

**THE RATIONALITY OF RETIREMENT PRESERVATION
DECISIONS: TOWARDS A SCIENTIFIC MODEL**

by

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DECLARATION OF ORIGINALITY

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ABSTRACT

There is worldwide concern that individuals are not saving sufficiently for retirement. Low savings rates, coupled with a lack of preservation of retirement funds when individuals move jobs, could have adverse repercussions on the ability to retire with sufficient funds. The traditional response to low preservation levels has been to impose taxes on cash withdrawals and a move is underway in South Africa to potentially mandate preservation. All these interventions assume that individuals are not acting rationally when they take a cash payout, however this assumption of irrationality has not been tested. Therefore, the aim of this study was to determine the factors that lead to low preservation levels in order to determine whether intervention is required to increase preservation, and if so, what form it should take. The study consisted of two phases.

Phase one carried out a critical, multidisciplinary literature review to construct a conceptual model of the factors which potentially lead to low preservation levels. According to this model, these factors could arise from rational decision making in line with consumption smoothing behaviour linked to the life cycle hypothesis or irrational decision making arising from behavioural factors linked to bounded willpower or bounded rationality. The resultant model highlighted the distinct differences in the drivers of rational and irrational behaviour and therefore, the distinctly different interventions required.

Phase two of the study focused on the empirical testing of the conceptual model to obtain an understanding of the relative importance of the factors. This phase made use of an analytical survey to test relationships between the predictor variables identified in the conceptual model, and the outcome variable which is whether the individual preserved funds when moving jobs. The data was analysed with logistic regression techniques. The study found that behavioural factors play an important role in explaining the preservation decisions made by individuals. In particular behavioural factors related to bounded rationality as a result of the inherent computational complexity of the decision making environment emerged as important explanatory variables. This appears to indicate that solutions should focus on decision support and guidance to assist individuals in making optimal decisions.

This study makes a unique contribution to the field of retirement finance and decision making as it highlights the role that behavioural factors play in retirement preservation decisions. The implications regarding which interventions are best suited to assist in optimal decision

making are informative for policy makers, providers of retirement products and financial advisors, as well as sponsors and members of retirement funds.

Keywords: retirement decision making; pre-retirement cash outs; life-cycle hypothesis; behavioural life-cycle hypothesis; bounded willpower; bounded rationality.

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LIST OF ABBREVIATIONS

BIS	Barratt Impulsiveness Scale
BLCH	behavioural life-cycle hypothesis
CFC	consideration of future consequences
DSS	decision support systems
GLM	generalised linear model
LCH	life-cycle hypothesis
MPC	marginal propensity to consume
NAV	net asset value
PCA	principal component analysis
ROC	receiver operating characteristic
UP	University of Pretoria
ZTPI	Zimbardo Time Perspective Inventory

CHAPTER 1 INTRODUCTION

1.1 OVERVIEW

Worldwide there is concern that individuals are not saving sufficiently for retirement. Some of the reasons given include not having access to a suitable retirement product, delaying the decision to save, not saving enough, or not preserving saved funds (South Africa, National Treasury, 2004, 2007, 2011). Globally, the focus of many studies and reform programs has been on how to address the first three issues, however the problem of preservation is increasingly recognised as a key issue that may result in insufficient savings at retirement (United States, Working Group on Retirement Plan Leakage, 1998; South Africa, National Treasury, 2007). A number of South African surveys and studies have concluded that the majority of employees who move jobs do not preserve their retirement funds, and rather take their benefit in cash (South Africa, National Treasury, 2007; Old Mutual, 2012; Sanlam Employee Benefits, 2013). This trend is also observed in the United States (United States, Working Group on Retirement Plan Leakage, 1998; Engelhardt, 2002).

The reasons for choosing to take a cash payout rather than preserving retirement funds when leaving a job could be either rational or irrational. Rational reasons would focus on the predictions of the life-cycle hypothesis (LCH) linked to consumption smoothing, whereas irrational reasons would be driven by behavioural factors. The LCH is based on the idea that the consumer is able to determine the optimum saving and consumption levels over their lifetime (Graham & Isaac, 2002). This would imply that individuals are able to determine how much of their income they need to save for retirement, implement the appropriate saving plan and not deviate from the plan (Monahan, 2004). If individuals act according to the LCH, there is no requirement for taxes, penalties, regulation or any intervention to influence behaviour, as individuals make rational decisions that result in optimal consumption and saving levels.

Considering the many decisions that individuals have to make regarding saving for retirement, a number of authors have highlighted that behavioural factors have the potential to result in sub-optimal decision making. The main behavioural factors which have the ability to influence decisions are considered to be bounded rationality and bounded willpower (Desai, 2011:268; Jolls, Sunstein & Thaler, 1998; Monahan, 2004:498; Thaler, 1994:187). In the first instance, problems of bounded rationality would result in a situation where the computational complexity of the preservation decision makes it difficult to make an optimal

decision. Bounded willpower would lead to situations where funds are cashed out due to self-control problems. In light of computational limitations and self-control issues, the decisions made by individuals may not result in optimal savings levels. This would imply that there is a need for intervention to ensure that sufficient funds are available for retirement.

The question of whether individuals act rationally is not merely a theoretical debate as it has important implications for whether policy makers should intervene in individual decision making regarding savings. Solutions and interventions in retirement preservation decisions would therefore need to be dependent on the underlying causes of low preservation levels. In a South African context, interventions are already in place to try to encourage preservation such as taxes on cash withdrawals (South African Revenue Service, 2012). In addition, as part of the retirement reform process, mandatory preservation is being investigated as a potential solution to low preservation levels (South Africa, National Treasury, 2007, 2013). However, without an understanding of the rationality of factors that drive low levels of preservation, these interventions might potentially do more harm than good.

1.2 PROBLEM STATEMENT

A large number of employees do not preserve their retirement savings when they leave an employer; instead they choose to take a cash payout of their accumulated funds. This may have an adverse impact on the funds which employees eventually have access to when they retire. While there are a number of theories regarding the factors contributing to low preservation levels it would appear that a comprehensive study to understand these factors, particularly in a South African context, has not been carried out.

The current proposals by the South African Government to increase preservation assume that individuals are not acting rationally when they take cash payouts, and their decisions are therefore driven by behavioural factors, however this assumption of irrationality has not been tested. Therefore the problem that emerges is that there is a lack of understanding of the rationality of factors driving retirement preservation decisions.

1.3 RESEARCH OBJECTIVES

This study aims to determine whether rational or irrational behaviour leads to low preservation levels in order to determine whether intervention is required, and if so, what form it should take.

The research objectives are:

1. To determine whether preservation decisions are driven by rational or behavioural factors.
2. Based on the findings from objective one, suggest what interventions, if any, would be most effective in assisting individuals to make optimal preservation decisions.

1.4 THESIS STATEMENT

In light of the lack of understanding of the rationality of factors that play a role in preservation decisions, and the implications for potential solutions, the thesis statement that will be explored in this study is:

Behavioural factors play an important role in explaining the preservation decisions of individuals when they move jobs.

The implications of the thesis statement are that if behavioural factors play an important role in preservation decisions, suitable interventions would need to be implemented to ensure individuals save sufficiently for retirement. However, if behavioural factors do not play a role then individuals should be left to their own devices and will accumulate sufficient funds for retirement on their own, without intervention.

The main hypothesis to be tested in this study is therefore:

H₀: A model of preservation that contains behavioural factors will not provide a better prediction of preservation than a model that contains only socioeconomic and demographic variables linked to rational decision making.

H₁: A model of preservation that contains behavioural factors will provide a better prediction of preservation than a model that contains only socioeconomic and demographic variables linked to rational decision making.

In testing this thesis statement and hypothesis a better understanding of the rationality of retirement preservation decisions will be obtained. In addition, depending on what factors best predict preservation, suitable solutions to assist in the decision making process will be identified.

1.5 DELIMITATIONS AND LIMITATIONS

There are numerous decisions that individuals are faced with in a retirement planning context, this study will only focus on retirement preservation decisions when individuals move jobs.

While the literature review and design of the conceptual model will focus on both South African and international sources, the empirical part of the study will be limited to participants in South Africa.

The relative importance of various factors will be determined using a survey questionnaire. Once the relevant factors are determined a model will be proposed in terms of the various interventions which have been identified in literature and other related studies. However, the effectiveness of these proposed interventions will not be tested in this study.

As this is an exploratory study a convenience sample is used to allow for testing of the hypothesis. Follow up studies will be required to allow generalisation to a broader population, however that is beyond the scope of this study.

1.6 ASSUMPTIONS

It is assumed that not everyone should necessarily preserve retirement funds when they move jobs. A number of rational factors related to age, outstanding debt and current liquidity requirements would play a role in determining what the optimal decision is in each case. There is therefore a clear distinction between solutions aimed at ensuring the highest levels of preservation and solutions which aim to assist individuals to make optimal preservation decisions, which are the focus of this study.

1.7 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

The low retirement savings rate, coupled with a lack of preservation of retirement funds when an individual moves jobs, has potentially adverse implications for the ability of individuals to retire with sufficient funds. The problem may be exacerbated by the increased mobility within the workforce and the large number of job changes in an individual's working career.

The response to low preservation levels has traditionally focused on taxes and penalties and a move is underway in a South African context to potentially mandate preservation. However if the factors that cause low preservation are not clearly understood, these interventions might do more harm than good. Therefore it is important that any solution should match the specific problem in order to avoid unintended consequences. For this reason, it is essential that a better understanding of the rationality of preservation decisions is obtained to determine whether intervention is required and, if so, what form it should take.

This study seeks to make a unique contribution to the field of retirement finance and decision making both from a theoretical and empirical perspective. It aims to extend the boundaries of

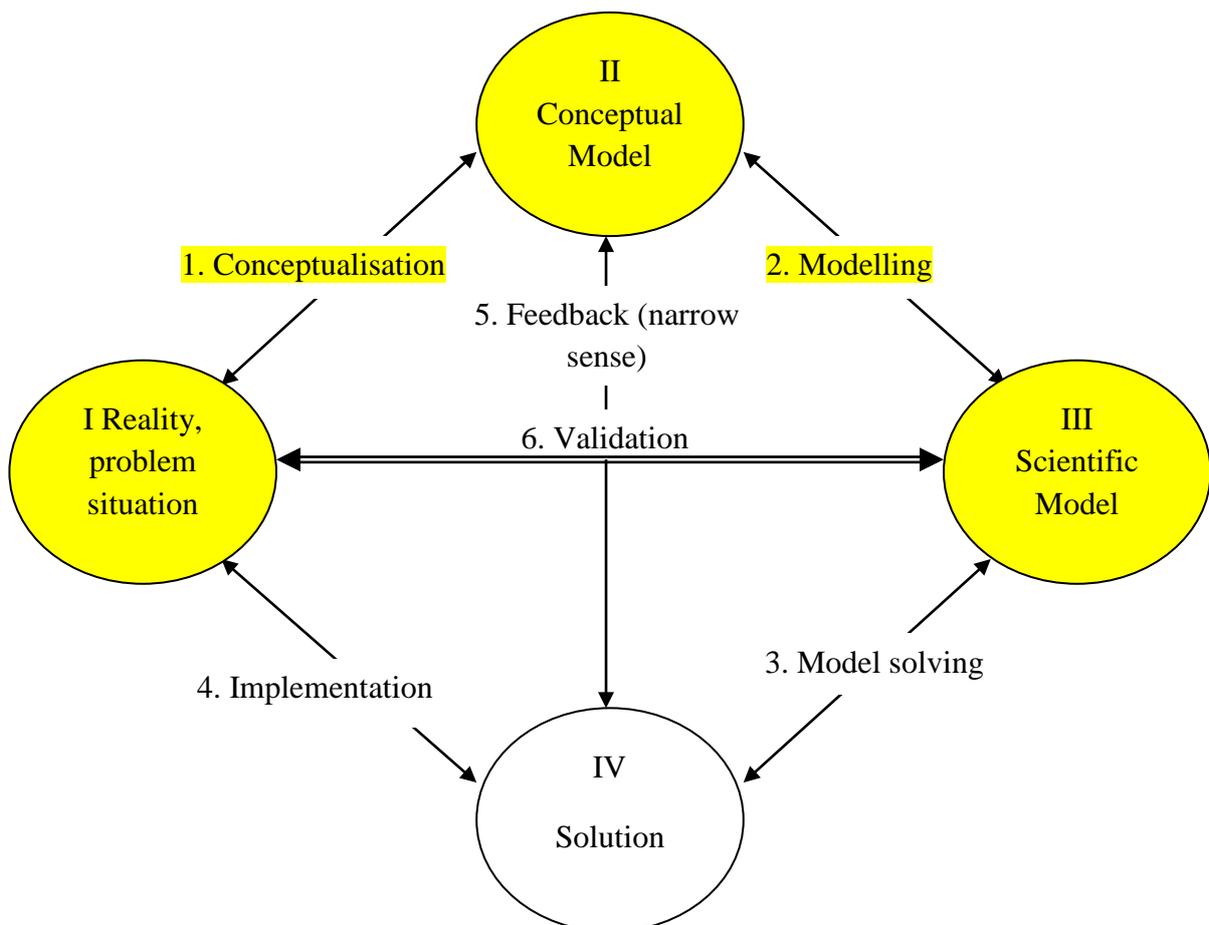
the traditional finance discipline to include insights provided by psychology and behavioural research to produce a more comprehensive understanding of the decision making processes of individuals as they prepare for retirement. The insights provided by this study will therefore be informative for policy makers, members of retirement funds, sponsors of retirement funds, retirement product providers and financial advisors.

1.8 RESEARCH DESIGN AND CHAPTER OVERVIEWS

1.8.1 Overview of research design

The approach that this study takes is explained in terms of the problem solving model developed by Mitroff, Betz, Pondy and Sagasti (1974). The model is represented diagrammatically in Figure 1.1.

Figure 1.1: A systems view of problem solving



Note: Highlighted sections represent the focus areas of this study.

Source: Mitroff *et al.* (1974:48)

The figure illustrates the various phases of the research process, and in terms of the systems view perspective adopted by Mitroff *et al.* proposes that there are multiple start and end points depending on the form of scientific enquiry adopted (Mitroff *et al.*, 1974:49). By implication, research need not address every aspect of the model to produce answers to the specific query that the researcher addresses in a particular research study.

This study aims to focus on parts I, II and III by developing a conceptual model, empirically testing that model and initiating the development of a scientific model. This study will therefore follow a phased approach. Each phase of the study is discussed in further detail, along with an overview of the chapters that cover each phase.

1.8.2 Phase One: conceptualisation (Chapter 2 and Chapter 3)

The study commences at point I in Figure 1.1 which represents the research problem identified, being the lack of understanding of the rationality of factors driving low levels of preservation of retirement funds when employees move jobs. A critical, multidisciplinary literature review is carried out to determine the factors which potentially lead to low preservation levels, and these factors are then used to create a conceptual model (as illustrated by point II in Figure 1.1). The literature review and construction of the conceptual model are contained in Chapter 2 and Chapter 3.

Chapter 2 focuses on the development of savings theories over the past two centuries providing an overview of the theories of intertemporal choice. This chapter is included to provide context to the preservation decision making process as an example of intertemporal choice. The chapter traces the varying levels of prominence given to rational and behavioural factors in explaining savings behaviour over time. The chapter then provides an overview of the renewed focus on the individual as decision maker in a world of defined contribution retirement plans, and the resultant behavioural factors which might influence individuals in the context of retirement decision making.

Chapter 3 commences with an overview of evidence of the lack of preservation of retirement funds. Next, the chapter provides insights into the various factors, both rational and behavioural, that potentially explain low preservation levels. The chapter then explores a range of solutions to sub-optimal decision making and concludes with the development of the initial conceptual model of preservation decision making. This model forms the basis for the empirical phase of the study.

1.8.3 Phase Two: empirical testing (Chapters 4, 5 and 6)

Phase two focuses on the empirical testing of the conceptual model. Based on the model developed in phase one, a questionnaire is designed to test the importance of the various factors in a South African context with a view to testing the thesis that behavioural factors play an important role in retirement preservation decisions.

Chapter 4 contains an outline of the research method adopted in this study and the design of the research instrument. An analytical survey is selected as the most appropriate research approach for this study. A questionnaire is designed to test the factors identified in the conceptual model as potential drivers of preservation. The questionnaire uses a combination of established psychometric tests and factual questions to measure the conceptual model constructs in light of actual preservation decisions made by individuals. The chapter also provides an overview of the data collection and data analysis techniques adopted in this study.

The primary analysis technique is logistic regression using a purposeful selection model building approach to assess the importance of the factors identified in the conceptual model. The model building approach has two stages. First the initial assessment of the importance of each variable in terms of the preservation decision, and second the construction and testing of models containing multiple variables. The findings of this study are therefore divided between these two stages and presented in Chapter 5 and Chapter 6 respectively.

Chapter 5 presents the findings from the empirical study relating to stage one and the initial review of the statistical significance of each variable from the conceptual model associated with the preservation decision. In addition, relationships between predictor variables are explored to better understand their impact on preservation decisions.

Chapter 6 focuses on the findings from stage two regarding the logistic regression model building and hypothesis testing. The chapter uses variables and relationships between variables identified in Chapter 5 to build and compare various logistic regression models. The chapter first reviews models of bounded willpower, bounded rationality and a rational model to assess whether each model provides statistically significant predictions of preservation decisions. Thereafter a model of behavioural factors is compared to a model with rational factors to assess the validity of the thesis statement. The chapter concludes with the construction of a model of all rational and behavioural factors to assess which are the most important predictors of preservation.

1.8.4 Phase Three: developing a model (Chapter 7)

Based on the outcome of phase two, and again referring to the literature, a model of preservation decision making is developed. This phase concentrates on transitioning from a conceptual model to a scientific model which will highlight, given the factors which contribute to low preservation levels, what the key interventions are which have the potential to result in optimal preservation decisions. As noted in delimitations, the testing of this model and therefore the activities in Figure 1.1 of “Validation”, “Model Solving” and “Implementation” fall outside the scope of the present study.

Chapter 7 provides an analysis and discussion of the findings from Chapter 5 and Chapter 6 and places them in context within the initial conceptual model. The chapter contains an assessment of the relative importance of behavioural factors compared to rational factors in understanding what drives preservation decisions to address the overall thesis of this study. In light of these findings, the implications for solutions to ensure optimal preservation decisions are discussed and the first steps to establishing a scientific model of preservation are taken.

CHAPTER 2 SAVINGS BEHAVIOUR

2.1 INTRODUCTION

Why do people save? How do people determine how much to save and how much to consume? Why do people discount the future? These questions have puzzled economists for the past two centuries and have resulted in the development of a number of theories to explain savings behaviour. While this study is concerned primarily with the retirement preservation decisions of individuals, in order to provide context to these decisions, an overview of savings theories is required.

