesis also had to be rejected. However, the third hypothesis, which addresses the influence of frame dependence on listed property fund managers' decision framework, was accepted.

The data that pertained to Hypothesis 3 were not statistically tested, as the whole sample indicated a higher despondency towards losses than towards gain. It was therefore clear that the disposition effect, as well as loss aversion, influenced listed property fund managers' investment decisions. With regard to the fourth hypothesis, it was found that it had to be rejected on the basis of the statistical analysis, because the majority of the respondents relied mainly on market fundamentals in arriving at their investment decisions.

Having outlined what the study set out to do and the method followed to achieve the objective, final conclusions are now reached on the basis of the findings and discussions.

## 7.3 CONCLUSIONS

The conclusions reached on the basis of the findings of the survey data follow the sequence of the analysis and discussion of the data as set out in Chapter 6 of the study.

With regard to property holding periods and the influence of behavioural aspects, the analysis showed that there was no statistically significant relationship between listed property fund managers in South Africa's average holding period in months and the holding period of the last three properties sold in 2011, if the the Wilcoxon matched-pair signed rank test was applied to the data. Therefore the property holding periods of South African listed property fund managers do not appear to be changing.

The analysis also showed that there was no statistically significant relationship between the average holding period in months and the influence of the representativeness heuristic-driven bias and herding behaviour, applying the Mann-Whitney U test to test the data. Therefore it was found that behavioural aspects in heuristic-driven bias do not seem to influence the property holding periods of the listed property fund managers in South Africa.

In spite of the above findings, the results did show, in accordance with the average holding periods reported by MacCowan and Orr (2008:350) and Gardner and Matysiak (2005:17), that listed property fund managers in South Africa have a short-term investment view regarding the holding of property. This reason for the short-term investment view was argued from two perspectives. Firstly, it was shown in a study by Fisher *et al*. (2004:362) that shorter investment horizons may indicate loss aversion. Gardner and Matysiak (2005:17) deduced that factors such as the under-performance of assets leads to feelings of loss and regret among investors.

The respondents in the current study indicated a desire to cut losses as the most important reason to sell property. The current study then suggested, in line

with previous research, that this desire to cut losses and the prevalent disposition effect, according to Hypothesis 3 of this study, loss aversion and feelings of regret may influence the length of property holding periods in the listed property fund industry in South Africa. The listed fund managers may take short-term investment views to prevent holding on to underperforming properties, implying that these listed fund managers are loss averse. In general, therefore it seems that shorter investment views may prevail because of behavioural factors such as the disposition effect, and loss aversion, but not because of the representativeness heuristic-driven bias and herding behaviour.

On the other hand, the short-term view of property investments by listed property fund managers in South Africa may be an established view. The reason for this, it is argued, is that the listed property fund managers indicated the end of the property life as the second most important reason to sell. The end of the property life may thus be a short-term view, as fund managers may not hold on to property for relatively long periods. Unfortunately, it was not possible to test this influence statistically in terms of the two perspectives presented above.

It must be noted that in an emerging in economy such as the South African economy, the supply of stock (direct property) is scarce. In an interview on the main findings of the study, a respondent argued that property is often only sold if it decreases in value. The same respondent argued that short-term investment views are a function of the performance of the property asset, as well as of the performance of peers in the listed property fund industry in South Africa.

The influence of heuristic-driven bias in listed property fund managers in South Africa's decision-making framework were hypothesised as the second hypothesis and assisted in addressing the main research problem.

Disappointing, but relevant, was the finding that representativeness heuristic-driven bias may exist in the decision framework of listed property fund managers in South Africa, but it could not be statistically established that it does influence listed property fund managers in South Africa's decision-making abilities.

With regard to the overconfidence heuristic-driven bias, Fisher's exact test was used to determine the influence of this bias on listed property fund managers' investment decisions. The test related the respondents' age with their indication of their chances of outperforming other fund managers and with their indication of the chances of their fund's achieving above average risk-adjusted returns in future, respectively. The same relation was then examined, but in relation to the respondents' fund sizes. Fisher's exact test showed no statistically significant relationships in the results that could be analysed and no influence of the overconfidence heuristic-driven bias could be derived.

The results on the anchoring and adjustment heuristic-driven bias were encouraging. It showed consistency with the results of Northcraft and Neale (1987:84), Shefrin (2002:20), Kudryavtsev and Cohen (2010:171) and Leung and Tsang (2011:13). It seems that the respondents in the current study selected an anchor which represents the most favourable option. As new information was introduced, the majority of these respondents indicated that

they would stay with their original anchor property. They disregarded the fact that the new information deemed the original anchor property less favourable.

In this study, it was argued that the anchor property was selected by the respondents as the most obvious choice. As new information on the three property options was introduced, the respondents seemed to fail to adjust to the now more favourable option, as they did not understand how to incorporate the new information into their decision framework. This finding suggests potential judgement errors, as the respondents in the current study might be too conservative.

These results are consistent with those of other studies and suggest that there might be a bias towards anchoring and adjustment in the decision-making framework of listed property fund managers in South Africa.

In an interview held after the results of the study were known, a respondent confirmed that listed property fund managers in South Africa tend to have a conservative outlook when they make financial decisions. He argued that this conservative outlook was mainly due to the current socio-political situation in South Africa, which was considered to carry a greater weight in shaping investment decisions than the global financial crisis.

No statistical evidence was found that listed property fund managers in South Africa exhibit herding behaviour, either irrational or rational, but it was argued that they might display aversion to ambiguity, as the results, although they were not statistically significant, are consist with previous research results reported by French and Poterba (1991:226).

The data showed that South African listed property fund managers invest largely in South African properties, because they have superior knowledge of this market. The offshore market is perceived as unknown territory and is therefore seen as too risky to invest in, although it might hold unclaimed rewards in respect of capital and income growth.

Some respondents, in an interview on the results of the study, argued that aversion to uncertainty is present for two main reasons:

- investment in the rest of Africa is not possible until there is more certainty on property rights in African countries; and
- investment in the rest of the world is too risky because of the weak South African currency.

In the analysis of the role that emotion plays, listed property fund managers in South Africa seem to show both positive and negative emotions regarding decisions made, but it could not be determined which of these two emotions was the strongest, because of the small sample size. An important deduction was that, as was the case earlier**,** that listed property fund managers in South Africa do regret holding onto underperforming properties for too long. Respondents afterwards agreed that this was indeed the case.

Through the investigation of the influence of frame dependence on the investment decisions made by listed property fund managers in South Africa as stated in the third hypothesis, it was found that the disposition effect is present. There was a clear indication that respondents all feel more despondent about losses than towards gains.

Furthermore, the respondents indicated that the desire to cut losses was the most important reason for selling property. Together with the difficulties they pointed out in making buying decisions and the associated feelings of regret on holding on to losing properties, it could conceivably be argued that frame dependence, the disposition effect and loss aversion influence the South African listed property sector.

This result corroborates research findings reported by Tversky and Kahneman (1981:458), Rabin (1998:46), Shefrin (2002:23), Godoi *et al*. (2005:50), Chen *et al*. (2007:448) and Szyszka (2010:132) on the presence and influence of the disposition effect, loss aversion, and feelings of regret in respect of investors' selling "winners" and holding onto "losers" as investments.

The use of market sentiment and personal experience rather than market fundamentals in property investment decision-making was examined in relation to the fourth hypothesis of this study. The majority of listed property fund managers in South Africa indicated that they do not use assistance in the form of an in-house research department in making investment decisions. This finding did not support the findings of MacCowan and Orr (2008:355). In the current study, it was deduced that it might be an indication that listed property fund managers in South Africa depend on their own knowledge and expertise to make investment decisions. However, it was also argued in the current study that the use of in-house research departments might simply be too expensive. The listed property fund managers might therefore rather use private databases as information sources that are less expensive than in-house research departments.