This chapter provides a summary of the development of savings theories over the past 180 years. It begins with a review of the development of the theory of intertemporal choice, followed by an overview of more modern economic theories of savings. The chapter concludes by highlighting the behavioural factors which can potentially influence savings decisions and the renewed importance placed on these factors as the focus moves to the role played by the individual decision maker in a market dominated by defined contribution pension plans.

2.2 DEVELOPMENT OF SAVINGS THEORY

2.2.1 Early contributors: a theory of intertemporal choice

One of the key aspects of savings decisions relates to the trade-off between current and future consumption. As a result many of the issues surrounding these decisions are considered in terms of intertemporal choices. Frederick, Loewenstein & O'Donoghue (2002:351) define intertemporal choices as "... decisions involving tradeoffs among costs and benefits occurring at different times".

The early work on developing a theory of savings initially focussed on the concept of intertemporal choices with the aim of determining why people discount the future (Loewenstein, 1992). John Rae is credited with being the first economist to consider the concept of intertemporal choice as it related to choices between current and future utility (Frederick *et al.*, 2002). Rae's work was first published in 1834 under the title, *The New Principles of Political Economy* (his 1905 book *Sociological Theory of Capital* was merely a reprint of this first book). Rae (1905) was very aware of the psychological aspects which influenced decisions about current and future time periods. He postulated that if humans lived forever then reason would be the key driving force in determining current sacrifices for future

needs. However, the uncertainty of both life span and ability to enjoy future consumption resulted in a situation where people placed their present needs much higher in priority than any future needs.

Rae was of the opinion that a number of factors influenced the decision to save or consume. One key factor was limited self-control which arose from the temptation of immediate consumption which Rae explained as follows: “The actual presence of the immediate object of desire in the mind, by exciting the attention, seems to rouse all the faculties, as it were, to fix their view on it, and leads them to a very lively conception of the enjoyments which it offers to their instant possession. The prospects of a future good, which future years may hold out to us, seem at such a moment dull and dubious, and are apt to be slighted, for objects on which the daylight is falling strongly, and showing us in all their freshness just within our grasp.” (Rae, 1905:54).

Rae noted that there were factors which could influence an individual to exercise self-control. According to him individuals would make a sacrifice for an uncertain future if they were concerned about providing for future generations or possessed, as he termed it, “... social and benevolent affections” (Rae, 1905:57). In addition, he believed that intellect played a role in individuals being able to take action which would ensure future benefits through the ability to apply reflective thought and prudence. He was also of the opinion that the level of law and order in a society would play a role in savings decisions. In general he believed that the less uncertainty that existed in a society (free from war, disease, hazardous occupations etc.) the more likely the society as a whole would be able to focus on providing for future needs. Rae therefore concluded that choices about current or future consumption were influenced by what he called “... the desire for accumulation” (Rae, 1905:53) and it was his belief that the level of desire for accumulation would differ between individuals and societies in line with the presence or absence of uncertainty, self-control, concern for future generations and intellect.

The next contributions to the theory of intertemporal choices came from Nassau Senior and William S. Jevons in 1836 and 1871 respectively. Frederick *et al.* (2002) distinguish between the two fundamental perspectives of anticipatory abstinence and utility which were championed by each of the above. Senior focussed on the concept of abstinence and was of the opinion that individuals who felt the pain of self-denial more acutely would value present consumption higher than delayed consumption. Jevons concentrated on the idea of utility and more specifically on the anticipation of future utility. He believed that the anticipation of

receiving something in the future gave pleasure. Therefore if the utility of anticipation increased by more than the decrease in immediate utility then consumption would be deferred. Loewenstein (1992:10) notes the similarities of the two theories with Senior considering the “pain of deferral” while Jevons focused on the “pleasure of deferral”.

The next major contributor to the development of the theory of intertemporal choice was Eugene von Böhm-Bawerk. Böhm-Bawerk (1891) highlighted the link between interest payments and intertemporal value differences. He observed that people preferred present goods to future goods and saw interest payments as compensation for delaying the consumption of a good until some future time period. One of the causes for the discrepancy between current and future values was, he believed, that individuals had a tendency to underestimate what their future requirements would be, “... we attach a less importance to future pleasures and pains simply because they are future, and in the measure that they are future. Thus it is that, to goods which are destined to meet the wants of the future, we ascribe a value which is really less than the true intensity of their future marginal utility. We systematically underestimate future wants, and the goods which are to satisfy them.” (Böhm-Bawerk, 1891:253).

Therefore, while Senior and Jevons focussed on “motivational effects” and interpreted the willingness to defer consumption as the ability of individuals to control their emotions at the present time, the work of Böhm-Bawerk adopted a more cognitive approach to the trade-off between the present and future. The reason for discounting was driven primarily by the decision maker being unable to properly imagine the future (Loewenstein, 1992).

The next major advancement in the theory of intertemporal choice came from Irving Fisher’s work on the theory of interest. Fisher is credited with formalising and clarifying the work of Böhm-Bawerk in terms of time preference and its impact on consumption in different time periods. He provided a mathematical means of expressing these factors in terms of indifference curves and using time preference and diminishing marginal utility to explain observed time preferences of individuals (Frederick *et al.*, 2002; Loewe, 2006).

In developing his theory of interest Fisher relied heavily on the work of Rae and Böhm-Bawerk and even went so far as to dedicate his book *The Theory of Interest* to them. He noted the concept of time preference or impatience was central to his theory of interest and that it was in essence “... what Rae calls the “effective desire for accumulation,” and what Böhm-Bawerk calls the “perspective undervaluation of the future.”” (Fisher, 1930:62).

Fisher devoted an entire chapter of his book to a discussion of time preference or human impatience in the determination of his theory of interest rates. He was of the view that impatience would depend on four characteristics of the individual's income stream namely, size of expected income stream, the expected distribution of income over time, the composition of income and lastly the probability of the income stream being realised. In his discussion of size of income, Fisher distinguished between rational and irrational aspects of the preference for present over future income. In a situation of poverty, it would be rational to want immediate income as this would be essential in ensuring the individual survives. As Fisher explained, "Not only is a certain minimum of present income necessary to prevent starvation, but the nearer this minimum is approached the more precious does present income appear relative to future income" (Fisher, 1930:73). In contrast, the irrational aspects of impatience occurred when individuals neglected to make provision for the future due to a lack of self-control and a willingness to assume that the future would sort itself out once present needs were addressed. With respect to the expected distribution of income over time, Fisher was of the opinion that an individual who expected his income to increase over time would show a greater preference for present income, which is scarce, over future income, which would be abundant.

In addition to the influence of the characteristics of income, Fisher was of the opinion that personal factors would also determine levels of impatience. In particular, Fisher believed that personal differences resulted from "... at least six personal characteristics: (1) foresight, (2) self control, (3) habit, (4) expectation of life, (5) concern for the lives of other persons, (6) fashion." (Fisher, 1930:81). The factors which would lead to a higher level of impatience would be "(1) short-sightedness, (2) a weak will, (3) the habit of spending freely, (4) emphasis upon the shortness and uncertainty of his life, (5) selfishness, or the absence of a desire to provide for his survivors, (6) slavish following of the whims of fashion." (Fisher, 1930:89).

Fisher therefore considered both objective factors and psychological characteristics in determining time preference. He believed that individuals would display different time preferences, and that these preferences would vary over the life of an individual. However, due to supply of and demand for loanable funds, a common rate of interest would be reached. As Fisher concluded: "So the rate of interest is the mouthpiece at once of impatience to spend income without delay and of opportunity to increase income by delay." (Fisher, 1930:495).

2.2.2 The discounted utility model

While the groundwork for developing a theory of intertemporal choice as articulated by Rae, Jevons, Senior, Böhm-Bawerk and Fisher took account of the role that psychology played, the adoption of the theory of intertemporal choice into mainstream economics in the form of the discounted utility model postulated by Paul Samuelson in 1937 compressed all psychological aspects into one parameter, the discount rate (Frederick *et al.*, 2002). The irony is that Samuelson was aware of the shortcomings of his model and concluded his paper with the following disclaimer: “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.” (Samuelson, 1937:161). However, these cautionary words appear to have gone unheeded and the discounted utility model was to become a widely accepted model of intertemporal choice.

The reason for the widespread adoption of the model was driven primarily by its simplicity, (Frederick *et al.*, 2002) and the fact that it provided a mathematical structure to deal with intertemporal choices (Loewe, 2006). The main tenants of the discounted utility model were that future goods are less valuable than goods received in the present; discounting was considered to be independent of utility and the discounting function was exponential (Loewe, 2006). While the model was appealing to many, empirical tests of the discounted utility model highlighted numerous problems with the real world applicability of the underlying assumptions. One of the key challenges to the discounted utility model revolves around the use of an exponential discounting function. The introduction of a rival theory based on hyperbolic discounting has done much to discredit the discounted utility model as an accurate depiction of real world intertemporal decision making (Thaler & Shefrin, 1981). This is discussed in more detail in section 2.3.2.

The theory of intertemporal choice and the discounted utility model formed the basis for the development of the so-called modern economic theories of savings (Warneryd, 1999). The following section contains an overview of the development of these theories which began with Keynes’ absolute income hypothesis and culminated with Ando and Modigliani’s Life-Cycle Hypothesis.

2.2.3 Modern economic theories of saving

In the early part of the 20th century, John Maynard Keynes began to investigate the relationship between income, consumption and savings and expanded on these ideas in his

book *The General Theory of Employment, Interest and Money* (Keynes, 1936). Keynes' interest in the savings behaviour of individuals was driven from a macroeconomic perspective as he sought to understand the relationship between savings and investment as drivers of economic growth. Prior to Keynes, the general view of classical economists was that the rate of interest was the factor bringing equilibrium to the supply and demand for savings, however Keynes believed that savings were related to consumption and income levels (Galbraith, 1993; Harrod, 1937). Keynes identified two distinct decisions that needed to be made in terms of time preference, first how much to consume, and second, in what form to retain money that was not consumed. Keynes believed that interest rates were related to the second decision which linked to the individual's liquidity preference, and were not, as the classical economists believed, a reward for saving. The interest rate would be the reward for giving up liquidity, as an individual decided whether to hold money in cash, and earn no interest, or invest it (Keynes, 1936:166).

In Keynes's opinion, the first decision, regarding consumption, was related to income levels. Keynes noted that, "The fundamental psychological law, upon which we are entitled to depend with great confidence both a priori from our knowledge of human nature and the detailed facts of experience, is that men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not be as much as the increase in their income." (Keynes, 1936:96) This would lead to "... a greater proportion of income being saved as real income increases" (Keynes, 1936:97). This theory is commonly referred to as the absolute income hypothesis.

In developing his theory, Keynes (1936) specifically mentioned that consumption, and therefore savings depended on a number of "... subjective needs and the psychological propensities and habits of ... individuals" (Keynes, 1936:91). He mentioned that individuals might be motivated by a number of factors to save as a result of "Precaution, Foresight, Calculation, Improvement, Independence, Enterprise, Pride and Avarice" while at the same time they might be tempted to consume as a result of "Enjoyment, Shortsightedness, Generosity, Miscalculation, Ostentation and Extravagance" (Keynes, 1936:108).

While the simplifying assumptions of Samuelson in his discounted utility theory removed psychological considerations from the theory of intertemporal choices, Keynes made an assumption in the development of his model that would also see the removal of psychological considerations from savings theories. In developing his overall theory regarding consumption and saving, Keynes made the assumption that so-called "subjective" factors would be

unlikely to change over short time periods, in which case they need not be considered as part of his theory which only considered consumption in the short term (Keynes, 1936:109).

The absolute income hypothesis was subjected to extensive empirical testing in the years that followed the publication of Keynes's book. While initial tests, based on relatively short time frames supported the hypothesis, discrepancies emerged over longer testing periods. A number of new theories were subsequently developed in an attempt to provide an explanation for the real world data emerging from empirical studies including the relative income hypothesis, the permanent income hypothesis and the life-cycle hypothesis (Gausden, 2002).

The ideas which led to the formation of the relative income hypothesis were developed by Brady and R.D. Friedman in 1947 and Duesenberry in 1949. The key issue was the suggestion that consumption did not depend on absolute income, and rather was determined by the position occupied among the distribution of income within a community (Friedman, 1957:4). Duesenberry's theory explicitly acknowledged the impact of social and psychological forces on consumption decisions. He was of the view that a theory of consumption that did not take account of social factors was incomplete. The need for people to emulate others, and participate in conspicuous consumption led to his conclusion that relative, rather than absolute income levels were the key to understanding consumer saving and spending habits (Mason, 2000). Duesenberry's theories were to a large extent supported by empirical analysis (Friedman, 1957), however the desire of the economic community to focus on scientific explanations for economic theory, and an aversion to including social and psychological phenomena in their analyses led to his hypothesis disappearing into relative obscurity (Mason, 2000). The publication of Milton Friedman's permanent income hypothesis in 1957, which effectively removed the need to consider social influences on consumption, was another factor in the marginalization of Duesenberry's theory, particularly in light of the increasing focus on the "mathematisation" of economics which dominated the 1950s and 1960s (Mason, 2000).

In the introductory chapter of his book *A Theory of the Consumption Function*, Friedman explicitly acknowledged the contribution of previous theories to the development of what he called "the permanent income hypothesis", and he noted that his hypothesis "... is more general than ... the relative income hypothesis ... taken by itself. It incorporates fully the wealth-income effect and explains why the relative income hypothesis should be valid under special conditions" (Friedman, 1957:6). The key distinction in the permanent income hypothesis is between income which consumers actually receive and the income which

influences consumer behaviour. In this regard the former income type is referred to as “measured income” while the latter is “permanent income”. Fluctuations in measured income will not influence consumption, rather permanent income levels will be the primary factor in determining the level of consumption. Therefore consumers will predict longer term income levels and save in circumstances where their current income is at a higher level than permanent income, and borrow when current income levels are below the permanent income level (Friedman, 1957:221).

Closely linked to the permanent income hypothesis was the life-cycle hypothesis developed in the late 1950s and early 1960s by Ando, Modigliani and Brumberg. This hypothesis extended the time frame of the permanent income hypothesis to include the entire life span of an individual or household and considered consumption and saving decisions in light of expected lifetime income (Bunting, 2001:150). Other than its links to the permanent income hypothesis, the life-cycle hypothesis basically supported Keynes’s propositions, however Modigliani and Brumberg clearly explained the fundamental distinction between the Keynes hypothesis and that of the life-cycle hypothesis: “We depart from Keynes, however, on his contention of “... a greater *proportion* of income being saved as real income increases” (p. 97, italics his). We claim instead that the *proportion of income saved is essentially independent of income*; and that systematic deviations of the saving ratio from the normal level are largely accounted for by the fact that short-term fluctuations of income around the basic earning capacity of the household, as well as gradual changes in this earning capacity, may cause accumulated saving to get out of line with current income and age.” (Modigliani & Brumberg, 2005:32).

The two fundamental propositions supporting this claim focus on the idea that savings provide a buffer against both long term and short term variations in income, and that providing for retirement and emergency requirements is linked to basic earning capacity while the time frame during which such savings occur is generally not related to income levels (Modigliani & Brumberg, 2005:32). The major implication of this hypothesis from the perspective of savings was that individuals borrow to finance their consumption requirements in the early stages of life. Once they are earning sufficient income they pay off borrowings and begin to save for retirement. As Modigliani later explained it, “... consumption at any point in time, as well as over the lifetime, depends on life resources and not on income at the time of consumption. Thus saving represents the residual between the consumption optimally

allocated to a period and whatever the income happens to be in that period.” (Modigliani, 2005:111).

The patterns predicted by the life-cycle hypothesis are generally representative of the savings behaviour of households as savings rise with age and then fall as retirees dissave, however there are a number of savings behaviours which seem to contradict the predictions of the life-cycle hypothesis (Mitchell & Utkus, 2004:5) Therefore, while the life-cycle hypothesis might be a useful normative theory, in that it predicts how individuals should act if they are rational and utility maximising, it does not necessarily account for how individuals really act. Warneryd (1999:142) makes the observation that instead of these limitations leading to a rejection of the model, as would be in accordance with Popper’s falsification concept, a number of ad hoc explanations have been put forward to provide explanations for these deviations which include such notions as the bequest motive and the precautionary motive. This has allowed the dominance of the life-cycle hypothesis as an explanation of savings behaviour to prevail.

2.2.4 The Behavioural Life-Cycle Hypothesis

While early economists considered both willingness and ability to save as determinants of ultimate savings patterns, the permanent income hypothesis and life-cycle hypothesis focussed only on ability to save (Warneryd, 1999:146). This exclusion of psychological factors resulted in an incomplete explanation of savings.

In 1988 Shefrin and Thaler suggested a new approach to understand motivations for saving and consumption which altered the traditional models to incorporate behavioural elements. Their Behavioural Life-Cycle Hypothesis (BLCH) incorporated issues related to self-control, mental accounting and framing to present a more realistic model of savings and consumption (Shefrin & Thaler, 1988). In their view, their model described actual behaviour, whereas the life-cycle hypothesis model was predicated on rational behaviour. Shefrin and Thaler were of the opinion that the life-cycle hypothesis model was actually a special case of their behavioural life cycle model where an individual displayed no self-control problems.

A number of factors have been identified which have the potential to influence individual’s decisions regarding savings. These include both internal factors such as self-control, inertia and procrastination and external influences such as framing, default choices and the influence of peers and society (Akerlof & Shiller, 2009; Mitchell & Utkus, 2004; Thaler, 1994;

Warneryd, 1999). The next section highlights some of the key behavioural issues that play a role in the savings decision.

2.3 BEHAVIOURAL ISSUES IN SAVINGS DECISIONS

In general, limitations on the ability to act as the life-cycle model predicts originate from two key areas, the first being computational limitations, and the second linked to willpower or self-control and procrastination (Benartzi & Thaler, 2007; Desai, 2011:268; Laibson, Repetto & Tobacman, 1998; Monahan, 2004; Thaler, 1994; Thaler & Sunstein, 2008:117). A number of behavioural factors are at play in both of the above instances and are discussed in more detail in the following sections.

2.3.1 Computational limitations

The life-cycle hypothesis requires individuals to possess advanced computational capacity to solve what Thaler (1994:186) terms “... a multiperiod dynamic optimization problem”. Thaler highlights a number of factors that impact on the ability to solve such problems including the complexity of the problem and how often an individual is required to solve the problem. He concludes that savings decisions are by their very nature hard to solve, and individuals are not in a position to learn from past mistakes as they are planning for a once in a lifetime event such as retirement (Thaler, 1994:187). Studies have shown that individuals are not very adept at solving savings problems. According to a 2003 survey conducted by the Employee Benefit Research Institute, less than 40% of workers in the United States had calculated how much they needed to save for retirement (Mitchell & Utkus, 2004:5).

Kahneman is quoted by Bernstein (2007:5) in *Capital Ideas Evolving* as noting that “The failure in the rational model is... in the human brain it requires. Who could design a brain that could perform in the way this model mandates? Every single one of us would have to know and *understand* everything, completely and at once.” The idea that humans are limited in their ability to carry out the computations necessary for making optimal rational decisions is often referred to as bounded rationality. Herbert Simon is credited as being the first person to use the term “bounded rationality”. The concept developed from his writings on decision making between 1947 and 1957 (Klaes & Sent, 2005:37). Simon (1987:266) defined bounded rationality as referring to “... rational choice that takes into account the cognitive limitations of the decision-maker – limitations of both knowledge and computational capacity.”

Given these limitations, it is no longer sufficient to conclude that, as postulated by the life-cycle hypothesis, individuals left to their own devices will always choose the most optimal

savings level. Instead consideration needs to be given to the numerous factors that influence the individual in the savings decision process.

The uncertainty regarding future growth rates, returns, income levels and other unknowns makes it particularly difficult to calculate an optimal savings rate, even among economists (Benartzi & Thaler, 2007:82). Usually when confronted by difficult computations, the human brain makes use of heuristics, or mental shortcuts, to solve problems, however, this process is only useful if there are good heuristics or rules of thumb to apply. Thaler (1994:187) mentions that he is not aware of any useful savings heuristics which are commonly applied. In the absence of useful heuristics, another source of information for individuals who are trying to establish what to save would be from external cues (Akerlof & Shiller, 2009:119). These could include cues provided by authority figures, the advice of individuals perceived as experts and the actions of peers or society in general (Benartzi & Thaler, 2007:94).

The cues from authority figures might occur deliberately, such as Government incentives and tax penalties to encourage savings. However, in some circumstances the cues are less deliberate and result from the use of default options. Thaler & Sunstein (2008) point out that default options can become very strong external cues, particularly when individuals consider the default option to reflect a recommended choice. From this perspective, employees might decide to take their cue for savings levels from employers who define default contribution rates for retirement savings.

Another option for individuals who do not know how much to save is to consult experts, or individuals who are considered to be experts. Benartzi & Thaler (2007:94) refer to an interesting phenomenon observed at a supermarket chain where management were confused as to the homogeneity in savings behaviour at particular stores, but heterogeneity between stores. On further investigation it was discovered that employees were relying on a particular individual within the store to provide investment advice and this in turn influenced ultimate savings behaviour within each store. As the “expert” differed in each store, the savings behaviour between stores showed differences.

Another external cue which may influence savings decisions are the actions of peers and society. Duflo & Saez (2002) observed a peer effect in their study of retirement savings decisions at a university. Their results appeared to suggest that peers influenced both the decision to participate in a pension plan, as well as the choice of mutual fund vendor.

In their book *Animal Spirits*, Akerlof & Shiller (2009:125) provide an overview of the influence of peers and society on the general savings behaviour of individuals. They are of the opinion that individuals take cues from the actions of those around them when making decisions regarding how much to spend and save. According to them, this effect is also observable when considering savings levels at a country level, where China's support for and campaigns in favour of saving are contrasted with the message of consumerism generally observable in America, the savings rates in China is one of the highest in the world, while America has negative savings rates.

Bounded rationality and the lack of computational capacity can therefore result in a number of deviations from rational savings behaviour as individuals rely on external cues to assist them in their decision making.

2.3.2 Willpower

The second factor which restricts rational behaviour as predicted by the life-cycle hypothesis is the impact of limited willpower. Bounded willpower results in individuals knowingly taking actions that are not in their best interests in the long term (Jolls *et al.*, 1998:1479) and is linked to self-control and procrastination (Diamond & Vartiainen, 2007:2). This manifests itself in individuals exhibiting a lack of self-control by consuming rather than saving and procrastinating by putting off the decision to start saving (Monahan, 2004:481). Thaler (1994) notes that even if an individual was able to work out an optimal savings plan the key issue would be whether the individual is able to stick to such a plan given the ever present temptation of current consumption. As mentioned previously, early economists such as Rae, Böhm-Bawerk, Fisher and Keynes were aware of the impact of self-control on savings and consumption decisions. However, the life-cycle hypothesis implicitly assumes that individuals display perfect self-control (Bernheim, 2002:1202).

When considering the impact of self-control and procrastination on savings decisions, it is useful to refer to the categorisation of Weiss (1991), as further developed and explained by Monahan (2004) who categorise individuals who do not act rationally as impulsives and impatient. Impulsives are thought to save too little due to situational inconsistency. They are generally aware that they should be saving more, they just can't seem to make themselves take the necessary actions to achieve this. This group is generally believed to be suffering from self-control problems. On the other hand impatient tend to procrastinate when they make decisions about savings, they assume that their current consumption needs are more important than future needs, and they plan to save for the future, but they will start tomorrow.

The concept of self-control and procrastination is closely linked to intertemporal choice and time preference. Warneryd (1999:156) highlights this linkage as follows: “The degree of self-control can be conceptualized as rate of time preference. Persons with low self-control ... can be said to ask a high interest rate in their discount functions for future events or in more psychological terms be impatient.” The discounted utility model uses the discount rate to distinguish between levels of self-control and impatience of different decision makers. A high discount rate implies low levels of self-control, whereas a lower rate indicates that an individual has greater patience. However the model’s assumption of a single discount rate appears to oversimplify the decision making process as numerous examples exist where discount rates change due to circumstance and time (Goldin, 2007:50).

The time consistency of a single discount rate results in an exponential discount function where future time periods are discounted using a constant rate. Strotz (1955) was the first economist to suggest that there could be alternatives to using an exponential discounting function. He did not explicitly state what form these alternatives would take, however he was aware that any deviation from an exponential function would result in an inconsistency in time preference (Frederick *et al.*, 2002:366). Hyperbolic discounting was introduced as an alternative explanation of how individuals made intertemporal decisions. Hyperbolic discounting implies that the discount rate over longer time horizons is lower than the discount rate over shorter time horizons, this results in a situation where an individual’s preferences are inconsistent over time (Laibson, 1997). Hyperbolic discounting first appeared in its functional form in 1968 in Phelps & Pollak’s investigation of intergenerational altruism and was used for the first time in individual decision making by Jon Elster in 1979 (Frederick *et al.*, 2002). The concept has since gained popularity in explaining consumption and savings behaviour (Laibson, 1997; Laibson *et al.*, 1998; O’Donoghue & Rabin, 1999a).

Self-control problems emerge from inconsistent preferences in different time periods and changing circumstances. According to Loewenstein & Thaler (1989:183) “Discount rates observed in both laboratory and field decision-making environments are shown to depend on the magnitude and sign of what is being discounted, on the time delay, on whether the choice is cast in terms of speed-up or delay, on the way in which a choice is framed, and on whether future benefits or costs induce savoring or dread.”

Explanations for why these dynamic inconsistencies occur were first explained in terms of changing preferences and tastes (Strotz, 1955). Later models following a multiple self approach such as the two self economic man model proposed by Thaler and Shefrin (1981)

were put forward as explanations for the anomalies observed in decision making over time (Loewenstein, 1996). Thaler and Shefrin's (1988; 1981) explanation of the phenomenon in terms of a planner and doer model introduced a dual preference structure to illustrate the issue of self-control. The planner and the doer were cast as the elements which created internal conflict between the emotional and rational elements of an individual's decision making regarding intertemporal choice. More recently, the field of neuroeconomics has provided additional insights into self-control and intertemporal choice (Camerer, Loewenstein & Prelec, 2005).

A study by McClure, Laibson, Loewenstein & Cohen (2004) used functional magnetic resonance imaging to observe brain activity in subjects who were provided with different monetary reward options that varied in terms of amount and time delay. Their findings were in line with the idea that intertemporal choices are driven by two systems. The limbic system, which is associated with the midbrain dopamine system, showed heightened activity for immediate reward choices, whereas the prefrontal cortex and the posterior parietal cortex, which are typically associated with cognitive decision making, were used for intertemporal choices regardless of the time delay involved. On a relative basis, greater activity in the prefrontal cortex and posterior parietal cortex was associated with subjects choosing longer term options. McClure et al (2004:506) conclude that "Collectively, these studies suggest that human behaviour is often governed by a competition between lower level, automatic processes that may reflect evolutionary adaptations to particular environments, and the more recently evolved, uniquely human capacity for abstract, domain-general reasoning and future planning." The insights from neuroscience help to provide an explanation for the various anomalies observed in intertemporal choice, and the resultant self-control problems that arise. Camerer, Loewenstein & Prelec (2005) highlight the role played by intelligence, willpower and situational circumstances in explaining individual differences in intertemporal decisions.

A secondary theme within the study of intertemporal choice in savings decisions is the use of various mechanisms for delaying gratification and enhancing self-control. Strotz (1955) explained this in terms of a strategy of pre-commitment. He was of the opinion that an individual who was aware of his potential shortcomings when it came to making long term decisions and sticking to them would force himself to pre-commit to a decision, even if this entailed additional costs. Strotz uses the example of Christmas Clubs where individuals pay a certain amount each month into an inaccessible account (which often doesn't pay interest) in order to ensure that they have sufficient funds saved up at the end of the year. Ainslee (1975)

provides a review of impulse and impulse control and highlights the use of three main pre-commitment devices. The first entails rearranging the reward contingencies to ensure that the earliest alternative is never the preferred alternative. The second device is to deliberately constrain future behaviour so that the individual is unable to take action even if they change their mind. The last device is to direct attention to other tasks so that the individual doesn't focus on immediate gratification.

The work of Shefrin & Thaler (1988) focussed on the second device mentioned above as they developed their BLCH. They formulated this precommitment device in terms of the use of rules. They divided rules into external and internal rule categories. External rules related to precommitments enforced by external parties, such as the use of a pension plan where access to the funds is limited due to externally formulated rules and regulations. Internal rules on the other hand are those that the individual formulates and applies. In this respect, the most common formulation of such rules is observed in terms of a phenomenon referred to as mental accounting. In his critique of the life-cycle hypothesis, Thaler (1994) identifies one of the shortcomings of the hypothesis relates to its assumption of perfect fungibility of wealth and that money therefore has no particular labels. This implies that the marginal propensity to consume a unit of wealth is the same regardless of the source or location of the wealth. In their BLCH Shefrin and Thaler (1988) contend that individuals divide their wealth into a number of separate mental accounts, and depending on which account money is assigned to, this will ultimately influence the propensity to save or consume that wealth.

Thaler (1990) suggests that individuals use mental accounts to separate wealth. Individuals have a number of rules applied to different mental accounts that they enforce to help with self-control issues. These rules result in different treatment of money received from salary income, bonus income, lottery wins, gifts etc. and that this needs to be considered to provide a more realistic picture of savings behaviour

According to the supporters of the behavioural approach to savings, a theory of savings which does not take account of the impact of hyperbolic discounting, procrastination, self-control and the use of mental accounts is incomplete. While this might in the past have been seen as an academic debate with little real world consequence, the move which is underway globally to put the responsibility on the individual to save sufficiently for retirement has resulted in a renewed focus on the rationality of individual decision making.

2.4 IMPORTANCE OF THE INDIVIDUAL AS DECISION MAKER

One of the key issues in the retirement industry over the past few decades has been the move from a defined benefit to a defined contribution approach to retirement saving. This move has seen an increased responsibility being placed on the individual in terms of choices and decisions that need to be made (Monahan, 2004:479). This in turn has necessitated a renewed focus on the decision making process of the individual, with the aim of determining whether it is as rational as traditional economic theory assumes, or whether behavioural factors play a role.

Before highlighting the role of the individual in retirement savings decisions, a brief overview of the retirement savings landscape is included to provide context. Section 2.5 therefore highlights the differences between defined benefit and defined contribution schemes and outlines the factors leading to the move from defined benefit to defined contribution schemes. In light of this, the adequacy of retirement savings, and the potential of behavioural factors to influence retirement savings decisions are then addressed in section 2.6.

2.5 DEFINED BENEFIT AND DEFINED CONTRIBUTION RETIREMENT SCHEMES

2.5.1 Comparing defined benefit to defined contribution retirement schemes

Defined benefit funds are sometimes referred to as fixed benefit funds as they are structured to ensure that an employee receives a monthly pension from retirement until death which is usually related to the final salary the employee earned prior to retirement. In contrast, defined contribution funds do not guarantee a final retirement benefit as the fund is structured so that a fixed monthly contribution is paid into the fund by either the employer, the employee or both. These contributions are invested in various assets which will ultimately provide a pool of funds which will be available to the employee at retirement. However, there is no guarantee regarding the value of the funds which will be available at retirement.

The key differentiating factor between defined benefit and defined contribution schemes is the risk distribution between employer and employee. Table 2.1 highlights the various risks associated with retirement schemes and who bears each risk in defined benefit and defined contribution schemes.

Table 2.1: Risk distribution in defined benefit and defined contribution retirement plans

Type of Risk	Defined Benefit	Defined Contribution
Investment	Employer	Employee
Inflation	Employer / Employee	Employee
Longevity	Employer	Employee
Market timing risk at point of retirement	Employer	Employee
Accrual (portability)	Employee	DC plans are portable
Vesting	Employee	Employee
Employer insolvency	Employee	DC plans are always fully funded
Salary replacement	Employer	Employee

Source: Broadbent, Palumbo & Woodman (2006)

As can be seen in Table 2.1, employees bear the majority of risks in a defined contribution setting when compared with a defined benefit approach. The various investment risks and conditions in the financial markets at the point of retirement all contribute to the uncertainty of the final retirement fund balance that will be available to provide income during the employee's retirement years. In addition, depending on the lifespan of the employee post retirement, these funds may be insufficient to ensure an adequate income for the full retirement period. However, despite these risks, a key benefit of defined contribution plans is the portability of benefits when moving jobs where the employee can transfer the accumulated amount of retirement funds to the new employer or another retirement fund. In contrast, due to the structure of defined benefit plans, and the method for calculating accrued benefits, employees lose out every time they move jobs. These losses have been estimated at between 25 and 30% for someone moving jobs about six times over their working life compared with someone remaining with the same employer for their entire working career (Blake, 2003:352). The distribution of risk factors between employers and employees has been instrumental in motivating a shift from defined benefit to defined contribution schemes.

2.5.2 The move from defined benefit to defined contribution retirement schemes

Over the past few decades there has been a worldwide move from the traditional defined benefit pension schemes to defined contribution schemes (Broadbent *et al.*, 2006; Mercer, 2010; Mitchell & Utkus, 2004). There are a number of factors which have contributed to this trend. One of the main factors from an employee perspective has been increased workforce mobility which has made defined contribution funds more attractive to workers. However, the driving force behind the move has been from employers seeking to reduce their risk exposure. In general, changes to accounting treatment, increased life expectancies and volatility in financial markets have all led to a position in which employers with defined benefit schemes are more exposed to financial risks arising from these schemes than those who operate defined contribution plans (Broadbent *et al.*, 2006).

In a South African context the move from defined benefit to defined contribution has also taken place, however, some of the underlying causes for the move are unique to the South African situation. Key to the conversion from defined benefit to defined contribution in the 1980s and 1990s in South Africa was the influence of trade unions. The unions were instrumental in providing an alternative retirement benefit program to the existing defined benefit schemes which were not aligned to many of the employees needs and were seen to discriminate against black employees (Andrew, 2004; Kerrigan, 1991). Another factor driving the conversion to defined contribution funds was the move by employers to reduce their exposure to the risks associated with defined benefits funds, particularly in light of the political and economic uncertainty that existed in the early 1990s as South African moved towards its first democratic elections. Many defined benefit funds were closed to new entrants and the dominance of defined contribution funds was further solidified during this time (Andrew, 2004:8).

The trend towards defined contribution schemes has continued unabated and a recent worldwide survey (Mercer, 2010) revealed the high prevalence of defined contribution plans across many parts of the world, with most regions having more participants in defined contribution plans than defined benefit plans. In many cases, defined contribution plans are the only option available to new participants. The survey also notes that in most regions, the move to defined contribution plans has seen employers moving away from a paternalistic approach to retirement provision for employees. Instead they have now adopted a facilitator role in the retirement planning of their employees (Mercer, 2010:5). This change in roles has

seen the employee become the principal decision maker with regard to retirement savings decisions and choices.

2.6 THE INDIVIDUAL AS DECISION MAKER IN RETIREMENT PLANNING DECISIONS

2.6.1 Decisions that need to be made in the retirement planning process

The move to defined contribution plans has placed the individual in a position where they are required to make a number of decisions which will ultimately determine whether they will have sufficient funds available at retirement. In general the employee needs to determine whether to participate in a retirement scheme, work out the expected salary replacement level at retirement, calculate the level of contributions to meet this level, make decisions about asset allocations and decide whether to make any early withdrawals (Broadbent *et al.*, 2006:29). None of these issues should present a problem if individuals behave in a rational manner and adhere to the predictions of the traditional theories of savings, such as the life cycle hypothesis. However, as outlined above, heuristics and biases have the potential to play a role in each of the above-mentioned decisions and there is increasing recognition that these heuristics and biases could lead to insufficient retirement savings (Benartzi & Thaler, 2007; Laibson *et al.*, 1998; Mitchell & Utkus, 2004). The following section considers whether there is evidence that individuals are impacted by these biases as demonstrated by savings levels and savings behaviour.

2.6.2 Adequacy of retirement savings

There is an ongoing debate regarding whether individuals are saving adequately for retirement. A study by Munnell, Webb & Delorme (2006:1) found that 43% of American households were at risk of having insufficient retirement savings to maintain their pre-retirement lifestyle. This figure is relatively conservative as it is based on employees retiring at 65 and having the ability to annuitize all of their wealth, including the use of reverse mortgages on their homes. On the other hand, another study found that only 25% of households had insufficient retirement savings (Gale, Seshadri & Scholz, 2008). The issue with determining adequacy of retirement savings is what methodology is employed to measure and interpret results (Gale *et al.*, 2008) as different methodologies result in varying outcomes which appear contradictory and therefore inconclusive.

A key focus of many of the studies conducted in the late 1990s and early 2000s was the adequacy of retirement savings for the so-called baby boom generation who are approaching retirement in the early decades of the 2000s. However, changing work style and the

prevalence of defined contribution plans is far more likely to have an impact on the so-called Generation X and Generation Y. At this stage it is difficult to predict the longer term impact of higher job mobility and the higher prevalence of defined contribution plans on the eventual retirement funds that these generations will have access to.