A statistically significant relationship was shown by applying the Wilcoxon matched paired signed rank test, indicating that the use of market fundamentals is perceived as more important than the use of market sentiment when it comes to property investment decisions. This result contradicts the findings of previous research by Gallimore and Gray (2002:116), who indicated a higher use of market sentiment information than market fundamentals in decision-making.

The result above was further substantiated when the use of information types, presented as “facts” and “views”, as well as the use of financial management techniques, was compared to the importance of the use of market fundamentals and market sentiment, respectively. Through the application of Cronbach’s alpha and Spearman’s correlation coefficient, a statistically significant relationship was found between the importance of the use of market fundamentals and market sentiment and the use financial management techniques. Fundamentals and sentiment are both used as information types to assist property investment decisions made through the use of financial management techniques.

It was argued in the current study that, in line with the research of Gallimore and Gray (2002:116), actual transaction prices are the most important information type used by listed property fund managers in South Africa. These prices are derived from valuation-based indices, but, according to MacCowan and Orr (2008:357) and others, these indices have been linked with biases, as the prices are predetermined. Property valuers are under substantial pressure from institutional investors, which makes them, as valuers, susceptible to heuristic-driven biases. This creates deficiencies in the property market.

It is interesting then, and consistent with the previous research reported by Gallimore and Gray (2002:217), that listed property fund managers in South Africa rely heavily on the use of private and personal network sources in making property investment decisions. This may indicate that data in this market are not very factual and that private and personal network sources for information serve as substitutes where the fundamental data display deficiencies.

In an interview on the results, a respondent confirmed investors' reliance on personal networks and experiences. The respondent argued that the listed property fund industry is relatively small, and that the participants in this market know each other well. Personal networks are considered to be very reliable.

Given the results in this study, it is safe to deduce that market sentiment plays a relatively smaller role in property investment decision-making in South Africa. Secondly, it seems that there is a strong focus on market fundamentals and financial management techniques to arrive at investment decisions. Possible deficiencies in the fundamental data may be substituted by a reliance on personal networks and experience to arrive at a property investment decision.

Markedly disappointing was how respondents reacted with regard to the influence of the government on their investment decision-making. It seems that listed property fund managers experience this influence as negative. A clear statistically significant relationship was found between their experience of influence by the national government and the extent of the same negative influence. This negative feeling towards the influence of the South African national government on the listed property fund managers' investment decisions contrasts with the findings of the research by Ramabodu *et al*. (2007:20), who

claimed that negative national government influences in the South African property market were unlikely to appear. The finding sheds some light on the associated difficulties listed property fund managers in South Africa are faced with in making investment decisions. It may also be part of the reason that they find it difficult to make buying decisions, as they may not understand the actions and decisions implemented by national government. It may also lead them to be susceptible to behavioural aspects such as emotion and loss aversion.

The main objective of this dissertation was to identify whether behavioural aspects influence the investment decisions made by listed property fund managers in South Africa. In the light of the conclusions above, as well as the limitation of a small sample size, this study has five major findings that address this problem.

The first major finding was that the property holding period of listed property fund managers in South Africa appears not to have changed and is not significantly influenced by behavioural aspects. Listed property fund managers may, however, display short-term investment views.

The second major finding was that heuristic-driven bias does not seem to influence the investment decisions made by listed property fund managers in South Africa. It was found that anchoring and adjustment, and an aversion to ambiguity heuristic-driven biases may be present, but their influence on investment decisions made by listed property fund managers in South Africa could not be established to a statistically significant degree.

The third major finding was that frame dependence, as a behavioural aspect, does influence the investment decisions made by listed property fund managers

in South Africa. The disposition effect was evident. The listed property fund managers had a strong desire to cut losses and reported that they find it difficult to make buying decisions, which is indicative of loss aversion.

The fourth major finding was that listed property fund managers rely more on market fundamentals than on market sentiment to make investment decisions. It was established that actual transaction prices are the most important information type used in their investment decisions. They do use financial management techniques and use market fundamentals and market sentiment to interpret the techniques. They do, however, also rely on personal experience as the main information source to base their investment decisions on. In principle, the listed property fund managers follow a normative approach to property investment decision-making.

The fifth major finding is that the listed property fund managers in South Africa experience the influence of the national government on their property investment decision-making as negative, possibly making them susceptible to behavioural biases.

It must be noted that this study was conducted at a time when the after-effects of the 2008 financial crisis were still apparent. The uncertainty created through this crisis may have led listed property fund managers to display more risk-aversion in their investment decisions.

## 7.4 RECOMMENDATIONS

The recommendations made, based on the findings of this study, focus on three issues:

- Listed property fund managers should evaluate the financial feasibility of in-house research functionality, because the advantages may outweigh the additional cost. In-house research functionality may be more expensive, or not, than private databases, but their use will lead to a reduction in the time spent on buying and selling decisions, less dependence on personal networks, more confidence in the final decision made and less fear of incurring losses and the subsequent desire to cut losses.

- It is important to note on the basis of this study that the subject area of behavioural finance with special reference to real estate clearly does have a practical application. Frame dependence in particular is prominent in their investment decision-making. Fund managers should be made aware of these aspects so that they can incorporate them in their normative investment strategies in order to achieve maximum wealth.

- South African listed property fund managers must know that they are loss averse in their investment decision-making. Their high desire to cut losses and the associated difficulties in making buying decisions renders them conservative. This behaviour may be associated with the global financial crisis, but by being loss averse fund managers may lose perfectly positioned, profitable investment opportunities.

- Listed property fund managers must made be aware that they often rely on their personal experience as a major information source on which to base investment decisions. Although they present normative behaviour in relying mainly on market fundamentals in making property investment decisions, the

reliance on personal experience may indicate a lack of quality fundamental data in the industry and subsequent mispricing in the market.

- Government at all three tiers should create a positive property investment environment. This will enhance a positive property fund industry, with added value in terms of economic growth, job creation and the wealth of South Africa.

- Academic institutions must place a stronger emphasis on behavioural real estate as a teaching and research area, because it will (just as with this study) add to the growing body of research that assists an understanding of this subject area. The findings of such research can then be applied to prepare future property fund managers better to deal with the effects that behavioural aspects can have on the investment decisions they will make.

It is recommended that further research be undertaken in the following areas:

- An investigation on the investment strategies of listed property funds in South Africa in order to clarify the possible short-term investment views of fund managers;
- a more in-depth empirical investigation into the anchoring and adjustment heuristic-driven bias and the subsequent effects of herding behaviour, as well as the conservatism bias;
- a comparison of this study with data on property fund managers in other emerging countries to establish possible similarities or differences;
- the influence of local, provincial and national government on the decision-making behaviour of listed property fund managers to enhance

understanding of the investment environment in which these managers function; and

- an empirical investigation into the possibility of biased property price indices in South Africa to shed more light on the existence of deficiencies in the South African listed property fund industry.

Although this study was limited by the small sample surveyed, it did enhance understanding of the role that the normative approach plays in the South African property industry and more importantly, it went some way towards enhancing understanding of behavioural aspects and their influence on property investment decision-making in this country.

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# APPENDICES

# APPENDIX 1:

# THE QUESTIONNAIRE

# THE ROLE OF BEHAVIOURAL ASPECTS IN INVESTMENT DECISION-MAKING BY LISTED PROPERTY FUND MANAGERS IN SOUTH AFRICA

## QUESTIONNAIRE DOCUMENT

**by**

**GA LOWIES**

To be submitted in fulfilment of a part of the requirements for the degree

**PHILOSOPHIAE DOCTOR**
**(FINANCIAL MANAGEMENT SCIENCES)**

in the

**Faculty of Economic and Management Sciences**

University of Pretoria, 2012

# QUESTIONNAIRE: DRAFT

1. Respondent number …….

Please indicate the most accurate answer/s by ticking the appropriate box/es.

## PERSONAL INFORMATION

2. Please indicate your gender:

| | |
|---|---|
| Male | |
| Female | |

3. Please indicate your age in years:

.....