When considering trends in contribution rates to defined contribution plans, studies in the US have found that employees contribute 5% of gross salary to their retirement funds, which is insufficient to meet a 75% replacement rate at retirement. In the UK, low contribution levels have also been highlighted as a key concern for future retirement security (Broadbent *et al.*, 2006:29). Worldwide the low take up rates for employees where membership of defined contribution schemes is not mandatory also predict inadequate retirement savings in the future (Mercer, 2010:6)

A further issue when trying to determine adequacy of savings is the difficulty in determining what actually constitutes “sufficient” retirement savings. As Skinner (2007) summarises it, the wealth requirements to sustain consumption in retirement are daunting, and most households cannot save enough to guard against all future events such as turbulent financial markets and escalating health care costs. In addition, it is difficult to predict what is sufficient for retirement consumption requirements, as this will depend on the health, temperament and wealth of each individual.

Perhaps more revealing in terms of determining the rationality and efficiency of individuals as decision makers is to consider what they say about their own retirement savings behaviour. Surveys conducted around the world have produced interesting insights into the behaviour and fears of individuals in a retirement savings context. A survey of employees at a US company indicated that 68% felt their savings rates were too low. While 24% intended to increase their savings in the near term, only 3% acted on this (Choi, Laibson, Madrian & Metrick, 2002). According to a 2003 survey conducted by the Employee Benefit Research Institute, less than 40% of workers in the United States had calculated how much they needed to save for retirement (Mitchell & Utkus, 2004:5). A recent survey conducted by the Association of British Insurers found that 41% of respondents were saving too little or nothing for retirement. It was found that 28% strongly agreed with the statement “I am concerned that I will have insufficient income in retirement.” (O’Neill, 2010).

A South African survey revealed that the majority of respondents were concerned about their retirement savings adequacy. In addition, 38% of respondents were not aware of what

percentage of salary they contributed towards retirement, of the 62% who knew what they contributed, 17% felt they were saving too little. In addition, 57% of pensioners surveyed had experienced a drop in living standards since retirement (Old Mutual, 2010). In South Africa, it is estimated that over half of pensioners who reached retirement with a funded pension receive a retirement income which equates to less than 28% of preretirement income levels (South Africa, National Treasury, 2007).

In general, there appears to be concern regarding the adequacy of retirement savings. In many cases, the true impact of the move to defined contribution plans, and the focus on individuals as decision maker, will only be seen in the years to come as these employees reach retirement age over the next few decades. In the interim, historically low savings rates in many countries, volatile financial markets and government inability to provide social security to individuals beyond retirement, are all contributing to the move to encourage better savings behaviour, and to understand what drives such behaviour.

2.6.3 The potential influence of behavioural factors on retirement savings decisions

Considering each of the decisions that individuals have to make regarding participation in defined contribution schemes, a number of authors have highlighted behavioural factors that have the potential to result in sub-optimal retirement savings decisions (Benartzi & Thaler, 2007; Laibson *et al.*, 1998; Mitchell & Utkus, 2004; Monahan, 2004; O'Donoghue & Rabin, 1999b). The main behavioural factors which have the ability to influence retirement savings decisions can be broadly categorised as bounded rationality and bounded willpower (Desai, 2011:268; Jolls *et al.*, 1998; Thaler & Sunstein, 2008:117). Bounded rationality generally refers to computational limitations facing the decision maker (Simon, 1987:266), whereas bounded willpower is linked to self-control and procrastination (often linked to inertia or status quo bias) which result from situational and temporal inconsistencies in decision making (Monahan, 2004:482). The following sections highlight the potential impact of these biases on each decision area faced by the employee in the defined contribution framework. It should be noted that most of the research has been conducted in the United States as the country has a long history of defined contribution plans as part of private sector voluntary pension schemes (Broadbent *et al.*, 2006:29).

2.6.3.1 Enrolment decision

When an employee joins a company, they must decide whether or not to enrol in the employer's defined contribution plans (there are some countries and companies where enrolment is compulsory which eliminates this particular decision). In these decisions lack of

self-control and procrastination often lead to employees not enrolling, or only enrolling after a number of years of employment.

In many instances defined contribution plans provide multiple incentives to employees to join, including tax deductibility, tax deferrals and employer contribution matches. Despite these advantages, many employees do not join their company schemes. In the United States, the number of workers who are eligible to participate in 401(k) plans who are not participating was around 25% in the late 1990s and more recently in 2007 has been at 21% (Munnell, Golub-Sass & Muldoon, 2009).

In light of the issues with self-control and inertia, a number of researchers investigated an alternative to the traditional incentives which might change employee behaviour. Automatic enrolment, which simply changed the default choice from not enrolling to automatic enrolment (with the option to opt out), has had a profound impact on levels of participation (Madrian & Shea, 2001). One study found that without automatic enrolment, the average participation rates after six months of working for a company ranged from 26-43%, these levels rose to 86-96% participation when enrolment was automatic (Choi *et al.*, 2002). The trend in the United States over the past number of years has been a move toward automatic enrolment schemes with the number of schemes with automatic enrolment increasing from 11% in 2004 to 36% in 2007 (Munnell *et al.*, 2009).

2.6.3.2 Contribution levels

Determining the optimum contribution level requires computations often beyond the scope of the abilities of boundedly rational individuals. In addition, employees with self-control problems will favour current consumption over future consumption which results in employees electing low initial contribution levels. Inertia and procrastination may result in these low contribution levels remaining at the initial choice or default level (Monahan, 2004:486).

A number of studies have illustrated the irrationality of low contribution levels. A study conducted by Choi, Laibson & Madrian (2005) revealed that between 20% and 60% of employees who were eligible to receive employer matching contributions, and were in an age bracket where they could make penalty free withdrawals still chose lower than the optimal contribution level, leading to annual losses averaging between 0.66% and 2.32% of salary, with the largest loss 6% of one employee's salary.

While the use of defaults to overcome lack of participation seems to improve savings behaviour, the resultant use of default contribution levels has an adverse impact. Employees often go with the default option, with no consideration of their savings requirements, and then inertia, or status quo bias results in them staying at this sub-optimal level (Choi *et al.*, 2002). However, setting the default option to a higher contribution level raises the concern that this might lead to lower participation levels (Madrian & Shea, 2001:1185). A solution proposed by Benartzi & Thaler (2004) sought to overcome this issue. In their Save More Tomorrow™ scheme, automatic enrolment and initial default contribution levels overcome self-control and procrastination issues. The scheme then defers increases in contribution rates to later dates, and from money that the employee does not yet have (in the form of future increases) thus tapping into the individual's willingness to do something tomorrow, which they would not agree to do today. The scheme therefore overcomes cognitive biases through the design of the product.

2.6.3.3 Asset allocation

Decisions concerning asset allocation are also subject to numerous behavioural biases which lead to employees adopting naïve diversification strategies, failing to adapt their asset allocation over their life cycle, over-investing in company stock, and trying to time the market (Benartzi & Thaler, 2007; Monahan, 2004). The various behavioural biases contributing to these sub-optimal investment choices are linked to framing effects, inertia and procrastination, risk myopia in respect of company stock, overconfidence, loss aversion and the representative heuristic regarding past performance as a predictor of future returns (Mitchell & Utkus, 2004).

The introduction of default plans, and lifestyle funds attempt to direct employees to the optimal asset allocation, which will then change over time according to their age profile. In addition, simplification of choices, rather than the traditional view that more choice is better are suggested as ways to enhance the decision making process (Mitchell & Utkus, 2004).

2.6.3.4 Early withdrawals

Once employees have decided to participate, chosen contribution levels and decided on an asset allocation, a key factor in determining whether they meet their ultimate retirement goals is whether they stick to their savings plan when they switch jobs or are presented with an opportunity to withdraw funds from their accumulated pension funds prior to retirement. Once again behavioural factors related to self-control and procrastination can play a role in influencing individuals (Monahan, 2004). In addition, boundedly rational individuals may

struggle to determine what the optimal choice is when faced with a withdrawal decision. It has therefore been suggested that default rules, framing and providing information have the ability to direct employee behaviour when it comes to making decisions about early withdrawals (Gale & Dworsky, 2006).

2.6.4 Scope of study

The above overview has provided a brief background to some of the behavioural factors that potentially influence employee choices in a defined contribution framework. Each of the above areas has been the subject of much research, however, with the exception of 2.6.3.4, further elaboration falls outside the scope of this study. The remainder of this study therefore focuses only on retirement preservation decisions.

2.7 CONCLUSION

The common theme in a number of works that review the historical development of savings theories is the rise and fall, and rise again, of the influence of psychological factors in explaining savings behaviour (Frederick *et al.*, 2002; Loewenstein, 1992; Warneryd, 1999). In a number of cases the original contributors to theory development were acutely aware of the role that psychology played in the decision making process of individuals as it related to savings (Thaler, 1997). However the pressure to convert economics into a mathematical science resulted in the removal of psychological considerations from savings theories. This in turn led to the development of a number of theories, such as the life-cycle hypothesis, which are normative in nature, and describe how rational individuals should behave, rather than describing how they actually behave. The life-cycle hypothesis is based on the idea that the consumer is able to solve complex computations to determine the optimum saving and consumption levels over their lifetime (Graham & Isaac, 2002). According to the hypothesis, an individual is able to calculate their consumption requirement over their working life and retirement, and based on this calculation the individual will smooth their consumption over their entire life period. This would imply that individuals are able to determine how much of their income they need to save for retirement, implement the appropriate saving plan and not deviate from the plan (Monahan, 2004). If individuals act according to traditional models, there is no requirement for taxes, penalties, regulation or any intervention to influence behaviour as individuals make rational decisions that result in optimal consumption and saving levels.

However, in the latter part of the 20th century, a renewed focus on the influence of psychological considerations in economic decision making has led to the development of

descriptive theories of savings behaviour, such as the BLCH which explicitly consider the impact of behavioural and psychological factors on savings behaviour. In light of computational limitations and self-control issues the decisions made by individuals may not result in optimal savings levels. This would imply that there would need to be intervention in the savings decisions of individuals to ensure that sufficient funds are available for retirement.

A renewed focus on the individual as decision maker has occurred as the shift from defined benefit to defined contribution retirement plans has put the responsibility for retiring with adequate funds in the hands of the individual. A number of potential weaknesses in the decision making process of the individual have been highlighted in the context of retirement savings decisions from the decision to join, to the decision to preserve retirement funds.

The next chapter considers the issues raised in this chapter as they relate to retirement preservation decisions and highlights a number of solutions which have been suggested as ways to overcome behavioural shortcomings in savings decisions. The chapter concludes with the development of a conceptual model of the factors which play a role in retirement preservation decisions.

CHAPTER 3 RETIREMENT FUND PRESERVATION - DEVELOPING A CONCEPTUAL MODEL

3.1 INTRODUCTION

As highlighted in Chapter 1, the research approach adopted in this study is to undertake a critical multidisciplinary literary review to assist in the development of a proposed conceptual model. Chapter 2 has laid the foundation in terms of the theoretical approaches to savings theories. Chapter 3 focuses first on a detailed critical analysis of the literature related to preservation decisions and then utilises this analysis in the construction of a proposed conceptual model.

This chapter therefore explores the issues related to preservation decisions, focusing on evidence of early withdrawals, factors connected with low levels of preservation and potential solutions suggested as ways to overcome sub-optimal decision making in a retirement preservation context. The ultimate aim of the chapter is the development of a proposed conceptual model which explains the factors which potentially lead to low preservation levels. This model forms the basis of the empirical phase of the study.

3.2 EVIDENCE OF LACK OF PRESERVATION OF RETIREMENT FUNDS

Concern in the United States about the prevalence of employees cashing out their retirement funds prior to retirement has led to a number of studies and reports which aim to determine the severity of the problem. A study by Basset, Fleming & Rodrigues (1998) found that 47% of employees had taken at least one lump sum withdrawal prior to retirement, of these, only 28% rolled this over into another tax qualified retirement plan. However on a dollar basis those rolling over their funds accounted for 56% of the dollar value of withdrawals. Engelhardt (2002) reported that 67% of employees took a cash payment when they moved jobs, however the size of such payments, if they had been rolled over into another pension plan were relatively insignificant, representing only 5 – 11% of the pension wealth for a median household that spent the payout. Engelhardt notes that the level of savings erosion may be understated as the survey data concentrated on older workers, and therefore may not be reflective of the issues facing younger workers who take cash payouts. Poterba, Venti & Wise (1999, 2000) also find that the majority of those cashing out have very low accumulated pension balances, those with large balances and those nearing retirement preserve their funds and therefore the average impact of preretirement withdrawals is a loss of only 5% of final

retirement wealth. Studies by the Center for Retirement Research at Boston College have noted nearly two thirds of employees take a lump sum payment when moving jobs, of these employees, about 40% do not roll this money over into another tax-deferred savings vehicle. However, once again, because the employees who cash out are younger or have smaller balances, the overall percent of assets cashed out amounts to only 16% (Munnell *et al.*, 2009). Therefore, most US studies tend to agree that when considered in terms of the percentage of employees taking cash withdrawals prior to retirement the numbers are fairly large. However when considering the actual value of funds withdrawn, the number is considerably smaller. Therefore it would appear that the propensity to withdraw funds prior to retirement is higher for younger employees, lower income employees and those with low accumulated balances.

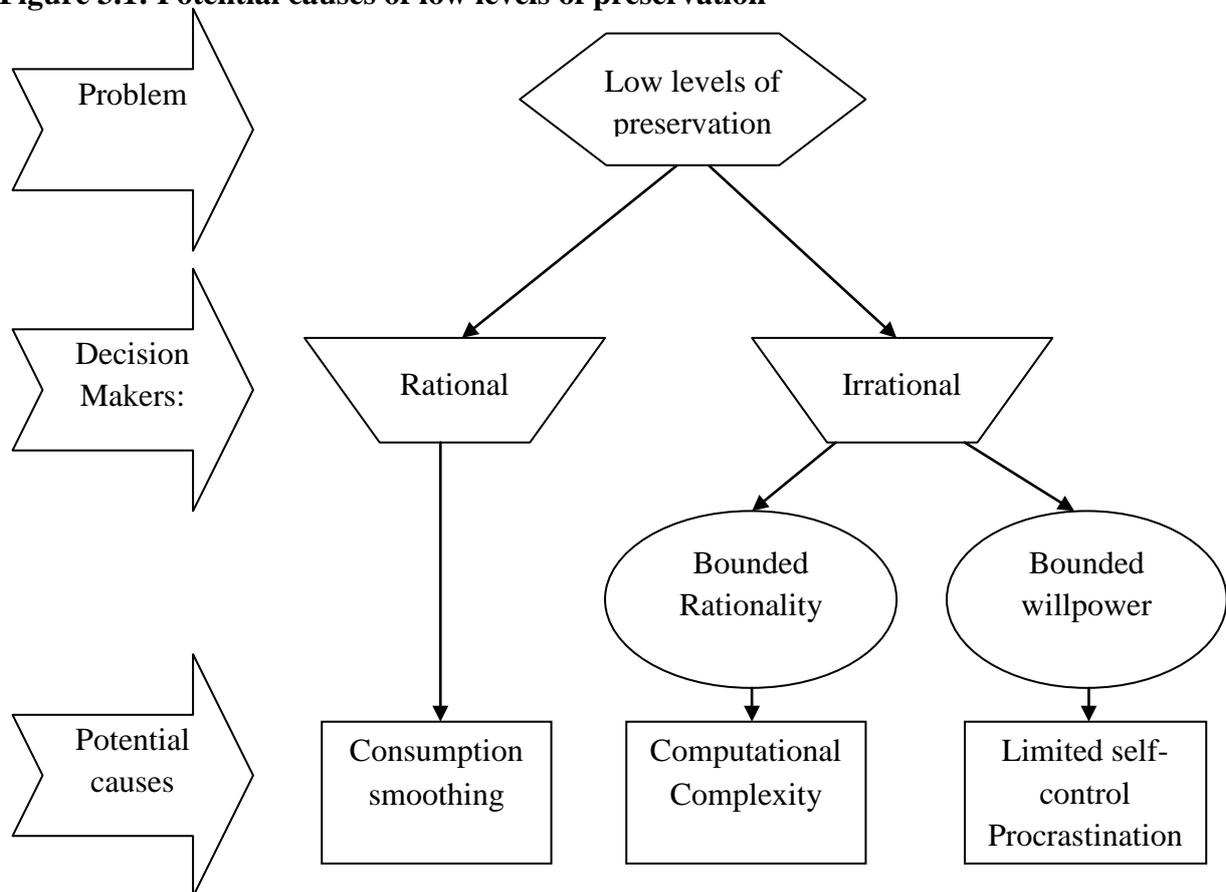
Research in South Africa has also found that the majority of individuals take a cash payout when switching employers (Sanlam Employee Benefits, 2013). One survey found that 52% of employees who had changed jobs in the previous 10 years took their benefit in cash, with the vast majority withdrawing 100% of their benefit (Old Mutual, 2010). Some studies have found that as little as 10% of employees switching jobs preserve their pension benefits, this percentage could be as low as only 1% for low income employees (Murphy, 2002; South Africa, National Treasury, 2007). A study of trends in the retirement fund industry found that between 1993 and 2006 withdrawals were higher than contributions to the retirement fund industry, and it is only investment income that has resulted in inflows exceeding outflows (Standish & Boting, 2006). Numerous newspaper and magazine articles have been written highlighting the lack of preservation, and inadequacy of retirement savings (see for example Moodley-Isaacs, 2010; Personal Finance, 2010; Stokes, 2010). One of the articles (Personal Finance, 2010) notes the worrying trend of South African's resigning from jobs, and even getting divorced, in an effort to access their retirement savings.

3.3 POTENTIAL REASONS FOR EARLY WITHDRAWALS

The reasons for choosing to take a cash payout rather than preserving retirement funds when leaving a job can be either rational or irrational. As illustrated in Figure 3.1, rational reasons would focus on the predictions of the LCH linked to consumption smoothing, whereas irrational reasons would be related to bounded rationality and bounded willpower. In the first instance, problems of bounded rationality would result in a situation where an individual is unable, due to the computational complexity, to determine whether preserving funds is the optimal solution in a given situation. Bounded willpower would lead to situations where

funds are cashed out due to a lack of self-control or procrastination (where an individual decides that they will start saving towards retirement at a later date and therefore decides to consume current savings) (Monahan, 2004:501).

Figure 3.1: Potential causes of low levels of preservation



Source: Author's conception

In order to determine the rationality of decision makers in a retirement preservation context, specific individual characteristics or circumstances would need to be associated with behaviour which is considered rational and behaviour which is considered irrational. The following section considers what factors would be associated with the decision maker in each of the above categorisations.

3.3.1 Rational decision makers

Rational reasons for taking a cash payment would relate to individuals who are exhibiting consumption smoothing behaviour as predicted by the LCH (Amromin & Smith, 2003; Love, 2007), therefore young adults who are in the consumption phase of their life cycle would be expected to make use of funds which they have access to when they move jobs to pay for immediate consumption needs, or to start paying back debt incurred in the consumption

phase. These individuals would ultimately be maximising their utility by choosing to use funds for immediate consumption, or the payment of existing debts. The LCH predicts that such behaviour would be observed among young adults, with a move to higher levels of preservation among older adults. A recent study (Blake, Wright & Zhang, 2011) finds that a rational life cycle approach to retirement savings would predict that those under the age of 35 should not be contributing to retirement savings, provided they increase their contribution to retirement savings as they age. This would imply that it could be considered rational for those younger than 35 to take the cash amount of accumulated retirement savings when they move jobs to fund current consumption requirements.

Liquidity constraints would also result in rational decision makers choosing to take a cash payment rather than preserving when leaving an employer. In this respect, a factor which would play a role in determining the rationality of not preserving funds would be related to the reason for leaving a job. In general, if the person has been fired or retrenched and has no other job to go to, then funds might provide consumption smoothing over the unemployed time period (Engelhardt, 2003). Another potential indicator of liquidity constraints relates to the relationship status of an individual as those who are divorced, separated or widowed have been found to be more liquidity constrained than their married and single counterparts (Hurd & Panis, 2006).

Alternatively, individuals might be in a position where they require the funds to meet immediate survival needs. The cash withdrawal of such funds is entirely rational, as Fisher noted (see Chapter 2): “Not only is a certain minimum of present income necessary to prevent starvation, but the nearer this minimum is approached the more precious does present income appear relative to future income” (Fisher, 1930:73). Therefore a further rational reason for taking a cash payment is necessity and would relate to circumstances where an individual requires the funds to survive on a day to day basis due to current liquidity constraints.

3.3.2 Irrational decision makers

In the context of preservation decisions the same biases that influence general retirement savings decisions have the potential to impact on decision making, namely bounded rationality and bounded willpower. In the first instance, problems of bounded rationality impacts on an individual’s ability to determine the optimal decision. Bounded willpower would lead to situations where funds are not preserved as a result of low levels of self-control or procrastination.

3.3.2.1 Individuals displaying bounded rationality

The decision as to whether it is optimal to preserve retirement funds is by its very nature complex and therefore has the potential to be an area where individuals who display bounded rationality would be predisposed to make sub-optimal choices. The computational complexity of the preservation decision requires, in the first instance, that an individual has the ability to understand and apply the impact of compounding over a future time period, which appears to be beyond the ability of many individuals (Lusardi & Mitchell, 2007a:216). In addition, the numerous uncertain factors that need to be taken into account, such as future investment returns, inflation rates, length of working life and retirement add to the complexity of the decision making process, with one conceptual model of retirement savings decisions highlighting thirty seven different elements that needed to be considered (Hershey, Walsh, Brougham, Carter & Farrell, 1998:453). As one study noted “The complexity of balancing financial need against financial resources over 12 to 20 years of retirement, in an economic environment of inflation and compounding investment returns, seems just too great an intellectual challenge” (Hershey *et al.*, 1998:468).

Given the complexity of the retirement decision making environment, it has been suggested that those with better education and financial knowledge might be better equipped to make retirement savings decisions (Bernheim, 2002; Broadbent *et al.*, 2006; John & Iwry, 2008; Thaler, 1994; United States, Working Group on Retirement Plan Leakage, 1998). A number of studies find positive relationships between financial knowledge and savings (Bernheim, Garrett & Maki, 2001; Lusardi & Mitchell, 2009; Peng, Bartholomae, Fox & Cravener, 2007). This appears to imply that highly educated and financially knowledgeable individuals are able to cope with the computational complexity of savings decisions. This would in turn imply that low education levels and a lack of financial knowledge and financial literacy would be associated with individuals who are not able to cope with the computational complexity. Therefore, it is expected that the potential factors which might indicate that an individual displays bounded rationality would be linked to lower education levels and low levels of financial literacy.

As discussed in Chapter 2, given the computational complexity of retirement savings decisions in general, it has been suggested that seeking advice or using external cues might be a way to overcome bounded rationality (Akerlof & Shiller, 2009:119; Benartzi & Thaler, 2007:94). Asking for advice would therefore be an indication of individual’s recognition of

the computational complexity of the decision environment and be another indicator that bounded rationality is a factor in the decision making environment.

3.3.2.2 Individuals displaying bounded willpower

3.3.2.2.1 Overview of the influence of impulse control and time perspective

As detailed in Chapter 2, behavioural biases associated with bounded willpower are thought to result from a lack of self-control and procrastination resulting from situational and temporal inconsistencies in decision making (Monahan, 2004) which are associated with two specific individual characteristics, namely impulsivity and time perspective (Ferrari & Díaz-Morales, 2007; Loewenstein, 1996:288; Mischel, Shoda & Rodriguez, 1989). Time perspective is defined as representing “... an individual’s way of relating to the psychological concepts of past, present, and future” (Boniwell & Zimbardo, 2004:166) and impulsivity usually refers to actions that are taken without thinking of future consequences and is linked to poor self-control, inability to delay gratification and temporal inconsistencies (Evenden, 1999).

In general, the ability to exert impulse control and a time perspective that focuses on the future are thought to play a major role in increasing self-control (Loewenstein, 1996:288) and overcoming procrastination (Ferrari & Díaz-Morales, 2007). A person with a high level of future orientation focuses on future goals and is able to delay gratification and resist temptation (Boniwell & Zimbardo, 2004:169), therefore, time perspectives are thought to have a strong influence on financial planning and savings behaviour (Hershey & Mowen, 2000; Jacobs-Lawson & Hershey, 2005:333). The level of impulsivity of an individual also plays a role in savings behaviour (Monahan, 2004:483). To provide greater context to these issues the following sections present an overview of the processes that drive willpower, as well as the reasons for specific differences observed between individuals.

3.3.2.2.2 Neurological processes linked to willpower

In an attempt to obtain a clearer understanding of the neurological processes that drive future orientation and impulse control neuroimaging studies have provided unique insights. As highlighted in Chapter 2, a study carried out by McClure, Laibson, Lowenstein & Cohen (2004) finds two distinct areas of the brain associated with future orientation and impulsivity in the context of intertemporal choice. The lateral prefrontal cortex is associated with the reasoning process linked to future orientation and the decision to defer gratification, while the limbic and paralimbic systems are associated with behaviour that is impulsive and based on immediate gratification. The interaction between the two regions is reflective of the two self

model proposed by Thaler and Shefrin (1981) where the “farsighted planner” competes with the “myopic doer”. Differences in levels of self-control and impulsivity have been linked to both developmental aspects, as well as persistent individual differences, these issues are discussed in further detail in the following sections.

3.3.2.2.3 Age related differences in willpower

Generally, willpower develops as part of the maturation process of the brain and links have been found between brain maturation and future orientation (Romer, Duckworth, Sznitman & Park, 2010:327) and the ability to exercise impulse control (Steinberg, Albert, Cauffman, Banich, Graham & Woolard, 2008:1774). A delay discounting task is often used to measure impulsivity (Green, Fry & Myerson, 1994) and may also provide insights into time perspective (Steinberg, Graham, O’Brien, Woolard, Cauffman & Banich, 2009:30). Green et al (1994:33) define delay discounting as the “... change in the value of a reward as a function of its temporal proximity”. As discussed in Chapter 2, the discounting function that results from studies of discount rates applied over various time periods is generally hyperbolic as higher discount rates are applied to events that are further away, and lower discount rates to near terms events (Laibson, 1997). There is evidence that steeper discount functions are associated with the young and these decreases with age (Green *et al.*, 1994). Other studies have found evidence of a U-shaped function (Read & Read, 2004) with high discount rates for both the young and the old. In general these studies seem to confirm that the development of the brain from childhood to adulthood results in less impulsive behaviour and a clearer future orientation.

A study of neural images across age in a temporal discounting task showed support for the view that humans develop progressive self-control as they mature from adolescence to adulthood, as a result of the strengthening of connections between brain areas related to foresight and self-control (Christakou, Brammer & Rubia, 2011). Giedd (2004) highlights that one of the last brain regions to mature is the dorsal lateral prefrontal cortex which is associated with controlling impulses. This area reaches adult dimensions in the early twenties. Another study finds that regions associated with response inhibition and planning continue to develop into early adulthood (in this study 23 – 30 years old) (Sowell, 1999:860).

All these studies are important in the context of preservation decisions as one needs to determine what factors may explain the high level of cash withdrawals among the young as highlighted in section 3.2. The above studies imply that cash withdrawals among young individuals could be related to underdeveloped willpower and therefore reflect irrational

decision making or, alternatively as explained in section 3.3.1 it could be related to rational decision making as per the life cycle hypothesis. In the context of preservation decisions an important distinction would therefore need to be made between the actions of young individuals who do not preserve their funds as a result of bounded willpower related to underdeveloped impulse control and the actions of young individuals who take a cash payout to rationally smooth consumption. Therefore age as an isolated factor would provide no clear insight as to whether rational or irrational factors drive low levels of preservation.

3.3.2.2.4 Individual differences in willpower

While the brain maturation process explains differences between children, adolescents and adults there are still individual differences that exist in terms of impulse control and time perspective which are unique to each individual (Peters & Büchel, 2011; Romer *et al.*, 2010). Although time perspective is influenced by a number of factors such as culture, religion, upbringing, education and specific societal influences (Boniwell & Zimbardo, 2004:167) it is also recognised that an individual's time perspective is a relatively stable trait, particularly if an individual is influenced predominantly by one specific time frame. (Zimbardo & Boyd, 1999:1272). Impulse control is also considered to be a fairly stable personality trait as demonstrated in a 40 year longitudinal study (Casey, Somerville, Gotlib, Ayduk, Franklin, Askren, Jonides, Berman, *et al.*, 2011) which finds that the ability to delay gratification in childhood was a predictor for how well people were able to resist temptation in favour of long term goals throughout adolescence and adulthood.

As a related measurement of future orientation and impulse control, the degree of delay discounting is also considered a personality trait as it appears to be relatively stable across time (taking into account developmental changes) and situations (Odum, 2011). In addition, there are indications that individual differences in delay discounting have genetic (Anokhin, Golosheykin, Grant & Heath, 2010; Reynolds, Leraas, Collins & Melanko, 2009) and neurobiological origins (McClure *et al.*, 2004).

Therefore, while age plays a role in individuals becoming more future orientated and less impulsive, there are key individual differences in these particular personality traits which persist over time. The empirical part of this study will therefore need to determine individual differences in time orientation and impulsivity to determine the impact of bounded willpower on preservation decision making.

3.3.3 Summarised impact of factors

Table 3.1 contains a summary of the factors that could potentially explain low preservation levels. It appears that if we observe low levels of preservation among young individuals, or individuals who are facing liquidity constraints then these individuals are acting rationally, provided that these individuals are not also demonstrating characteristics of bounded rationality or bounded willpower.

From the perspective of bounded rationality, it is anticipated that low levels of education and financial literacy would result in low preservation levels. In addition if suitable advice is not available to assist individuals in the computationally complex environment, then it is anticipated that low levels of preservation will be observed. Furthermore when considering bounded willpower, individuals with high levels of impulsivity and low levels of future orientation would also be expected to cash out retirement savings.

Table 3.1: Potential factors which could drive low preservation levels

Decision maker	Decision frame	Potential causes	Contributing Factors	What would predict low levels of preservation
Rational	Rational	Consumption smoothing	Age Temporary liquidity constraints	Young Temporarily unemployed
		Necessity	Liquidity constraints	Low levels of liquidity
Irrational	Bounded rationality	Computational complexity	Education; Financial literacy; Availability of advice	Low levels of education / financial literacy Absence of suitable advice
	Bounded willpower	Limited self-control	Time perspective	Low level of future orientation
			Level of impulsivity	High levels of impulsivity

Source: Author's conception

Although the level of rationality in retirement preservation decisions is of importance in its own right, a further concern relates to the specific solutions which would need to be implemented to improve preservation decisions depending on the underlying cause of low preservation levels and the nature of the decision maker.

While the distinction between those displaying bounded rationality and bounded willpower, either as a result of a lack of self-control or procrastination is not clear cut, and by no means mutually exclusive, it provides a useful categorisation for considering the impact of various solutions. The following section outlines potential solutions depending on the assumed level of rationality of the decision maker.

3.4 POTENTIAL SOLUTIONS

3.4.1 Overview

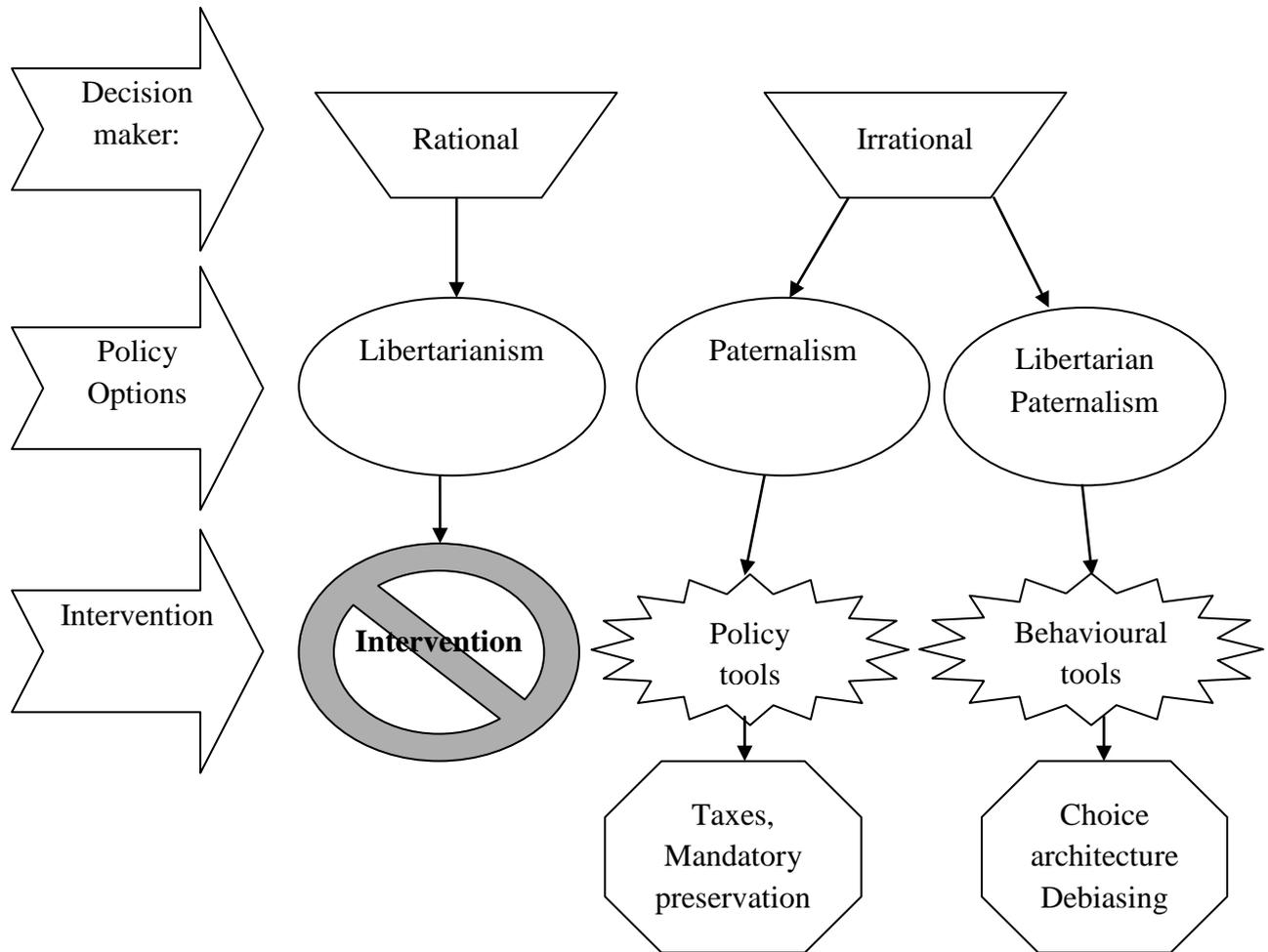
Whether individuals are seen to be acting rationally or irrationally in their decision making process will determine whether policy makers believe intervention is necessary, and if so to what extent they wish to intervene. In order to provide a complete picture of the framework for preservation decisions, it is crucial to include the potential solutions which exist to enhance preservation levels, and the specific applicability of each solution. In this respect the following section highlights what solutions are available, the effectiveness of such solutions, and benefits and drawbacks of implementing the various solutions. This ultimately provides context to what is at stake if the solutions implemented do not match the underlying problems.

3.4.2 Libertarianism, Paternalism and Libertarian Paternalism

Desai (2011:283) provides an overview of the general solutions available to policy makers in an attempt to solve cognitive biases in individual decision making. First policy makers can choose to do nothing and in so doing adhere to a policy of pure libertarianism, this would suggest that individuals are acting rationally and know what is best for them and intervention is not required. Second, a purely paternalistic policy can be adopted using policy tools such as regulatory intervention to dictate how individuals must behave on the assumption that individuals are acting irrationally. Third, policy makers may consider libertarian paternalism which combines a paternalistic element by directing individuals to a specific choice, with a libertarian aspect in which it is relatively easy to opt out of the suggested choice (Sunstein & Thaler, 2003:1161). This can be achieved through the use of behavioural tools such as choice architecture which would influence individuals to act in a specific way, or education and

debiasing to overcome specific biases in the decision making process. Figure 3.2 illustrates the various policy options and the implications for specific interventions.

Figure 3.2: Policy options and resultant interventions



Source: Adapted from Desai (2011)

The first approach of pure libertarianism is appealing to those who believe that individuals act rationally and in their own best interest. However, it is interesting to note the disconnect between the level of autonomy created by the defined contribution paradigm, and the regulatory interventions that have been put in place to direct individuals to make certain choices. Zelinsky provides the following insight: “At its core, the defined contribution paradigm reflects an individualized conception of retirement savings, a conception that carries tremendous appeal in a culture that, like ours, places a high value on private property and individual autonomy.” (Zelinsky, 2004:469) At the same time, the use of taxes and penalties to direct retirement savings behaviour appears to illustrate that policy makers believe that individuals are not able to look after their own best interests. Weiss explains the issue in the following manner: “Paternalism presumes that people are unable to understand

their own best interest and require the protection of a benevolent state. In the pension context, paternalism supposes that...many people, left to their own devices, will not save enough for their old age.” (Weiss, 1991:1276).