4. For how many years have you been in the listed property fund **industry**, in a decision-making position?

…….

5. For how many years have you been at the listed property fund where you **currently** work (in a decision-making capacity)?

…….

6. Please indicate your highest academic qualification:

| | |
|---|---|
| Matric | |
| Undergraduate | |
| Postgraduate | |

7. Please indicate if you have any professional affiliation/s:

| | |
|---|---|
| Yes | |
| No | |

**FUND INFORMATION**

8. What is the approximate size of the fund?

| | |
|---|---|
| ≤ R1bn | |
| > R1bn ≤ R5bn | |
| > R5bn ≤ R10bn | |
| > R10bn ≤ R15bn | |
| > R15bn | |

9. In which geographical market(s) does the fund invest? (Tick more than one if applicable)

| | |
|---|---|
| South Africa | |
| Other African countries | |
| Europe | |
| Rest of the world | |

10. What percentage of your fund's property portfolio is located in South Africa?

……..

11. In what property type does the fund primarily invest?

| | |
|---|---|
| Residential | |
| Retail (Shop and warehouse) | |
| Commercial (Office) | |
| Industrial | |
| Leisure | |
| Mixed-use | |

12. What was the approximate number of properties in the fund on 31 December 2011?

……

13. What was the average total return (capital and income growth) (%) of the fund in 2011?

……

**PROPERTY ACQUISITIONS**

14. What were the total **purchases** of property assets in 2011?

| | |
|---|---|
| ≤ R300m | |
| >R300m ≤ R600m | |
| >R600m ≤ R900m | |
| >R900m ≤ R1.2bn | |
| >R1.2bn | |

15. What is the average holding period of the total property portfolio of the fund **in months**?

……

16. How many properties were bought in 2011?

……

## PROPERTY DISPOSALS

17. What were the total sales of property assets in 2011?

| | |
|---|---|
| ≤ R300m | |
| >R300m ≤ R600m | |
| >R600m ≤ R900m | |
| >R900m ≤ R1.2bn | |
| >R1.2bn | |

18. How many properties were sold in 2011?

……

19. What was the holding period of the last three properties sold in 2011 **in months**?

| **Holding period** | **Property 1** | **Property 2** | **Property 3** |
|---|---|---|---|
| Months | | | |

20. Are the reasons for the disposal of **the above three properties** typical for this fund?

| **Last 3 properties sold (2011)** | **Yes** | **No** |
|---|---|---|
| Property 1 | | |
| Property 2 | | |
| Property 3 | | |

## DECISION-MAKING INFORMATION

21. Please indicate which one of the following scenarios you are more comfortable with:

| | | |
|---|---|---|
| A. | Invest in a property because of its recent good performance feeling that the performance of the property is most likely to be repeated in future. | |
| B. | Invest in a property that recently performed badly but your feeling is that it will perform well in future. | |

22. Are you well informed about your competitors?

| | |
|---|---|
| Yes | |
| No | |

23. In your opinion, what is the likelihood that your fund would achieve an above- average risk-adjusted return in future?

| | |
|---|---|
| Far below average | |
| Below average | |
| Average | |
| Above average | |
| Far above average | |

24. In your opinion, what are the chances that you, as the fund manager, would outperform the other fund managers in the future?

| | |
|---|---|
| Far below average | |
| Below average | |
| Average | |
| Above average | |
| Far above average | |

25. Would you say that you have overall achieved an above average job performance in 2011?

| | |
|---|---|
| Yes | |
| No | |

26. You have to choose an investment in the following three properties. For consistency's sake, all three properties are shopping centres located in the Gauteng province. The three properties will yield as follows:

Property A: Average return with low risk.
Property B: Average return with high risk.
Property C: Above average return with moderate risk.

Which one of the above three properties will you invest in?

| | |
|---|---|
| Property A | |
| Property B | |
| Property C | |

27. Now assume that you have the following further information regarding the above three properties available:
**Property A:** Has a probability of 70% of yielding a higher return than Property C in the following financial year and a 30% probability of yielding a lower return than Property C in the following financial year given the same risk profile.
**Property B:** Has a probability of 50% of yielding a lower return than its current return in the following financial year with a 50% probability of yielding a higher return than its current return in the following financial year given the same risk profile.

**Property C:** Has a probability of 70% of yielding the same return than its current return in the following financial year and a 30% probability of yielding a lower return than its current return in the following financial year given the same risk profile.

Would you change your investment decision to the decision made in Question 26 above **and** in which of the three properties would you invest in, based on the new information?

| | |
|---|---|
| Yes, Property A | |
| Yes, Property B | |
| Yes, Property C | |
| No, my decision stays the same as in Question 26 above. | |

**For Questions 28 to 31, let us consider the three properties in Question 27 above again.**

28. Would your investment decision made in Question 27 above have changed if your competitors chose a different property as yourself, even if you know that their **reason for investing** may be the wrong investment decision?

| | |
|---|---|
| Yes, I would change my decision to that of my competitors. | |
| No, I would continue with my original investment. | |
| Not sure | |

29. Would your investment decision made in Question 27 above have changed if your competitors chose a different property as yourself, because they are **better informed** than yourself on this specific investment?

| | |
|---|---|
| Yes, I would change my decision to that of my competitors. | |
| No, I would continue with my original investment. | |
| Not sure | |

30. Would your investment decision made in Question 27 above have changed if your competitors chose a different property as yourself and you know that there is a **degree of uncertainty of the information** at your disposal?

| | |
|---|---|
| Yes, I would change my decision to that of my competitors. | |
| No, I would continue with my original investment. | |
| Not sure | |

31. Do you normally make investment decisions based on your own viewpoint assuming that you are the only decision-maker?

| | |
|---|---|
| Yes | |
| No | |

32. How would you rate your knowledge of the South African real estate market?

| | |
|---|---|
| Poor | |
| Average | |
| Good | |
| Very good | |
| Excellent | |

33. How would you rate your knowledge of the offshore real estate markets?

| | |
|---|---|
| Poor | |
| Average | |
| Good | |
| Very good | |
| Excellent | |

34. If you have to choose between a South African property and an offshore property, both of which risk profiles is **nearly** unknown, in which of the two properties would you invest?

| | |
|---|---|
| South African property | |
| Offshore property | |

35. If you have to choose between a South African property and an offshore property, both of which risk profiles is **well-known**, in which of the two properties would you invest?

| | |
|---|---|
| South African property | |
| Offshore property | |

36. Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you decided to **sell** the office block. You found out this morning (2011) that, after a commercial valuation was done, the value of the office block has **escalated to R20m** and is fully let.

Please rate your satisfaction/regret with this decision:

| | |
|---|---|
| Regret very much | |
| Regret to some extent | |
| Satisfied | |
| Satisfied to some extent | |
| Very satisfied | |

37. Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you thought about selling but decided to **hold** the property. You found out this morning (2011) that, after a commercial valuation was done, the value of the office block **escalated to R20m** and is fully let.

Please rate your satisfaction/regret with this decision:

| | |
|---|---|
| Regret very much | |
| Regret to some extent | |
| Satisfied | |
| Satisfied to some extent | |
| Very satisfied | |

38. Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you decided to **sell** the office block. You found out this morning (2011) that, after a commercial valuation was done, the value of the office block **dropped to R10m** because of the declining vacancy rate.

Please rate your satisfaction/regret with this decision:

| | |
|---|---|
| Regret very much | |
| Regret to some extent | |
| Satisfied | |
| Satisfied to some extent | |
| Very satisfied | |

39. Assume that in 2007 you purchased an office block, which was fully let at that stage, for R15m. In 2010, due to the recession, the vacancy rate dropped to 60% and you thought about selling the office block, but decided to **hold**. You found out this morning (2011) that, after a commercial valuation was done, the value of the office block **dropped to R10m** because of the declining vacancy rate.