Policy makers appear to agree that intervention is required to ensure that individuals save sufficiently for retirement. In this respect, the traditional policy tools to encourage retirement savings have used regulatory intervention in the form of taxes and mandated preservation. The influence of behavioural economists in the last few decades has led to the introduction of alternative behavioural tools to encourage savings behaviour. The next sections consider the various approaches and potential benefits and drawbacks of each approach.

3.4.3 Libertarianism

Freedom of choice is a key tenet of a libertarian approach (Thaler & Sunstein, 2003). This approach requires that individuals are left to make their own decisions without any interference. It assumes that individuals know what is best for them and are able to determine optimal choices.

3.4.3.1 Impact on rational decision makers

Without any form of intervention a rational decision maker would be able to make the choice to preserve or not preserve retirement funds. The choice made would result in the maximisation of their utility over their lifespan as predicted by the life cycle hypothesis.

3.4.3.2 Impact on irrational decision makers

Irrational decision makers, both those displaying bounded rationality and bounded willpower would be disadvantaged by an approach that leaves them to make their own decisions. From the perspective of a boundedly rational individual, they will be unable to work out the optimal choice. Those suffering from a lack of self-control will inevitably take the cash payment as will those who are procrastinators as they will believe that they can start saving towards retirement again at a later date (Monahan, 2004).

3.4.4 Paternalism: regulatory intervention

The traditional response to promote retirement savings and preservation of retirement funds has taken the form of regulatory intervention. In this respect, the most common measures implemented include tax incentives to save, and taxes and penalties to dissuade withdrawals. A more stringent approach to stop withdrawals from pension funds prior to retirement is to mandate preservation of funds through regulation.

The Netherlands, Australia, Canada and the United Kingdom strictly regulate pension withdrawals (Broadbent *et al.*, 2006; Dailey & Turner, 1992). In the United States, pension withdrawals prior to retirement are discouraged through the use of taxes and penalties (Bassett *et al.*, 1998). In addition to state and federal income taxes due on withdrawals, they are also subject to a 10% penalty tax for employees under the age of 55, however in certain circumstances, such as paying for medical expenses, education, limited down payments for first time home owners, this penalty is waived (Zelinsky, 2004:516).

In a South African context, taxes are used to discourage withdrawals, however the system is based on cumulative withdrawals, providing for an initial tax free amount of R22,500 followed by a sliding scale of taxes based on income levels for withdrawals above this amount ranging from 18% - 36% (South African Revenue Service, 2013). There are a number of issues with how the tax is structured from a behavioural perspective as, due to the cumulative nature of the system, consequences of actions taken today are only felt in the future. The first time someone withdraws cash when they move jobs, they usually will incur very little tax on the withdrawal, however subsequent moves will have higher tax implications, and eventual tax treatment of funds at retirement is also impacted. If individuals suffer from myopia, or hyperbolic discounting they are more likely to take cash disbursements early in their working careers despite the eventual tax consequences of these payments, and the impact on eventual retirement savings adequacy. While the above shortcomings have not been explicitly considered by the South African National Treasury, given the low level of preservation in South Africa, the National Treasury has stated that: “The challenge with the current tax system is that the tax clearly does not serve as a strong disincentive since people are willing to pay it and withdraw their savings.” (South Africa, National Treasury, 2011:52).

In light of the growing concerns about low savings levels and the lack of preservation of retirement savings, some governments, such as those in the United States and South Africa, are considering how to decrease withdrawals through further policy intervention (John & Iwry, 2008; South Africa, National Treasury, 2011). The current move in South Africa is therefore towards a mandatory preservation system. However, the issue of mandatory preservation has a controversial history in South Africa. The 1980 draft bill on pension preservation which aimed to reduce leakages from funds by mandating preservation of benefits met with great resistance from employees and trade unions who perceived this move as a way for companies to deny employees access to money on retrenchment, the bill was

withdrawn but the issue of preservation has continued to be a contentious issue in a South African context (Murphy, 2002:188). Over the past decade various reports regarding the reform of the South African pension and social security systems have raised the issue of preservation. One report suggested that access to withdrawal benefits be limited to those who are unemployed, and that instead of a lump sum payment, monthly payments would be made once the state unemployment benefit had been exhausted (Taylor, 2002:94). Subsequent reports have supported the idea of compulsory preservation with a limited degree of flexibility to allow for withdrawals in certain circumstances (mainly related to unemployment) (South Africa, National Treasury, 2004, 2007). The South African government's current focus is on implementing mandatory preservation with limited annual access to funds (South Africa, National Treasury, 2013). While the intention of this intervention is to increase preservation, without an understanding of the factors which are contributing to low preservation, the solution might have unintended adverse effects.

3.4.4.1 Impact on rational decision makers

The use of penalties and restrictions on withdrawal may have a negative impact on those who act rationally as part of consumption smoothing behaviour over their life span. One study which makes use of a stochastic life cycle model to determine the potential impact of various plan features such as employer matching, vesting and early withdrawals found that the model predicts that a system which allows for un-penalised withdrawals would increase the participation of younger college graduates by up to 30% as the account would allow access to rational savers who participate in consumption smoothing behaviour as predicted by the life cycle hypothesis (Love, 2007). While this is only a simulation model, it does draw attention to the fact that any penalties imposed on withdrawals have a potentially negative impact on rational individuals participating in consumption smoothing behaviour. If it is only optimal to begin saving later in life, then job moves give rational individuals the opportunity to cash out retirement savings which they do not yet require.

In addition the most vulnerable in society are those who suffer the most from penalties imposed on withdrawals which have to be made to meet pressing liquidity constraints. One study of the impact of the introduction of the 10% penalty on early withdrawals in the United States found that among high income groups, a 1% increase in the tax price raised the probability of preservation of benefits by 0.4%, while among low income groups the probability of preservation increased by only 0.2%. The study found that those in the low income bracket were probably liquidity constrained and as such were willing to incur the

penalty to access their funds. According to the authors, the insignificant impact of the penalty on those in low income brackets meant that penalties would be an ineffective policy tool for curbing the withdrawal of funds among low income earners (Chang, 1996).

A number of investigations in the United States aimed at understanding how to reduce leakage from pension plans have reached similar conclusions in terms of the use of penalties. In general they have cautioned against the use of penalties, and the idea that increased penalties provide solutions to leakage. The key reason for this is the impact that such penalties have on those who are most vulnerable. As one study noted: "... the link between the incidence of cash outs and these indicators of need [poor financial position or short-term uncertainty about future income] raises the question of whether the excise tax on early withdrawals is unnecessarily punitive and whether the opportunity cost of giving up future tax-deferred earnings is not itself a sufficient penalty." (Scherpf, 2010:32). In their testimony before the Special Committee on Aging of the United States Senate, John and Irwy (2008) were very particular about what approach should not be endorsed: "However, increasing the 10% penalty might not significantly increase its deterrent or attention-getting power, but could readily increase the amount of benefit forfeited by those typically lower-income individuals who are desperate for the cash and will therefore take the withdrawals in any event." (John & Irwy, 2008:13). Overall, taxes, penalties and mandatory preservation produce sub-optimal results for rational decision makers who require access to their savings to facilitate consumption smoothing or to meet urgent liquidity needs.

3.4.4.2 Impact on irrational decision makers

From the perspective of individuals displaying bounded willpower, it has been suggested that limitation and penalties on withdrawals provide individuals with a way to exercise self-control and therefore act as a pre-commitment device (Venti & Wise, 1990:664). As Bernheim explains "Anticipating a possible future loss of self-control, an individual may actually be more likely to contribute to a tax-favored account that provides a credible mechanism for precommitment. In contrast, under the life-cycle hypothesis, restrictions on early withdrawals reduce the likelihood that individuals will be willing to make contributions." (Bernheim, 2002:1205)

The use of rules, both external and internal, as a means to overcome self-control issues was outlined in Chapter 2. In this regard, Thaler (1990:200) discusses the impact of considering retirement funds as "off limits" as the taxes and penalties associated with accessing these funds prior to retirement provide a useful self-control mechanism. Taken to the extreme it

could be suggested that individuals want to have these limitations enforced on them, the findings of one report were that participation rates were higher in plans that did not permit withdrawals from pension funds prior to retirement in the form of hardship withdrawals or loan. The researchers stated: “Our data do not permit us to explain this apparent inconsistency with the common expectations.” (United States, General Accounting Office, 1988:4). It would also appear that individuals recognise their weaknesses, 77% of respondents in a UK survey of retirement savings attitudes agreed that the lack of access to funds in a pension was beneficial for achieving savings goals (Clery, McKay, Phillips & Robinson, 2007:134).

The impact of imposing penalties on withdrawals cannot be considered in isolation. The knock-on effect of these penalties on the savings decisions, and choice of contribution levels requires careful analysis to ensure that penalties do not result in unintended consequences of lowering overall savings. However, a study which developed a model for encouraging savings in light of self-control problems proposed that a withdrawal penalty of 50% could be levied without impacting on contribution levels (Laibson *et al.*, 1998:166).

From the perspective of individuals who display bounded rationality, taxes and penalties do not necessarily assist them, unless the optimal choice is to save funds. This arises from the fact that taxes and penalties could be perceived to be an external cue regarding the optimal choice (Akerlof & Shiller, 2009:119), leading the individual to preserve funds. However, if the individual is better off using the funds for other purposes (e.g. to pay off debt), a decision to preserve funds would be sub-optimal.

3.4.4.3 Conclusion regarding paternalistic intervention

While paternalistic interventions can dissuade irrational behaviour, they end up punishing those who may be acting rationally, or can even discourage saving in the first place. The above discussion would seem to suggest that the inherent paternalism of taxes and regulations aimed at ensuring that individuals do what the government believes is in their best interests does not necessarily result in a system that provides optimal solutions for all participants. While the system might assist irrational individuals in exercising self-control, those acting rationally run the risk of being penalised.

3.4.5 Libertarian paternalism: behavioural intervention

The shortcomings and potential for unintended consequences of a system that relies on regulatory incentives and disincentives has led to a move to find an approach that assists

those acting irrationally, without imposing constraints and restrictions on those who act rationally. As Zelinsky explains it “In short, we must search for essentially noncoercive ways of guiding individuals' retirement decisions, nudging them over any cognitive hurdles without succumbing to the temptation of overbearing paternalism.” (Zelinsky, 2004:524). O’Donoghue & Rabin (1999b:5) call this “cautious paternalism” where policies are adopted if they do little harm to those acting rationally, while at the same time help those acting in an irrational manner. It has been suggested that the ideas of behavioural economics might provide a solution that meets this mandate.

The concept of financial ergonomics which is defined as “... a discipline that engineers financial products and services according to human needs and that optimizes well-being and overall system performance.” (De Bondt, Muradoglu, Shefrin & Staikouras, 2008:17) considers that there is a way to design products to assist humans to make appropriate choices. The most well known approach is the use of choice architecture, where the choice architect has the ability to influence decisions through the design of products, policies etc (Thaler, Sunstein & Balz, 2010). However, there is another way to use the insights provided by behavioural economists to enhance decision making and that is through a process known as debiasing, which is defined as “... a procedure for reducing or eliminating biases from the cognitive strategies of the decision maker.” (Bazerman, 1990:170). Each of these approaches is considered in more detail below.

3.4.5.1 Choice architecture

The idea that one can design products and choices that will assist the individual to make optimal decisions, without dictating what that decision should be, is usually referred to by the phrase coined by Thaler and Sunstein (2003), “libertarian paternalism”. Instead of the traditional paternalism which dictates individual choices, usually through regulatory interventions, libertarian paternalism does not rely on coercion to dictate behaviour, rather it advocates the use of choice architecture to assist individuals in making optimal decisions. This approach makes use of “nudges” which Thaler and Sunstein define as “... any aspect of choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid.” (Thaler & Sunstein, 2008:6)

The use of behavioural approaches in a retirement framework has gained popularity over the past few decades (Mitchell & Utkus, 2004; Monahan, 2004; Thaler, 1994) and has been at the heart of new ideas for product design to promote optimal decision making in retirement

savings (Benartzi & Thaler, 2004). One of the key methods of integrating behavioural insights into retirement savings decisions is through the use of choice architecture which makes use of specific presentation and framing to direct individuals to an optimal choice (Thaler *et al.*, 2010).

Standard economic theory predicts that the way options are presented and framed should have no impact on the ultimate decision making process as the framing does not impact on the economic fundamentals of the choice that needs to be made. Therefore a rational individual would see through any frames to the underlying economic impact of the decision and act accordingly (Burman, Coe, Dworsky & Gale, 2012). However according to behavioural economists the way that problems are presented and framed ultimately impacts on the choices of individuals (Sunstein & Thaler, 2003). Therefore, the use of choice architecture to frame decisions, and the use of defaults in product design has the potential to impact on individual decision making, either negatively or positively depending on the decisions taken by the choice architect (Thaler & Sunstein, 2008:85).

The use of defaults is one of the key tools of a choice architect, and provided that there is an option to opt out of the default choice, and that due consideration has been given to what the optimal default should be, it meets the criteria for libertarian paternalism. Defaults are very powerful as many individuals end up in the default condition as a result of inertia and procrastination or because they see the default as a recommended choice (Thaler & Sunstein, 2008).

As mentioned in Chapter 2, the use of choice architecture in the form of defaults is now widely used to increase enrolment in pension plans. Changing the default option to an automatic enrolment in a pension plan when a new employee commences work (with the option to opt out) has been shown to have a dramatic impact on participation levels (Choi *et al.*, 2002; Madrian & Shea, 2001). Defaults are therefore able to overcome the tendency to procrastinate and delay decision making. In addition, in many instances, defaults are seen as a recommendation from an authority figure or as the “correct” choice to make (Choi, Laibson, Madrian & Metrick, 2004; Madrian & Shea, 2001; Thaler & Sunstein, 2008). As highlighted in Chapter 2, this would influence boundedly rational individuals who are looking for some indication of what the “correct” choice is.

Given the ability of defaults to dictate behaviour, the use of defaults in preservation decisions has received increasing attention. The negative impact of defaults has been observed in a

number of studies of employee preservation behaviour related to the US 401(k) pension accounts. Prior to 2005, employers were allowed to compel a cash distribution for any individual who left a company and had a balance below \$5000. The employee had to actively choose to preserve the distribution, the default option was a cash payout, which was then subject to taxes and penalties. This default option has been linked to the relatively low level of preservation of small cash balances. One study indicated that the probability of balances below \$5000 being rolled over into a new employers pension fund or into an IRA was between 5% and 16%, whereas balances over \$5000 had between a 26% and 69% chance of being preserved (Poterba, Venti & Wise, 1998:98).

Following investigations regarding the level of plan leakages, and recommendations from various committees (see for example (United States, Working Group on Retirement Plan Leakage, 1998)) the US government made a change to how small plan balances were treated. As with the adoption of automatic enrolment, the government recognised the positive impact that default choices can potentially have on savings behaviour and the defaults post 2005 are now very different. Employers are no longer allowed to compel cash distributions for small balances between \$1000 and \$5000. The employer must either maintain the balance in their pension fund, or alternatively set up an IRA for the employee, therefore changing the default to preservation. Employees must actively elect to take a cash payout (Choi *et al.*, 2004:119). Prior to the change, a 2002 study by Hewitt Associates found that 87% of 401(k) balances of less than \$5000 were cashed out (Munnell & Lee, 2004), and the expectation was that the change in default would reduce this figure. An updated study using 2008 data (Hewitt Associates, 2009) has found that for plan balances less than \$1000 (where the default is still a cash payout) 85% of participant's balances are paid out. In contrast, of those participants with a balance of between \$1000 and \$5000, 45% take a cash payout. This is still high compared to larger balances where more participants choose to preserve, however it does seem to reflect an improvement on the 2002 levels of withdrawals, so the change in default appears to have had an impact on preservation levels of smaller balances.

3.4.5.1.1 Impact on rational decision makers

The key benefit of using defaults rather than taxes and regulations to influence decision making, is that individuals have the option to opt out of a default, whereas taxes and regulations dictate what choice should be made, and individuals who choose not to make that choice are penalised. Therefore if individuals are acting rationally when they choose to withdraw funds from their pension when they move jobs, either due to liquidity constraints,

or in an effort to smooth consumption over their lifetime, they can opt-out of a default choice without incurring penalties.

3.4.5.1.2 Impact on irrational decision makers

If individuals are acting irrationally when taking a cash withdrawal, the default option to preserve might lead to higher preservation levels as issues such as inertia and procrastination, or the fact that the default option carries an endorsement that this is the correct way to behave influence behaviour.

Critics raise the issue that while defaults are useful in solving the cognitive biases of procrastinators and those who are subject to status quo bias, they fail to address the issues of bounded rationality or self-control problems (Desai, 2011:274). Therefore an individual who has self-control problems will merely opt out of the default of preservation. In addition, using default options to make individuals preserve their retirement funds might not be the optimal solution for each individual. If individuals, due to bounded rationality, are not able to work out whether preserving is the optimal solution, the default of preservation might result in sub-optimal solutions as the person might choose to remain with the default choice as they see this as an indication of the preferred choice from an authority or expert, whereas in their particular circumstance it might not be the best solution.

3.4.5.2 Debiasing

Given some of the drawbacks of choice architecture, another approach suggested as a way to overcome various biases associated with irrational decision making is to make use of a debiasing process. The seminal paper regarding debiasing was written by Fischhoff in 1982. In this paper Fischhoff outlines the methods that can be applied to debias decision making. The ways to eliminate bias focus on four escalating steps namely “... warn of problem; describe problem; provide personalized feedback; train extensively” (Fischhoff, 1982:424). Another approach to debiasing proposed by Keren (1990) entails a three stage general framework for debiasing. Stage one focuses on the identification of the bias, the second stage looks at ways to reduce the impact of the bias and the third stage focuses on monitoring and evaluating the effectiveness of the debiasing strategy. In a similar vein Bazerman (1990:171) describes a three stage process for debiasing which entails unfreezing, change and then refreezing. In essence this amounts to making individuals aware of their current biases, explaining how to overcome biases, and ensuring that once this change in decision making has occurred, that the individual ingrains this in their decision making process rather than

reverting back to a biased process. While the above approaches highlight the need to reduce and overcome bias, they do not explicitly state how this can practically be achieved.

The practical implementation of debiasing strategies generally focus on two different approaches either cognitive interventions, based on education and training or technological interventions, such as the use of intelligent software and decision aids (Evans, 1989:17; Larrick, 2004:323). To better explain the philosophy of these approaches, Larrick (2004:317) distinguishes between “Meliorists” and “Technologists”. Meliorists was a term which Stanovich (1999:7), used to identify those who believe remedial cognitive interventions can assist decision making, while Technologists believe that decision making can benefit from the use of technological interventions. The remedial strategies of Meliorists make use of cognitive interventions such as education and training to overcome biases. Technological strategies focus on the use of tools such as decision support systems to alleviate biases (Larrick, 2004:317).

3.4.5.2.1 Impact on rational decision makers

The use of educational and technological interventions to assist decision making will have a neutral impact on rational decision makers. However if decision makers are rational then the costs of these interventions would be wasted. Depending on who bears the costs, rational individuals could end up being negatively impacted by these interventions.

3.4.5.2.2 Impact on irrational decision makers

Whether debiasing can be successful is open to debate. Some believe that cognitive limitations will stand in the way of any educational or training efforts to overcome bias (Larrick, 2004:317; Stanovich, 1999:7). Others are of the opinion that technological interventions don't promote the learning required to overcome bias and therefore lead to weakened decision making (Glover, Prawitt & Spilker, 1997). In addition, there are a number of other obstacles that can prevent debiasing, resulting from the nature of the individual decision maker (Fischhoff, 1982:426; Larrick, 2004:331), the psychological processes that produce the bias (Epley & Gilovich, 2005) or the specific decision making environment (Willis, 2008:249).

That being said, there are studies that have found that educational debiasing can be effective (Larrick, Morgan & Nisbett, 1993; Mann, Beswick, Allouache & Ivey, 1989; Nisbett, Fong, Lehman & Cheng, 1987) and that technological interventions can also assist in debiasing (Bhandari, Hassanein & Deaves, 2008; Lim, Benbasat & Ward, 2000; Looney & Hardin,

2009; Roy & Lerch, 1996). While the research in this area is limited, preliminary debiasing studies using decision support systems in the investment and retirement decision making fields have produced positive results (Bhandari *et al.*, 2008; Looney & Hardin, 2009).

It would therefore appear that the complexity of preservation decisions, along with biases resulting from lack of self-control and procrastination might be susceptible to debiasing interventions. Decision support systems and decision aids can assist with computations thereby assisting individuals who suffer from bounded rationality. From the perspective of overcoming bounded willpower, various studies have shown that there are methods to debias both impulsivity (Mischel, Ebbesen & Raskoff Zeiss, 1972; Odum, 2011; Peters & Büchel, 2011:236) and a lack of future orientation (Hall & Fong, 2003; Hershfield, Goldstein, Sharpe, Fox, Yeykelis, Carstensen & Bailenson, 2011; Marko & Savickas, 1998). Whether the techniques can successfully be implemented in a retirement preservation decision making context has not been established.

3.4.5.2.3 Conclusions regarding behavioural intervention

An approach that uses the insights from behavioural economics to provide solutions to the problem of low preservation levels has potential to assist individuals, however, depending on the approach adopted, it may not succeed to overcoming bias in decision making. Choice architecture and the use of defaults will generally only assist those individuals suffering from procrastination, while at the same time rational individuals are able to opt out of such defaults ensuring they are not negatively impacted. As mentioned above, individuals suffering from bounded rationality and self-control problems are not generally assisted by choice architecture. Debiasing has the potential to provide assistance to individuals displaying both bounded rationality and bounded willpower, however, depending on the costs incurred in setting up a debiasing process, rational individuals may end up bearing costs they do not need to incur.

3.4.6 Summary of the impact of proposed solutions on various decision makers

Table 3.2 summarises the potential impact of various types of intervention. A libertarian approach is only successful if decision makers are rational. The interventions proposed by paternalism in the form of taxes, penalties and regulation and those proposed by libertarian paternalism in the form of choice architecture and debiasing may assist irrational decision makers, but they are not appropriate for all decision makers in all preservation decisions.

In general paternalism is most effective in assisting irrational individuals who display self-control and procrastination problems as the penalties and regulations which encourage preservation are most likely to change the behaviour of these individuals. However for rational individuals, taxes, penalties and regulation have a negative impact if withdrawal is the optimum solution in a particular instance, the same is true for individuals suffering from bounded rationality.

Libertarian paternalism through choice architecture in the form of defaults is most useful in directing the actions of irrational individuals who display procrastination. Defaults have a neutral impact on rational individual as they can opt out of the default. Lastly, for an individual who is boundedly rational defaults have a potential negative impact as the individual is not sure of what the correct decision is and may take the default to indicate a recommended course of action in circumstances where preservation may not be optimal.

Table 3.2: Potential impact (positive or negative) of interventions on various types of decision makers

Approach	Intervention	Impact on Rational decision maker	Impact on Irrational decision maker		
			Bounded rationality	Bounded willpower	
				Self-control	Procrastination
Libertarianism	None	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Paternalism	Taxes and mandatory preservation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Libertarian paternalism	Choice architecture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Debiasing	<input checked="" type="checkbox"/> *	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

*depending on who bears costs of debiasing intervention could have a negative impact.

Source: Author's conception

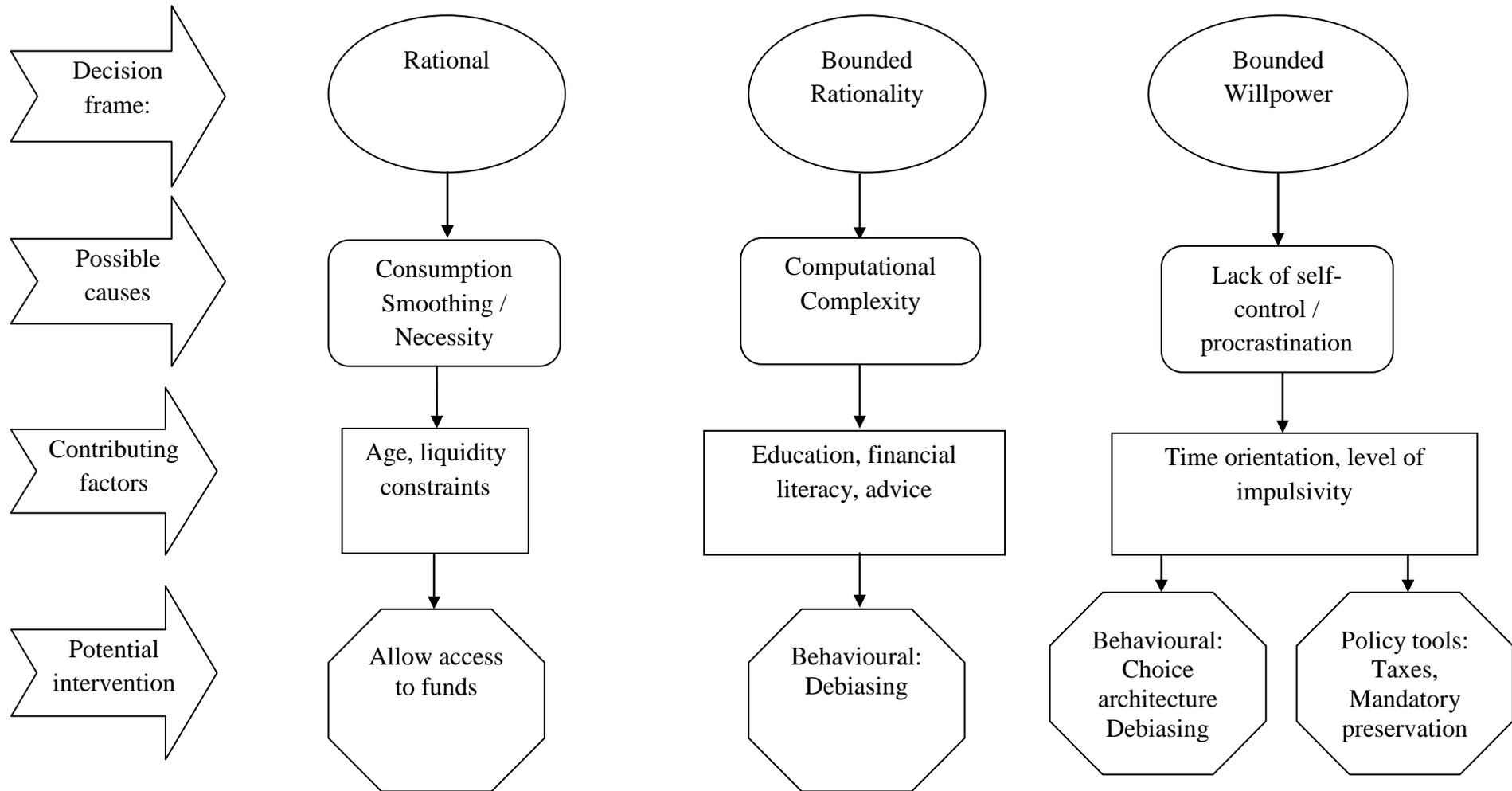
Another concern with the use of defaults is that they are seen to be using a process of “rebiasing” which involves using one bias to offset another (Larrick, 2004), the problem is therefore that “... choice architecture addresses but fails to solve cognitive biases” (Desai, 2011:272). Ultimately penalties and defaults do not address the underlying issues involved in the complexity surrounding the decision to preserve funds or withdraw them. In this regard, it has been suggested that debiasing might provide a better intervention strategy. Desai (2011:280) points out that education can facilitate individual decision making by allowing a person to determine what they should do, and perhaps more importantly helping them to ascertain what it is that they actually want, something that does not necessarily occur when penalties and defaults are in use. Therefore, a debiasing process might assist in helping individuals understand the long-term impact of their decisions. Debiasing has the potential to positively impact on both individuals suffering from bounded rationality, and those who display bounded willpower, however the ideas in the debiasing framework are currently untested in a preservation context. The impact on rational individuals is generally limited, unless costs from debiasing are incurred by these individuals.

A number of critics have pointed out that any interventions in individual decision making must help those who require assistance, without penalising those who do not need assistance (Camerer, Issacharoff, O’Donoghue, Rabin & Loewenstein, 2003; Desai, 2011; Klick & Mitchell, 2006; O’Donoghue & Rabin, 1999b). As the above discussion illustrates, interventions are successful in specific instances and therefore, a one size fits all approach has the potential to do more harm than good. Deciding which of the above strategies is optimal requires an understanding of the inherent level of rationality of decision makers in a retirement preservation context. The aim of the empirical phase of this study is to provide insights into the factors driving retirement preservation decisions in order to recommend the correct intervention strategies.

3.5 PROPOSED CONCEPTUAL MODEL

This chapter has summarised the insights provided by existing literature into the possible causes and contributing factors which may lead to inadequate savings as a result of suboptimal retirement preservation decisions. In addition, an overview of the various solutions had provided insight into potential ways of overcoming the problem of low preservation of retirement funds. The resultant conceptual model is highlighted in Figure 3.3.

Figure 3.3: Conceptual model of barriers to retirement preservation and potential interventions



Source: Author's conception

As has been highlighted, each solution has both benefits and drawbacks, therefore it is essential that there is an accurate understanding of the factors that are actually driving low preservation levels, so that the correct solution can be implemented. A rational model of preservation decision making would predict that those who are young or liquidity constrained would be least likely to preserve funds. This would arise as a result consumption smoothing as predicted by the LCH or would be driven by necessity where an individual requires access to funds to survive on a day to day basis. If rational factors drive low levels of preservation no intervention is required as individuals make optimal retirement preservation decisions. Individuals should be allowed access to funds to allow them to facilitate consumption smoothing behaviour, or meet liquidity requirements.

A model of bounded rationality would predict that those who have low levels of education or financial literacy would display low preservation levels as they are not able to cope with the computational complexity. In addition, the absence of suitable financial advice would also lead to low preservation as individuals are unable, by themselves, to overcome the computational complexity of the decision making environment. The intervention required to assist decision making in this instance would focus on debiasing, either through education and training, or technological decision support.

From the perspective of bounded willpower, low levels of preservation would be expected for those who have an immediate time orientation and a high level of impulsivity. These two factors would collectively point to low levels of self-control and a tendency to procrastinate. Interventions required to assist decision makers would either be directed at behavioural tools using choice architecture or debiasing, or alternatively, policy tools such as taxes and mandatory preservation.

Therefore factors that have the potential to influence retirement preservation decisions might arise from rational decision making in line with consumption smoothing behaviour linked to the life cycle hypothesis or irrational decision making arising from bounded willpower or bounded rationality as per the behavioural life cycle hypothesis. Determining which factors are most important in the decision making process would provide insight into the correct interventions. As discussed in Chapter 1, the aim of this study is to determine what solutions drive optimal preservation decisions. There is therefore a clear distinction between solutions aimed at ensuring the highest levels of preservation, where mandatory preservation would be the most effective intervention, and solutions which aim to assist individuals to make optimal

preservation decisions, which would therefore result in optimal levels of preservation, which is the focus of this study.

3.6 PREVIOUS STUDIES

Before moving on the empirical part of this study, which aims to understand the rationality of retirement preservation decisions, this section presents an overview of the results of previous studies of factors driving preservation decisions. These factors are assessed to determine what they reveal about the rationality of preservation decisions. The shortcomings of these studies are also addressed.

As highlighted in section 3.2, most studies tend to agree that a large percentage of employees take cash withdrawals when they move jobs. However, the actual value of the funds withdrawn is relatively small. Various studies have been conducted to determine which factors are linked to low levels of preservation.

A number of studies have determined that there appear to be certain factors which will determine whether a person withdraws funds or preserves them. In general, those who do not preserve funds when they move jobs are younger, have small accumulated balances, lower income levels, low wealth levels and are less well educated or display lower levels of financial literacy (Bassett *et al.*, 1998; Hurd & Panis, 2006; Moore & Muller, 2002; Munnell *et al.*, 2009; Poterba *et al.*, 1998).

When considering the rationality of the abovementioned factors, the age factor could be related to either rational consumption smoothing behaviour, or alternatively under-developed willpower of young adults as discussed in section 3.3.2.2. Low income and wealth levels would appear to indicate rational decision making by individuals driven by necessity and liquidity constraints. The high incidence of lower levels of preservation among those who are less educated or have low financial literacy levels might indicate elements of bounded rationality as individuals struggle to determine the optimal choice. Again, these factors in isolation might not provide a full picture of the decision maker as low education levels could also be linked to individuals with lower income and therefore low preservation levels might again reflect necessity and liquidity constraints.

The propensity to not preserve small accumulated balances is again difficult to analyse as an isolated factor as it could be rational or irrational. If low balances are indicative of low income levels, then not preserving funds might be driven by liquidity constraints and necessity, both rational reasons for taking a cash payout. However, a number of irrational

factors might also result in the low levels of preservation of small balances. First from the perspective of self-control, one of the predictions of the BLCH is that the marginal propensity to consume from “windfall” income (i.e. income that is largely unexpected) declines as the size of the income increases (Shefrin & Thaler, 1988:635). The authors suggest that this is linked to mental accounts and the rules applied to what is seen as wealth, which must be preserved (when payouts are higher), and what is seen as ordinary income, which can be spent (when payouts are lower). Another potential explanation of the low preservation of small balances might be linked to status quo bias or inertia driven by the default options which govern the disbursement of cash balances when individuals move jobs. As highlighted in section 3.4.5.1 prior to 2005 in the United States (the country and time period where the majority of the above studies were conducted) the default was for balances below \$5000 to be paid out in cash. After 2005 this default was lowered to balances below \$1000, and a study post 2005 (Hewitt Associates, 2009) found higher levels of preservation of balances between \$1000 and \$5000. However the levels were still below the preservation levels of higher payouts suggesting that additional factors are at play

Another study found that adverse income shocks were a predictor of low preservation levels (Amromin & Smith, 2003). Therefore job losses, divorce and low levels of other sources of wealth indicated liquidity constraints and, as such, a rational decision to not preserve retirement funds. In a South African context, Anderson (2010) highlights the high propensity to take a cash payout in the case of retrenchments and divorce. Once again these factors could indicate a rational requirement for cash linked to liquidity constraints.

The reason for leaving a job also has an influence on whether a cash distribution is taken, Hurd and Panis (2006) noted that those who left jobs as a result of disability were more likely to take cash payouts. The authors were of the opinion that this would be linked to liquidity requirements facing the disabled person. In a similar vein, Engelhardt (2003) finds that those who were retrenched, left their job (without another job to go to) or moved geographically were more likely to take a cash payout. Once again these people were more likely to be facing liquidity constraints, and as such their behaviour was rational.

One of the few studies which explicitly considered time orientation, found that individuals who have short planning horizons were more likely to take cash distributions (Hurd & Panis, 2006). However, this study also highlighted a number of rational factors driving low levels of preservation linked to high inflation expectations, anticipation that the social security system will still provide generous support in the future, and factors indicating liquidity

constraints such as low levels of wealth, poor health, and low preservation among divorced, separated or widowed individuals (who are generally believed to be more liquidity constrained). Table 3.3 provides an overview of the abovementioned studies and attempts to classify the factors identified in these studies.

Table 3.3: Factors identified in studies as contributing to lack of preservation

Study / Survey	Factors identified			
	Consumption smoothing / necessity	Bounded rationality	Bounded willpower	Ambiguous
(Bassett <i>et al.</i> , 1998)	Low family income level; do not own a home.	Lower level of education.		Small distribution amount.
(Hurd & Panis, 2006)	Low levels of non retirement wealth; poor health; high inflation expectations; don't believe social security system will become less generous; divorced, separated or widowed; job loss due to disability.	Lower level of education.	Short planning horizon.	Young.
(Moore & Muller, 2002)	Low earnings.			Small distribution amount; young.
(Munnell <i>et al.</i> , 2009)				Small distribution amount; young.
(Poterba <i>et al.</i> , 1998)	Low income level.	Lower level of education.		Small distribution amount; young.

(Amromin & Smith, 2003)	Job loss; income shocks; divorce; low levels of non-retirement wealth.			
(Anderson, 2010)	Retrenchment; divorce.			
(Engelhardt, 2003)	Job loss; geographic job move.			

The vast majority of factors that distinguish those who preserve from those who don't would appear on the surface to originate from rational decision making linked to consumption smoothing and necessity. Very few factors touch on computational limitations or issues linked to self-control. However, a shortcoming of many of the above studies is that they make use of data collected from existing, pre-specified surveys such as the Health and Retirement Study (HRS); Current Population Survey (CPS); Survey of Income and Program Participation (SIPP), which do not explicitly consider behavioural factors. Therefore any conclusions are based on proxies for various factors. In addition, as discussed above, there are a number of factors that are ambiguous when considered in isolation. As a result, more information is required to determine whether these factors indicate rational or irrational decision making. The primary focus of the empirical phase of this study will therefore be on determining the role played by behavioural factors and the potential insight this provides into the rationality of preservation decision making.

3.7 CONCLUSION

The worldwide move to defined contribution retirement schemes has put the spotlight on the ability of individuals to make optimal decisions concerning their retirement preservation decisions. This chapter has highlighted a number of concerns regarding the decision making ability of individuals and provided an overview of some of the potential solutions ranging from no intervention, to paternalistic intervention by way of taxes, penalties and regulation, to libertarian paternalism using choice architecture in the form of defaults or debiasing.