Please rate your satisfaction/regret with this decision:

| | |
|---|---|
| Regret very much | |
| Regret to some extent | |
| Satisfied | |
| Satisfied to some extent | |
| Very satisfied | |

40. Thinking back to investment decisions that you now regret, which one of the following do you feel more regret for:

| | |
|---|---|
| Selling a “winning” property too soon? | |
| Not selling a “losing” property soon enough? | |

PTO

41. Please rate the importance of the following factors in your decision to sell a property:

| | Not important at all | Important to some extent | Standard Importance | Important | Most important |
|---|---|---|---|---|---|
| Broker recommendation | | | | | |
| The value of the property has reached its predetermined target | | | | | |
| Need for liquidity | | | | | |
| Desire to purchase a other property | | | | | |
| Desire to cut loss | | | | | |
| Desire to take profits | | | | | |
| Anticipated direction of the market | | | | | |
| Outside the control of the fund manager. | | | | | |
| End of fund/property life | | | | | |

42. Please indicate on which of the following decisions you spend more time on:

| | |
|---|---|
| Decisions to buy a property | |
| Decisions to sell a property | |
| I spend about the same amount of time on each decision | |

43. Please indicate which of the following decisions are more difficult to take:

| | |
|---|---|
| Decisions to buy a property | |
| Decisions to sell a property | |
| I spend about the same amount of time on each decision | |

Please use the following information to answer Questions 44 and 45.

Assume that you face the following pair of concurrent decisions (Questions 44 and 45). First examine both sets of choices, and then indicate the option you prefer for each.

**44. First decision – Choose one of the following:**

| | | |
|---|---|---|
| A. | You have a possibility to sell a property and realise a sure profit of R5m, **or** | |
| B. | You have a possibility sell a property with a 25% chance of realising a profit of R20m and a 75% chance of realising no profit at all. | |

**45. Second decision – Choose one of the following:**

| | | |
|---|---|---|
| C. | You have a possibility to sell a property and realise a sure loss of R15m, **or** | |
| D. | You have a possibility to sell a property with a 75% chance of losing R20m and a 25% chance of losing nothing. | |

46. Which of the following two actions would you conduct a more thorough analysis for?

| | |
|---|---|
| The investment of internal funds, **or** | |
| The investment of new funds obtained. | |

## THE USE OF INFORMATION

47. Does your company have an in-house research department?

| | |
|---|---|
| Yes | |
| No | |

48. Please rate the level of importance of all the decision-making information on **market fundamentals (such as earnings growth, dividend payments and risk information)** in your property purchase and disposal decision-making process:

| | |
|---|---|
| Not important at all | |
| Important to a small extent | |
| Of moderate importance | |
| Important | |
| Essential | |

49. Please rate the level of importance of **market sentiment** in your property purchase and disposal decision-making process:

| | |
|---|---|
| Not important at all | |
| Important to a small extent | |
| Of moderate importance | |
| Important | |
| Essential | |

50. Please indicate the extent to which **you use** the following **types** of decision-making information to make decisions about property purchases and disposals.

| Information type | Not used at all | Used to a small extent | Used to a moderate extent | Used to a high extent | Always used |
|---|---|---|---|---|---|
| Actual transaction prices/rents/yields | | | | | |
| Floor-space supply/demand indicators | | | | | |
| Vacancy data | | | | | |
| Money market returns/interest rates | | | | | |
| Property price inflation indicators | | | | | |
| General price inflation indicators (CPI, CPIX) | | | | | |
| Personal “feel” for state of property market, based on experience rather than current data | | | | | |
| Views of general economic commentators | | | | | |
| Publicly available forecasts of property market trends | | | | | |
| Publicly available forecasts of economic trends | | | | | |
| Views of property market commentators | | | | | |
| Other (please specify): | | | | | |

51. Please indicate the extent to which **you use following sources** of information in property purchase and disposal decision-making:

| Information source | Not used at all | Used to a small extent | Used to a moderate extent | Used to a high extent | Always used |
|---|---|---|---|---|---|
| Public sources | | | | | |
| Private database sources | | | | | |
| Private/personal network sources | | | | | |
| Other (please specify): | | | | | |

52. Please indicate which of the following techniques, in making property investment decisions, you use:

| Technique | Not used at all | Used to a small extent | Used to a moderate extent | Used to a high extent | Always used |
|---|---|---|---|---|---|
| Payback Period | | | | | |
| Net Present Value (NPV) | | | | | |
| Internal rate of return (IRR) | | | | | |
| Modified internal rate of return (MIRR) | | | | | |
| Risk-adjusted discount rates (RADRs) | | | | | |
| Other (please specify): | | | | | |

53. Please indicate to what extent the following entities influence your investment decision-making:

| Government type | No influence | Influenced to a small extent | Influenced to a moderate extent | Influenced to a high extent | Always influenced |
|---|---|---|---|---|---|
| Local government | | | | | |
| Provincial government | | | | | |
| National government | | | | | |

54. Please indicate how you experience the influence of the following entities on your investment decision making:

| Government type | No influence | Positive influence | Negative influence |
|---|---|---|---|
| Local government | | | |
| Provincial government | | | |
| National government | | | |

**CONCLUSION**

55. What other areas of research do you think should be explored in the property fund industry? (Please list.)

……

……

……

……

……

……

……

……

……

56. If you have any comments on the property fund management industry or any suggestions regarding my research, please comment here:

……

……

……

……

……

……

……

……

……

……

……

57. Would you like a complete digital copy of my dissertation?

| | |
|---|---|
| Yes | |
| No | |

Thank you for your time and effort in completing this questionnaire.

# APPENDIX 2:
# THE COVERING LETTER

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

**24/04/2012**

**Dear Sir or Madam**

**THE ROLE OF BEHAVIOURAL ASPECTS IN INVESTMENT DECISION-MAKING BY LISTED PROPERTY FUND MANAGERS IN SOUTH AFRICA**

Decision-making by listed property fund managers is not a well-researched area in South Africa. I am a registered doctoral student in Financial Management at this university. The main goal of my research is to investigate the behavioural aspects that influence investment decision-making.

Attached please find a questionnaire based on an extensive literature review and supporting theories. The questionnaire should not take more than 30 minutes to complete and you are welcome to give your commentary in English or Afrikaans.

Your input will be appreciated, as you can make a significant contribution to the listed property fund industry in South Africa.

Please note: Under no circumstances will information be released in a format that allows individuals or businesses to be identified. Your anonymous answers to the questions will be treated as strictly confidential and will be processed by the Department of Statistics: Research Support at the University of Pretoria along with those of other respondents.

If you have any further questions, you are welcome to contact my supervisors:
Prof. John Hall; john.hall@up.ac.za; 0828944104
Prof. Chris Cloete; chris.cloete@up.ac.za; 0124204545

Yours sincerely,

Braam Lowies
Project Researcher

# APPENDIX 3:
# THE SURVEY REQUEST

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Dear Sir/Madam

**ASSISTANCE IN RESEARCH ON PROPERTY INVESTMENT DECISION-MAKING REQUESTED**

I am a registered PhD student in Financial Management Sciences at the University of Pretoria. The goal of my research is to investigate the behavioural aspects that influence investment decision-making amongst listed property fund managers in South Africa.

A questionnaire was compiled after studying the appropriate literature and supporting theories on the topic and will be distributed to all the listed property funds in South Africa. The target group also involves the individual Heads/Managers of the sectors that your fund invests in.

If my request meets with your approval, the questionnaires will be sent by e-mail to each individual. I will conduct this part of my research myself to ensure total confidentiality.

Please note: This study involves an anonymous survey. Names will not appear on the questionnaire and respondents cannot be identified in person based on the answers they give. I will encrypt the data and will not be able to identify any fund and/or the individuals that were surveyed.

The results from this study will provide critical and valuable information to the property fund industry regarding behavioural aspects and its influence on investment decision-making. It will recommend and suggest methods in which behavioural aspects, if present, can be accommodated in decision-making in order to further streamline the investment decision-making process. It will also assist in appointing the correct person/s in terms of the type of investment decision to be made.

*A report on the main findings will be made available to you on your request.*

I trust that you will consider my request favourably. **If you do so, please indicate so by replying to this e-mail with your signature and supply me with the name/s and email addresses of the person/s you nominate.**

Best regards,

Braam Lowies
Project Researcher

**Signature:**_____

# APPENDIX 4:

# SOUTH AFRICAN-BASED LISTED PROPERTY FUNDS

## SOUTH AFRICAN LISTED PROPERTY FUNDS ON 31 DECEMBER 2011

| |
|---|
| ACUCAP PROPERTIES LIMITED |
| ARROWHEAD PROPERTIES LIMITED |
| BONATLA PROPERTY FUND |
| CAPITAL PROPERTY FUND |
| DIPULA INCOME FUND |
| EMIRA PROPERTY FUND |
| FAIRVEST PROPERTY HOLDINGS LTD. |
| FORTRESS INCOME FUND |
| FOUNTAINHEAD PROPERTY TRUST |
| GROWTHPOINT PROPERTIES LTD |
| HOSPITALITY PROPERTY FUND |
| HYPROP INVESTMENTS LTD |
| INGENUITY PROPERTY INVESTMENTS LTD |
| OCTODEC INVESTMENTS LTD |
| ORION REAL ESTATE |
| PREMIUM PROPERTIES LTD |
| PUTPROP LTD |
| QUANTUM PROPERTY FUND |
| REBOSIS PROPERTIES LIMITED |
| REDEFINE PROPERTIES |
| RESILIENT PROPERTY INCOME FUND |
| SABLE HOLDINGS LTD |
| SA CORPORATE REAL ESTATE FUND |
| SYCOM PROPERTY FUND |
| VIVIDEND INCOME FUND |
| VUKILE PROPERTY FUND |
| VUNANI PROPERTIES LIMITED |

# APPENDIX 5:

# THE QUESTIONNAIRE DATA FREQUENCIES

The SAS System

The FREQ Procedure

| v2 | | | | |
|---|---|---|---|---|
| **v2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 16 | 94.12 | 16 | 94.12 |
| **2** | 1 | 5.88 | 17 | 100.00 |

| v3 | | | | |
|---|---|---|---|---|
| **v3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **24** | 1 | 5.88 | 1 | 5.88 |
| **35** | 3 | 17.65 | 4 | 23.53 |
| **38** | 1 | 5.88 | 5 | 29.41 |
| **40** | 1 | 5.88 | 6 | 35.29 |
| **42** | 1 | 5.88 | 7 | 41.18 |
| **43** | 1 | 5.88 | 8 | 47.06 |
| **45** | 1 | 5.88 | 9 | 52.94 |
| **47** | 1 | 5.88 | 10 | 58.82 |
| **50** | 1 | 5.88 | 11 | 64.71 |
| **51** | 1 | 5.88 | 12 | 70.59 |
| **52** | 1 | 5.88 | 13 | 76.47 |
| **54** | 1 | 5.88 | 14 | 82.35 |
| **55** | 1 | 5.88 | 15 | 88.24 |
| **57** | 1 | 5.88 | 16 | 94.12 |
| **59** | 1 | 5.88 | 17 | 100.00 |

| v4 | | | | |
|---|---|---|---|---|
| **v4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 3 | 18.75 | 3 | 18.75 |
| **2** | 1 | 6.25 | 4 | 25.00 |
| **5** | 1 | 6.25 | 5 | 31.25 |
| **6** | 2 | 12.50 | 7 | 43.75 |
| **7** | 1 | 6.25 | 8 | 50.00 |
| **8** | 1 | 6.25 | 9 | 56.25 |
| **9** | 1 | 6.25 | 10 | 62.50 |
| **10** | 1 | 6.25 | 11 | 68.75 |
| **12** | 1 | 6.25 | 12 | 75.00 |
| **17** | 1 | 6.25 | 13 | 81.25 |
| **20** | 1 | 6.25 | 14 | 87.50 |
| **22** | 1 | 6.25 | 15 | 93.75 |
| **23** | 1 | 6.25 | 16 | 100.00 |

Frequency Missing = 1

| v5 | | | | |
|---|---|---|---|---|
| **v5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 3 | 18.75 | 3 | 18.75 |
| **2** | 2 | 12.50 | 5 | 31.25 |
| **4** | 1 | 6.25 | 6 | 37.50 |
| **5** | 2 | 12.50 | 8 | 50.00 |
| **6** | 2 | 12.50 | 10 | 62.50 |
| **7** | 1 | 6.25 | 11 | 68.75 |
| **8** | 2 | 12.50 | 13 | 81.25 |

| v5 | | | | |
|---|---|---|---|---|
| **v5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **10** | 1 | 6.25 | 14 | 87.50 |
| **12** | 2 | 12.50 | 16 | 100.00 |

Frequency Missing = 1

| v6 | | | | |
|---|---|---|---|---|
| **v6** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 4 | 23.53 | 5 | 29.41 |
| **3** | 12 | 70.59 | 17 | 100.00 |

| v7 | | | | |
|---|---|---|---|---|
| **v7** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 12 | 70.59 | 12 | 70.59 |
| **2** | 5 | 29.41 | 17 | 100.00 |

| v8 | | | | |
|---|---|---|---|---|
| **v8** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 7 | 41.18 | 8 | 47.06 |
| **3** | 4 | 23.53 | 12 | 70.59 |
| **4** | 2 | 11.76 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v9_1 | | | | |
|---|---|---|---|---|
| **v9_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 17 | 100.00 | 17 | 100.00 |

| v9_2 | | | | |
|---|---|---|---|---|
| **v9_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 2 | 100.00 | 2 | 100.00 |

Frequency Missing = 15

| v9_3 | | | | |
|---|---|---|---|---|
| **v9_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| | | | | |

Frequency Missing = 17

| v9_4 | | | | |
|---|---|---|---|---|
| **v9_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **4** | 1 | 100.00 | 1 | 100.00 |

Frequency Missing = 16

| V10 What percentage of your fund's property portfolio is located | | | | |
|---|---|---|---|---|
| **V10_What_percentage_of_your_fund** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **65** | 1 | 5.88 | 1 | 5.88 |
| **91** | 1 | 5.88 | 2 | 11.76 |
| **95** | 1 | 5.88 | 3 | 17.65 |
| **99** | 1 | 5.88 | 4 | 23.53 |
| **100** | 13 | 76.47 | 17 | 100.00 |

| v11_1 | | | | |
|---|---|---|---|---|
| **v11_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 2 | 100.00 | 2 | 100.00 |

Frequency Missing = 15

| v11_2 | | | | |
|---|---|---|---|---|
| **v11_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 11 | 100.00 | 11 | 100.00 |

Frequency Missing = 6

| v11_3 | | | | |
|---|---|---|---|---|
| **v11_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 12 | 100.00 | 12 | 100.00 |

Frequency Missing = 5

| v11_4 | | | | |
|---|---|---|---|---|
| **v11_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **4** | 10 | 100.00 | 10 | 100.00 |

Frequency Missing = 7

| v11_5 | | | | |
|---|---|---|---|---|
| **v11_5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **5** | 2 | 100.00 | 2 | 100.00 |

Frequency Missing = 15

| v11_6 | | | | |
|---|---|---|---|---|
| **v11_6** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **6** | 2 | 100.00 | 2 | 100.00 |

Frequency Missing = 15

| v11_7 | | | | |
|---|---|---|---|---|
| **v11_7** | **Frequency** | **Percent** | **Cumulative Frequency** | **Cumulative Percent** |
| | | | | |

Frequency Missing = 17

| v12 | | | | |
|---|---|---|---|---|
| **v12** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **14** | 1 | 5.88 | 1 | 5.88 |
| **17** | 1 | 5.88 | 2 | 11.76 |
| **19** | 1 | 5.88 | 3 | 17.65 |
| **25** | 1 | 5.88 | 4 | 23.53 |
| **26** | 1 | 5.88 | 5 | 29.41 |
| **27** | 1 | 5.88 | 6 | 35.29 |
| **48** | 1 | 5.88 | 7 | 41.18 |
| **72** | 1 | 5.88 | 8 | 47.06 |
| **89** | 1 | 5.88 | 9 | 52.94 |
| **95** | 1 | 5.88 | 10 | 58.82 |
| **136** | 1 | 5.88 | 11 | 64.71 |
| **161** | 1 | 5.88 | 12 | 70.59 |
| **175** | 1 | 5.88 | 13 | 76.47 |
| **230** | 1 | 5.88 | 14 | 82.35 |
| **243** | 1 | 5.88 | 15 | 88.24 |
| **300** | 1 | 5.88 | 16 | 94.12 |
| **430** | 1 | 5.88 | 17 | 100.00 |

| v13 | | | | |
|---|---|---|---|---|
| **v13** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **-11.4** | 1 | 6.67 | 1 | 6.67 |
| **-6.4** | 1 | 6.67 | 2 | 13.33 |
| **0** | 1 | 6.67 | 3 | 20.00 |
| **8.5** | 1 | 6.67 | 4 | 26.67 |
| **9** | 3 | 20.00 | 7 | 46.67 |
| **9.3** | 1 | 6.67 | 8 | 53.33 |
| **9.8** | 1 | 6.67 | 9 | 60.00 |
| **10** | 1 | 6.67 | 10 | 66.67 |
| **11** | 1 | 6.67 | 11 | 73.33 |
| **11.8** | 1 | 6.67 | 12 | 80.00 |
| **13.1** | 1 | 6.67 | 13 | 86.67 |
| **14.5** | 1 | 6.67 | 14 | 93.33 |
| **15.7** | 1 | 6.67 | 15 | 100.00 |

Frequency Missing = 2

| v14 | | | | |
|---|---|---|---|---|
| **v14** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 6 | 35.29 | 6 | 35.29 |
| **2** | 3 | 17.65 | 9 | 52.94 |
| **3** | 4 | 23.53 | 13 | 76.47 |
| **4** | 1 | 5.88 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v15 | | | | |
|---|---|---|---|---|
| **v15** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **11** | 1 | 6.67 | 1 | 6.67 |
| **20** | 1 | 6.67 | 2 | 13.33 |
| **24** | 1 | 6.67 | 3 | 20.00 |
| **36** | 1 | 6.67 | 4 | 26.67 |
| **60** | 3 | 20.00 | 7 | 46.67 |
| **64** | 1 | 6.67 | 8 | 53.33 |
| **70** | 1 | 6.67 | 9 | 60.00 |
| **72** | 2 | 13.33 | 11 | 73.33 |
| **89** | 1 | 6.67 | 12 | 80.00 |
| **120** | 1 | 6.67 | 13 | 86.67 |
| **180** | 1 | 6.67 | 14 | 93.33 |
| **240** | 1 | 6.67 | 15 | 100.00 |

Frequency Missing = 2

| v16 | | | | |
|---|---|---|---|---|
| **v16** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **0** | 1 | 5.88 | 1 | 5.88 |
| **2** | 5 | 29.41 | 6 | 35.29 |
| **3** | 3 | 17.65 | 9 | 52.94 |
| **8** | 1 | 5.88 | 10 | 58.82 |
| **9** | 2 | 11.76 | 12 | 70.59 |
| **19** | 1 | 5.88 | 13 | 76.47 |
| **20** | 1 | 5.88 | 14 | 82.35 |
| **30** | 1 | 5.88 | 15 | 88.24 |

| v16 | | | | |
|---|---|---|---|---|
| **v16** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **34** | 1 | 5.88 | 16 | 94.12 |
| **89** | 1 | 5.88 | 17 | 100.00 |

| v17 | | | | |
|---|---|---|---|---|
| **v17** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 12 | 80.00 | 12 | 80.00 |
| **2** | 2 | 13.33 | 14 | 93.33 |
| **4** | 1 | 6.67 | 15 | 100.00 |

Frequency Missing = 2

| v18 | | | | |
|---|---|---|---|---|
| **v18** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **0** | 4 | 25.00 | 4 | 25.00 |
| **1** | 3 | 18.75 | 7 | 43.75 |
| **3** | 4 | 25.00 | 11 | 68.75 |
| **4** | 1 | 6.25 | 12 | 75.00 |
| **8** | 1 | 6.25 | 13 | 81.25 |
| **13** | 1 | 6.25 | 14 | 87.50 |
| **20** | 1 | 6.25 | 15 | 93.75 |
| **39** | 1 | 6.25 | 16 | 100.00 |

Frequency Missing = 1

| v19_1 | | | | |
|---|---|---|---|---|
| **v19_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **0** | 1 | 7.69 | 1 | 7.69 |
| **20** | 1 | 7.69 | 2 | 15.38 |
| **24** | 1 | 7.69 | 3 | 23.08 |
| **60** | 3 | 23.08 | 6 | 46.15 |
| **66** | 1 | 7.69 | 7 | 53.85 |
| **72** | 1 | 7.69 | 8 | 61.54 |
| **84** | 2 | 15.38 | 10 | 76.92 |
| **183** | 1 | 7.69 | 11 | 84.62 |
| **240** | 1 | 7.69 | 12 | 92.31 |
| **262** | 1 | 7.69 | 13 | 100.00 |

Frequency Missing = 4

| v19_2 | | | | |
|---|---|---|---|---|
| **v19_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **0** | 1 | 10.00 | 1 | 10.00 |
| **20** | 1 | 10.00 | 2 | 20.00 |
| **24** | 1 | 10.00 | 3 | 30.00 |
| **60** | 1 | 10.00 | 4 | 40.00 |
| **65** | 1 | 10.00 | 5 | 50.00 |
| **66** | 1 | 10.00 | 6 | 60.00 |
| **72** | 1 | 10.00 | 7 | 70.00 |
| **84** | 1 | 10.00 | 8 | 80.00 |
| **101** | 1 | 10.00 | 9 | 90.00 |

| v19_2 | | | | |
|---|---|---|---|---|
| **v19_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **240** | 1 | 10.00 | 10 | 100.00 |

Frequency Missing = 7

| v19_3 | | | | |
|---|---|---|---|---|
| **v19_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **0** | 1 | 10.00 | 1 | 10.00 |
| **10** | 1 | 10.00 | 2 | 20.00 |
| **24** | 1 | 10.00 | 3 | 30.00 |
| **56** | 1 | 10.00 | 4 | 40.00 |
| **60** | 1 | 10.00 | 5 | 50.00 |
| **61** | 1 | 10.00 | 6 | 60.00 |
| **66** | 1 | 10.00 | 7 | 70.00 |
| **72** | 1 | 10.00 | 8 | 80.00 |
| **84** | 1 | 10.00 | 9 | 90.00 |
| **120** | 1 | 10.00 | 10 | 100.00 |

Frequency Missing = 7

| v20_1 | | | | |
|---|---|---|---|---|
| **v20_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 11 | 91.67 | 11 | 91.67 |
| **2** | 1 | 8.33 | 12 | 100.00 |

Frequency Missing = 5

| v20_2 | | | | |
|---|---|---|---|---|
| **v20_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 9 | 100.00 | 9 | 100.00 |

Frequency Missing = 8

| v20_3 | | | | |
|---|---|---|---|---|
| **v20_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 9 | 100.00 | 9 | 100.00 |

Frequency Missing = 8

| v21 | | | | |
|---|---|---|---|---|
| **v21** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 13 | 76.47 | 13 | 76.47 |
| **2** | 4 | 23.53 | 17 | 100.00 |

| v22 | | | | |
|---|---|---|---|---|
| **v22** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 17 | 100.00 | 17 | 100.00 |

| v23 | | | | |
|---|---|---|---|---|
| **v23** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **3** | 5 | 29.41 | 6 | 35.29 |
| **4** | 8 | 47.06 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v24 | | | | |
|---|---|---|---|---|
| **v24** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 7 | 41.18 | 7 | 41.18 |
| **4** | 9 | 52.94 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v25 | | | | |
|---|---|---|---|---|
| **v25** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 16 | 94.12 | 16 | 94.12 |
| **2** | 1 | 5.88 | 17 | 100.00 |

| v26 | | | | |
|---|---|---|---|---|
| **v26** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **3** | 13 | 76.47 | 17 | 100.00 |

| v27 | | | | |
|---|---|---|---|---|
| **v27** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 6 | 35.29 | 6 | 35.29 |
| **2** | 1 | 5.88 | 7 | 41.18 |
| **3** | 3 | 17.65 | 10 | 58.82 |
| **4** | 7 | 41.18 | 17 | 100.00 |

| v28 | | | | |
|---|---|---|---|---|
| **v28** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 17 | 100.00 | 17 | 100.00 |

| v29 | | | | |
|---|---|---|---|---|
| **v29** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 7 | 41.18 | 7 | 41.18 |
| **2** | 9 | 52.94 | 16 | 94.12 |
| **3** | 1 | 5.88 | 17 | 100.00 |

| v30 | | | | |
|---|---|---|---|---|
| **v30** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 2 | 11.76 | 2 | 11.76 |
| **2** | 11 | 64.71 | 13 | 76.47 |
| **3** | 4 | 23.53 | 17 | 100.00 |

| v31 | | | | |
|---|---|---|---|---|
| **v31** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 8 | 47.06 | 8 | 47.06 |
| **2** | 9 | 52.94 | 17 | 100.00 |

| v32 | | | | |
|---|---|---|---|---|
| **v32** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 3 | 17.65 | 3 | 17.65 |
| **4** | 8 | 47.06 | 11 | 64.71 |
| **5** | 6 | 35.29 | 17 | 100.00 |

| v33 | | | | |
|---|---|---|---|---|
| **v33** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 7 | 41.18 | 7 | 41.18 |
| **2** | 6 | 35.29 | 13 | 76.47 |
| **3** | 1 | 5.88 | 14 | 82.35 |
| **4** | 3 | 17.65 | 17 | 100.00 |

| v34 | | | | |
|---|---|---|---|---|
| **v34** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 17 | 100.00 | 17 | 100.00 |

| v35 | | | | |
|---|---|---|---|---|
| **v35** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 16 | 94.12 | 16 | 94.12 |
| **2** | 1 | 5.88 | 17 | 100.00 |

| v36 | | | | |
|---|---|---|---|---|
| **v36** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 6 | 35.29 | 10 | 58.82 |
| **3** | 5 | 29.41 | 15 | 88.24 |
| **4** | 2 | 11.76 | 17 | 100.00 |

| v37 | | | | |
|---|---|---|---|---|
| **v37** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 4 | 23.53 | 4 | 23.53 |
| **4** | 7 | 41.18 | 11 | 64.71 |
| **5** | 6 | 35.29 | 17 | 100.00 |

| v38 | | | | |
|---|---|---|---|---|
| **v38** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 1 | 6.25 | 1 | 6.25 |
| **3** | 3 | 18.75 | 4 | 25.00 |
| **4** | 8 | 50.00 | 12 | 75.00 |
| **5** | 4 | 25.00 | 16 | 100.00 |

Frequency Missing = 1

| v39 | | | | |
|---|---|---|---|---|
| **v39** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 8 | 47.06 | 12 | 70.59 |
| **3** | 4 | 23.53 | 16 | 94.12 |
| **4** | 1 | 5.88 | 17 | 100.00 |

| v40 | | | | |
|---|---|---|---|---|
| **v40** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 17 | 100.00 | 17 | 100.00 |

| v41_1 | | | | |
|---|---|---|---|---|
| **v41_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 11 | 64.71 | 11 | 64.71 |
| **2** | 2 | 11.76 | 13 | 76.47 |
| **3** | 3 | 17.65 | 16 | 94.12 |
| **4** | 1 | 5.88 | 17 | 100.00 |

| v41_2 | | | | |
|---|---|---|---|---|
| **v41_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 5 | 29.41 | 5 | 29.41 |
| **3** | 3 | 17.65 | 8 | 47.06 |
| **4** | 9 | 52.94 | 17 | 100.00 |

| v41_3 | | | | |
|---|---|---|---|---|
| **v41_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 5 | 29.41 | 5 | 29.41 |
| **2** | 2 | 11.76 | 7 | 41.18 |
| **3** | 3 | 17.65 | 10 | 58.82 |
| **4** | 5 | 29.41 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v41_4 | | | | |
|---|---|---|---|---|
| **v41_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 4 | 23.53 | 8 | 47.06 |
| **3** | 2 | 11.76 | 10 | 58.82 |
| **4** | 6 | 35.29 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v41_5 | | | | |
|---|---|---|---|---|
| **v41_5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 1 | 5.88 | 2 | 11.76 |
| **3** | 4 | 23.53 | 6 | 35.29 |
| **4** | 5 | 29.41 | 11 | 64.71 |
| **5** | 6 | 35.29 | 17 | 100.00 |

| v41_6 | | | | |
|---|---|---|---|---|
| **v41_6** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 7 | 41.18 | 7 | 41.18 |
| **3** | 4 | 23.53 | 11 | 64.71 |
| **4** | 5 | 29.41 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v41_7 | | | | |
|---|---|---|---|---|
| **v41_7** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 1 | 5.88 | 1 | 5.88 |
| **3** | 3 | 17.65 | 4 | 23.53 |
| **4** | 10 | 58.82 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v41_8 | | | | |
|---|---|---|---|---|
| **v41_8** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 1 | 5.88 | 5 | 29.41 |
| **3** | 9 | 52.94 | 14 | 82.35 |
| **4** | 3 | 17.65 | 17 | 100.00 |

| v41_9 | | | | |
|---|---|---|---|---|
| **v41_9** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **3** | 3 | 17.65 | 4 | 23.53 |
| **4** | 9 | 52.94 | 13 | 76.47 |
| **5** | 4 | 23.53 | 17 | 100.00 |

| v42 | | | | |
|---|---|---|---|---|
| **v42** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 15 | 88.24 | 15 | 88.24 |
| **3** | 2 | 11.76 | 17 | 100.00 |

| v43 | | | | |
|---|---|---|---|---|
| **v43** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 12 | 70.59 | 12 | 70.59 |
| **2** | 2 | 11.76 | 14 | 82.35 |
| **3** | 3 | 17.65 | 17 | 100.00 |

| v44 | | | | |
|---|---|---|---|---|
| **v44** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 16 | 94.12 | 16 | 94.12 |
| **2** | 1 | 5.88 | 17 | 100.00 |

| v45 | | | | |
|---|---|---|---|---|
| **v45** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 8 | 47.06 | 8 | 47.06 |
| **2** | 9 | 52.94 | 17 | 100.00 |

| v46 | | | | |
|---|---|---|---|---|
| **v46** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 8 | 50.00 | 8 | 50.00 |
| **2** | 8 | 50.00 | 16 | 100.00 |

Frequency Missing = 1

| v47 | | | | |
|---|---|---|---|---|
| **v47** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 5 | 29.41 | 5 | 29.41 |
| **2** | 12 | 70.59 | 17 | 100.00 |

| v48 | | | | |
|---|---|---|---|---|
| **v48** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 1 | 5.88 | 1 | 5.88 |
| **4** | 4 | 23.53 | 5 | 29.41 |
| **5** | 12 | 70.59 | 17 | 100.00 |

| v49 | | | | |
|---|---|---|---|---|
| **v49** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 2 | 11.76 | 2 | 11.76 |
| **3** | 5 | 29.41 | 7 | 41.18 |
| **4** | 7 | 41.18 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v50_1 | | | | |
|---|---|---|---|---|
| **v50_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 2 | 11.76 | 2 | 11.76 |
| **4** | 5 | 29.41 | 7 | 41.18 |
| **5** | 10 | 58.82 | 17 | 100.00 |

| v50_2 | | | | |
|---|---|---|---|---|
| **v50_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **3** | 1 | 5.88 | 2 | 11.76 |
| **4** | 8 | 47.06 | 10 | 58.82 |
| **5** | 7 | 41.18 | 17 | 100.00 |

| v50_3 | | | | |
|---|---|---|---|---|
| **v50_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **3** | 1 | 5.88 | 2 | 11.76 |
| **4** | 6 | 35.29 | 8 | 47.06 |
| **5** | 9 | 52.94 | 17 | 100.00 |

| v50_4 | | | | |
|---|---|---|---|---|
| **v50_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 1 | 5.88 | 2 | 11.76 |
| **3** | 4 | 23.53 | 6 | 35.29 |
| **4** | 6 | 35.29 | 12 | 70.59 |
| **5** | 5 | 29.41 | 17 | 100.00 |

| v50_5 | | | | |
|---|---|---|---|---|
| **v50_5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 2 | 11.76 | 2 | 11.76 |
| **2** | 2 | 11.76 | 4 | 23.53 |
| **3** | 6 | 35.29 | 10 | 58.82 |
| **4** | 5 | 29.41 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v50_6 | | | | |
|---|---|---|---|---|
| **v50_6** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 5 | 29.41 | 6 | 35.29 |
| **3** | 6 | 35.29 | 12 | 70.59 |
| **4** | 2 | 11.76 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v50_7 | | | | |
|---|---|---|---|---|
| **v50_7** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **3** | 5 | 29.41 | 5 | 29.41 |
| **4** | 6 | 35.29 | 11 | 64.71 |
| **5** | 6 | 35.29 | 17 | 100.00 |

| v50_8 | | | | |
|---|---|---|---|---|
| **v50_8** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 4 | 23.53 | 4 | 23.53 |
| **3** | 4 | 23.53 | 8 | 47.06 |
| **4** | 7 | 41.18 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v50_9 | | | | |
|---|---|---|---|---|
| **v50_9** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 6 | 35.29 | 6 | 35.29 |
| **3** | 3 | 17.65 | 9 | 52.94 |
| **4** | 6 | 35.29 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v50_10 | | | | |
|---|---|---|---|---|
| **v50_10** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 5 | 29.41 | 6 | 35.29 |
| **3** | 4 | 23.53 | 10 | 58.82 |
| **4** | 6 | 35.29 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v50_11 | | | | |
|---|---|---|---|---|
| **v50_11** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 1 | 5.88 | 1 | 5.88 |
| **2** | 7 | 41.18 | 8 | 47.06 |
| **3** | 3 | 17.65 | 11 | 64.71 |
| **4** | 4 | 23.53 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v50_12 | | | | |
|---|---|---|---|---|
| **v50_12** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| | | | | |

Frequency Missing = 17

| v51_1 | | | | |
|---|---|---|---|---|
| **v51_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 3 | 17.65 | 3 | 17.65 |
| **3** | 3 | 17.65 | 6 | 35.29 |
| **4** | 8 | 47.06 | 14 | 82.35 |
| **5** | 3 | 17.65 | 17 | 100.00 |

| v51_2 | | | | |
|---|---|---|---|---|
| **v51_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 1 | 5.88 | 1 | 5.88 |
| **4** | 11 | 64.71 | 12 | 70.59 |
| **5** | 5 | 29.41 | 17 | 100.00 |

| v51_3 | | | | |
|---|---|---|---|---|
| **v51_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **4** | 9 | 52.94 | 9 | 52.94 |
| **5** | 8 | 47.06 | 17 | 100.00 |

| v51_4 | | | | |
|---|---|---|---|---|
| **v51_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| | | | | |

Frequency Missing = 17

| v52_1 | | | | |
|---|---|---|---|---|
| **v52_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 6 | 35.29 | 6 | 35.29 |
| **2** | 4 | 23.53 | 10 | 58.82 |
| **3** | 3 | 17.65 | 13 | 76.47 |
| **4** | 3 | 17.65 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v52_2 | | | | |
|---|---|---|---|---|
| **v52_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 2 | 11.76 | 2 | 11.76 |
| **3** | 3 | 17.65 | 5 | 29.41 |
| **4** | 7 | 41.18 | 12 | 70.59 |
| **5** | 5 | 29.41 | 17 | 100.00 |

| v52_3 | | | | |
|---|---|---|---|---|
| **v52_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **2** | 2 | 11.76 | 2 | 11.76 |
| **3** | 2 | 11.76 | 4 | 23.53 |
| **4** | 5 | 29.41 | 9 | 52.94 |
| **5** | 8 | 47.06 | 17 | 100.00 |

| v52_4 | | | | |
|---|---|---|---|---|
| **v52_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 6 | 35.29 | 10 | 58.82 |
| **3** | 1 | 5.88 | 11 | 64.71 |
| **4** | 4 | 23.53 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v52_5 | | | | |
|---|---|---|---|---|
| **v52_5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 4 | 23.53 | 8 | 47.06 |
| **3** | 2 | 11.76 | 10 | 58.82 |
| **4** | 5 | 29.41 | 15 | 88.24 |
| **5** | 2 | 11.76 | 17 | 100.00 |

| v52_6 | | | | |
|---|---|---|---|---|
| **v52_6** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| | | | | |

Frequency Missing = 17

| v53_1 | | | | |
|---|---|---|---|---|
| **v53_1** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 2 | 11.76 | 6 | 35.29 |
| **3** | 1 | 5.88 | 7 | 41.18 |
| **4** | 9 | 52.94 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v53_2 | | | | |
|---|---|---|---|---|
| **v53_2** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 4 | 23.53 | 4 | 23.53 |
| **2** | 4 | 23.53 | 8 | 47.06 |
| **3** | 2 | 11.76 | 10 | 58.82 |
| **4** | 6 | 35.29 | 16 | 94.12 |
| **5** | 1 | 5.88 | 17 | 100.00 |

| v53_3 | | | | |
|---|---|---|---|---|
| **v53_3** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 5 | 29.41 | 5 | 29.41 |
| **2** | 3 | 17.65 | 8 | 47.06 |
| **3** | 2 | 11.76 | 10 | 58.82 |
| **4** | 3 | 17.65 | 13 | 76.47 |
| **5** | 4 | 23.53 | 17 | 100.00 |

| v53_4 | | | | |
|---|---|---|---|---|
| **v53_4** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 6 | 35.29 | 6 | 35.29 |
| **3** | 11 | 64.71 | 17 | 100.00 |

| v53_5 | | | | |
|---|---|---|---|---|
| **v53_5** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 8 | 47.06 | 8 | 47.06 |
| **3** | 9 | 52.94 | 17 | 100.00 |

| v53_6 | | | | |
|---|---|---|---|---|
| **v53_6** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 7 | 41.18 | 7 | 41.18 |
| **2** | 3 | 17.65 | 10 | 58.82 |
| **3** | 7 | 41.18 | 17 | 100.00 |

| v55 | | | | |
|---|---|---|---|---|
| **v55** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| | | | | |

Frequency Missing = 17

| v56 | | | | |
|---|---|---|---|---|
| **v56** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| | | | | |

Frequency Missing = 17

| v57 | | | | |
|---|---|---|---|---|
| **v57** | **Frequency** | **Percentage** | **Cumulative Frequency** | **Cumulative Percentage** |
| **1** | 15 | 88.24 | 15 | 88.24 |
| **2** | 2 | 11.76 | 17 | 100.00 |