The conceptual model that emerges highlights the distinct differences in the drivers of rational and irrational behaviour and therefore the distinctly different solutions which depend on the level of rationality of the decision maker. Little is known about the rationality or otherwise of the decision making process in a South African context, however solutions

currently proposed only assist if individuals have bounded willpower. It is essential that a better understanding of South African decision makers is obtained to determine whether the proposed solution addresses the problem adequately.

Having completed the development of the proposed conceptual model, this study now moves on to the empirical testing of the model. Chapter 4 outlines the research method selected for the empirical phase of the study. The chapter provides an overview of the process followed in terms of selection of appropriate measures of the factors identified in the conceptual model, and the development of the resultant research instrument.

CHAPTER 4 RESEARCH METHOD & RESEARCH INSTRUMENT DESIGN

4.1 INTRODUCTION

The research approach for this study is empiricist, using the construction of a model which provides a theoretical description of the study area, followed by empirical testing of the model to allow the model to be refined and validated (Ryan, Scapens & Theobald, 2007:27). As outlined in Chapter 1, the approach that this study adopted is explained in terms of the problem solving model developed by Mitroff *et al.* (1974) where a conceptual model is developed and then empirically tested with the ultimate aim of developing a scientific model. The literature review conducted in Chapter 2 and 3 provided the basis for a conceptual model and therefore completed phase one of the study. Phase two focuses on the empirical testing of the conceptual model. Based on the model developed in phase one, a survey was designed to test the importance of the various factors in a South African context with a view to testing the thesis that behavioural factors play an important role in retirement preservation decisions.

This chapter first provides an overview of the research design selected for the study. Second the research method is addressed with specific reference to the design of the research instrument, the data collection procedure and the data analysis technique. To conclude, an overview is provided of specific limitations and ethical considerations.

4.2 DESCRIPTION OF OVERALL RESEARCH DESIGN

This study required a deductive approach in which relationships/associations were sought between the factors identified in the conceptual model (predictor/independent variables) and the decision to preserve or not preserve funds when moving jobs (the outcome/dependant variable). There were a number of research designs which could have been appropriate for this study. First, an experimental research design could have been used to test a hypothetical preservation decision in groups which varied in terms of the independent variable. However, in this respect, a major drawback would have been the hypothetical nature of the retirement preservation decision. This could lead to a situation where the person either makes a decision that they believe is “correct” as a result of social desirability bias (Crowne & Marlowe, 1964), or alternatively the person is unsure of the decision they would make. The key problem which arises is the potential suppression of the relationships between variables being tested, or alternatively, spurious observed correlations (Ganster, Hennessey & Luthans, 1983).

Another technique would have been to conduct a field study to observe actual preservation decision making at the time of moving jobs, and then gather data from individuals in terms of the various predictor variables identified in the conceptual framework. While this approach is appealing as it captures the real world decision making environment, drawbacks are encountered in the level of control which can be exercised in a field setting (Looney & Hardin, 2009). In addition, the practicalities of obtaining access to individuals moving jobs at the time of the preservation decision, and the time required to collect information from a sufficiently large and diverse group of individuals made this method unsuitable for this study.

An alternate research design that would capitalise on some of the benefits of an experimental study from the perspective of the deductive approach adopted, while at the same time allowing the analysis of real world decision making, was the use of an analytical survey. Analytical surveys follow a deductive approach to allow relationships amongst variables to be tested (Gray, 2009:99), such an approach facilitates the collection of information in a survey that can then be examined to elicit explanations for the existence of specific phenomena. Therefore an analytical survey goes much further than the usual descriptive approach of most surveys, which focus on describing attributes of the population being studied using means and proportions (Caldwell, 2010), as the analytic survey allows for the examination of interrelationships between variables and the testing of hypotheses.

Taking into consideration the above factors, the research design adopted for this study was an analytical survey. A key strength of this approach is that it allows information to be collected via a survey regarding actual preservation decisions made in the past by individuals when they moved jobs (the outcome variable), and at the same time, the survey facilitates the collection of information regarding the factors identified in the proposed conceptual model (the predictor variables). This approach therefore provides the necessary information to test the hypotheses of this study.

In general, the key weaknesses of survey instruments, including analytic surveys, are associated with a failure of the questions used in the survey to measure the theoretical construct that they are supposed to measure (a lack of construct validity), and sources of error introduced as a result of the sampling and data collection processes (De Leeuw, Hox & Dillman, 2008:7). However, surveys, if properly designed and executed, have the potential to produce high levels of both internal and external validity (Mouton, 2001:153). The measures used to overcome these potential shortcomings in the present study are addressed in the research design and data collection sections below.

The use of analytical surveys to measure the relationships between variables is widespread in the study of retirement decisions. The majority of studies make use of data collected in existing surveys and, by specifying outcome and predictor variables, determine possible relationships between variables (Amromin & Smith, 2003; Bassett *et al.*, 1998; Engelhardt, 2003; Hurd & Panis, 2006; Moore & Muller, 2002; Poterba *et al.*, 1998). While these studies have generally been able to determine relationships between demographic and other reported socioeconomic variables, they lack the insights into psychological factors which might impact savings decisions as they are not using custom surveys to test these relationships. To overcome this problem, other studies of retirement savings have made use of customised surveys to test relationships between variables to explain savings decisions (Hershey & Mowen, 2000; Jacobs-Lawson & Hershey, 2005).

Given the requirement of this study to test psychological and other explanations for retirement preservation decisions, a customised survey was designed. The survey takes the form of a structured questionnaire and uses existing measures of predictor variables, where available, supplemented with additional questions to capture factors for which there are no existing measures. The design of the research instrument is discussed in detail in Section 4.3.

4.3 METHOD

4.3.1 Research instrument

The customised questionnaire designed for this study needed to address three groups of predictor variables and one outcome variable. The outcome variable relates to the actual preservation decision when the individual last moved jobs. The predictor variables focus on the three aspects of the conceptual model being: bounded willpower, bounded rationality and rationality. The questions used to derive data for each variable are explained in greater detail below focussing on purpose, reliability and validity. The questionnaire is included as Appendix A and its constituents are discussed in more detail in the following sections.

4.3.1.1 Predictor variables group one: bounded willpower

In Chapter 3, the critical literature review and resultant conceptual model illustrated the importance of time horizon and level of impulsivity in determining the level of willpower of an individual. A number of tests have been developed over the past decades to measure time orientation and impulsivity. There are generally two approaches to measuring levels of impulsivity and time orientation. First using a self-reported measure based on a psychometric test, and second, making use of a delay discounting task (Mobini, Grant, Kass & Yeomans,

2007:1518; Teuscher & Mitchell, 2011). In a delay discounting task an individual is asked to choose between a small immediate reward, and a larger future reward. The time delay between the choices is altered until the point at which an individual reverses their choice and this is then taken as an indication of their level of impulsivity or time preference (Teuscher & Mitchell, 2011:614).

In lights of these two approaches, studies have been conducted to determine if there is any relationship between the scores of self-reported measures of time orientation and impulsivity and delay discounting rates. Some studies have found strong relationships between the delay discounting and self-report measures of both impulsivity (Mobini *et al.*, 2007), and time orientation (Joireman, Balliet, Sprott, Spangenberg & Schultz, 2008). Other studies have observed these relationships only in specific limited circumstances (McLeish & Oxoby, 2007) or have observed no relationships at all (Reynolds, Ortengren, Richards & de Wit, 2006).

A problem with trying to compare delay discounting tasks and self-report measure result from differences in the way in which delay discounting tasks are set up and the nature of the participants in particular studies (Mobini *et al.*, 2007). There is no standard delay discounting task, a variety of methods are classified as delay discounting tasks, common ones include choice tasks, matching tasks, pricing tasks and rating tasks. Differences exist as to what the reward is and also whether it is a real or hypothetical reward. The outcome of such an array of procedures has led to a situation where implicit discount rates have ranged from -6% to infinity (Frederick *et al.*, 2002:377).

Many other factors cloud the issue of whether a delay discounting task is actually measuring time preference, some additional factors that act as confounds are levels of uncertainty about receiving future rewards, inflation expectations, marginal utility of the reward amount to a specific individual and the mental costs of keeping track of money owed (Finke, 2005; Frederick *et al.*, 2002). All of this leads to a situation where results from such tasks might reflect many issues other than, or in addition to, time preference.

In general, the link between delay discounting and self-report measures remains disputed (Mobini *et al.*, 2007). Frederick *et al.* (2002:392) discuss the possibility that there are a number of dimensions to impulsivity, and that delay discounting tasks only capture one element of this. Another possible explanation for the differences observed is that self-report measures provide information about personality traits that exist over extended time periods,

while behavioural tasks focus on a more state-dependant impulsivity aspect (Stanford, Mathias, Dougherty, Lake, Anderson & Patton, 2009:387).

In light of the above issues with delay discounting tasks, both from a procedural and construct validity perspective, this study did not use delay discounting tasks, but instead focused on established psychometric tests of self-reported measures of time orientation and impulsivity. These are addressed in more detail below.

4.3.1.1.1 Time orientation self-report measures

Many of the initial attempts to create self-report measures of time orientation or time perspective suffered from reliability and validity issues. In the 1990s two tests emerged which were able to identify stable individual differences in time orientation in both a reliable and valid way, the first is the consideration of future consequences (CFC) scale and the second is the Zimbardo Time Perspective Inventory (ZTPI) (Finke, 2005). Both of these tests have been widely used to measure time perspective and orientation and are considered to be the primary measurement tools for contemporary time perspective research (Ryack, 2012).

The CFC scale is one of the most commonly used measures of time perspective in psychological research (Hevey, Pertl, Thomas, Maher, Craig & Ni Chuinneagain, 2010:654; Petrocelli, 2003:406). The CFC scale was developed by Strathman, Gleicher, Boninger and Edwards (1994) to measure "... the extent to which individuals consider the potential distant outcomes of their current behaviours and the extent to which they are influenced by these potential outcomes" (Strathman *et al.*, 1994:743). The original 12 item scale single factor model produces a measure on the continuum from present to future mindedness, with a low score representing an individual who seeks to satisfy immediate needs, with no concern for the future. A high score indicates that an individual uses future goals to guide current decisions.

Initial testing with a variety of surveys and experiments showed that the scale demonstrates a high level of internal consistency with a Cronbach's alpha of between 0.80 and 0.86. Reliability in terms of test-retest situations produced correlations of between 0.72 and 0.76 indicating sufficient temporal stability. Construct validity was established through the testing of the relationships with other measures, comparisons with a known group and prediction of response patterns related to the psychological consequences of CFC (Strathman *et al.*, 1994). The scale is considered to have excellent validity and reliability (Finke, 2005) and high Cronbach's alphas and test-retest stability have been found in a number of follow-up studies

(Hevey *et al.*, 2010; Toepoel, 2010). High CFC scores show correlations with personality traits such as delay of gratification and conscientiousness (Strathman *et al.*, 1994) and negative correlations in respect of impulsivity (Joireman, Anderson & Strathman, 2003) providing evidence for its convergent and discriminant validity. Numerous studies across a variety of domains have established construct validity of the CFC scale (for a review see Joireman, Strathman & Balliet, 2006).

Almost all of the studies which have used the CFC scale have used it to predict behaviour related to self-control (Joireman, Kees & Sprott, 2010:171). Studies have focussed on a variety of areas including health choices, risk taking, academic achievement and environmental behaviour (Joireman *et al.*, 2006). The use of the scale in a financial decision making context has been more limited, however, studies have linked low CFC scores with high levels of impulsive buying (Joireman, Sprott & Spangenberg, 2005), higher levels of credit card debt (Joireman *et al.*, 2010) and lower likelihood to participate in a retirement plan (Howlett, Kees & Kemp, 2008).

As the 12 item scale contained items reflecting both immediate concerns and future concerns, a key issue with the CFC score that emerged was that the interpretation of the score could be ambiguous, as factors that linked to issues of immediate concern were scored negatively (reverse coded), while those reflecting future concerns were scored positively. A low score could reflect a person who is concerned primarily with immediate consequences or someone who is not concerned with future consequences, or both. The same was true for the ambiguity of a high score (Joireman *et al.*, 2010). Subsequent studies have identified a two factor construct with a separation between CFC Immediate and CFC Future items (Joireman *et al.*, 2008; Petrocelli, 2003; Toepoel, 2010).

Joireman, Shaffer, Balliet and Strathman (2012) argue that from a theoretical and empirical perspective there are distinct advantages to using a two factor model. The main advantage of is that it allows for a distinction to be made between two theoretical models of how self-control and time perspective are linked by differentiating between a susceptibility model and a buffering model. The susceptibility model is based on the idea that high concern with immediate consequences leads to an inability to exercise self-control. On the other hand, the buffering model hypothesises that a high concern with future consequences leads to an individual exerting greater self-control (as they are “buffered” against failure of self-control) (Joireman *et al.*, 2008:16). Studies have confirmed the importance of the distinction with one study showing that low levels of self-control were predicted by high scores on the CFC

Immediate scale items and were not related to scores on the CFC Future scale items (Joireman *et al.*, 2008). Another study found that high levels of credit card debt were predicted by high scores on the CFC Immediate scale items, and again were unrelated to CFC Future scale items (Joireman *et al.*, 2010). On the other hand, the CFC Future scale items have been useful in predicting behaviours related to health (Joireman *et al.*, 2012).

In order to capture these two distinct elements, Joireman et al (2012) introduced a 14 item scale with CFC-Immediate and CFC-Future sub-scales. Exploratory and confirmatory factor analyses established the validity of the new scale, and high levels of reliability are observed (Cronbach's alphas of 0.80 and 0.84 for the CFC Future and CFC Immediate sub-scales respectively) (Joireman *et al.*, 2012:7). The scale of agreement for the CFC items ranges from extremely uncharacteristic to extremely characteristic, the CFC makes use of either a 5-point or 7-point scale of agreement (Joireman *et al.*, 2012, 2006).

Another self-report measure of time orientation was developed by Zimbardo and Boyd (1999) who created the Zimbardo Time Perspective Inventory (ZPTI) to overcome what they perceived as shortcomings in existing instruments used to measure time perspective which they believed were too simplistic as they focused on only one or two dimensions (Zimbardo & Boyd, 1999:1273). A key element of the ZPTI is that it takes into account past, present and future orientation in determining the time orientation of a particular individual.

Exploratory and confirmatory factor analysis was used to demonstrate the internal and test-retest reliability of the five factor ZPTI model, with Cronbach's alphas of between 0.74 and 0.82 and test-retest reliabilities of between 0.70 and 0.80. Correlation, experimental and case study research confirmed the validity of the scale (Zimbardo & Boyd, 1999). Construct validity of the ZPTI as related to intertemporal decisions has also been confirmed in other studies (Boyd & Zimbardo, 2005; Drake, Duncan, Sutherland, Abernethy & Henry, 2008). The scales have been widely used and validated in a number of countries (Zimbardo & Boyd, 2009:51).

The five factors identified in the ZPTI model are: Past-Negative, Past-Positive, Present-Hedonistic, Present-Fatalistic and Future. Past-negative relates to a general averse and negative view of the past, while past positive reflects a nostalgic view of the past filled with good memories. Present hedonistic links to a focus on living in, and enjoying the moment, with very little concern for the future. Present fatalistic has a hopeless view of the future as the individual believes they are powerless to influence or change the future. Finally future

orientation focuses on future goals and rewards with less concern for immediate gratification (Zimbardo & Boyd, 1999). The full ZTPI consists of 56 items; these items are divided between the various sub-scales as follows: Past-negative 10 items, past-positive 9 items, present-hedonistic 15 items, present-fatalistic 9 items, future 13 items.

The ZTPI is a commonly used measure of time perspective and research has ranged from links between time perspectives and health and risk behaviours (Boyd & Zimbardo, 2005), to understanding how time orientation predicts environmental behaviour (Corral-Verdugo & Pinheiro, 2006). A relatively new area of research is the use of the ZTPI in assessing the impact of time orientation on financial decision making with one study (Petkoska & Earl, 2009) considering the impact of time perspective on retirement planning.

Given the wide range of variables that needed to be tested in this study, it was not practical to include two measures of time perspective, therefore a choice needed to be made between the CFC and the ZTPI. In this respect, both measures are valid and reliable indications of time preference and are widely used. In addition, correlations have been observed between the ZTPI and the CFC scales (Daugherty & Brase, 2010; Lasane & O'Donnell, 2005; Zimbardo & Boyd, 1999) therefore either is suitable as a measure of time preference for this study. A key benefit of the CFC scale for this study is that it only consists of 14 items versus the 56 of the ZTPI. As this study had numerous variables to test, a shorter measure of time perspective was preferable, therefore, the two factor 14 item CFC scale was used as a self-report measure of time perspective for this study.

4.3.1.1.2 Impulsivity self-report measures

Impulsivity is a multidimensional construct and manifests in a number of ways from acting without thinking to an inability to inhibit responses (Kirby & Finch, 2010:704). As highlighted in Chapter 3, from a retirement preservation perspective, the key dimension which is of interest is impulsivity which results in the choice of small immediate rewards over larger future rewards. There are a number of self-report questionnaires which have been developed to measure impulsivity (Kirby & Finch, 2010). However what is included in the definition of impulsivity is very broad. For the purposes of this particular study, impulsivity as it relates to intertemporal choices is of key importance. This approach leads to the elimination of a number of dimensions which are categorised as impulsive, but which have no direct bearing on the underlying construct of impulsivity as it relates to choice over time (Kirby & Finch, 2010:712). This implies that one popular measure of impulsivity, the I-7

Impulsiveness Questionnaire, which includes a number of dimensions not directly related to the concept of impulsivity under investigation in this study, such as “empathy” and “venturesomeness”, (Eysenck, Pearson, Easting & Allsopp, 1985), was considered inappropriate for this study.

The Barratt Impulsiveness Scale (BIS) (Patton, Stanford & Barratt, 1995) is one of the most well known and commonly administered measures of impulsivity (Stanford *et al.*, 2009). While use of the Barratt impulsivity measure as a way to test delay of gratification has been criticised due to the fact that none of the BIS factors seem, on face value, to tap into this specific aspect (Holt, Green & Myerson, 2003:365) others have noted that the impulsiveness measure in the BIS scale captures the elements of trait-impulsivity related to the desire for immediate rewards, and also a broader definition of impulsivity related to planning for the future (McLeish & Oxoby, 2007). In support of the view that the BIS captures elements relevant to intertemporal choices and delay of gratification one study has found that individuals classified as high and low impulsives in terms of the BIS scale have shown differential outcomes on tasks which indicate a tendency to take short term rewards despite longer term detrimental outcomes (Potts, George, Martin & Barratt, 2006). Another study (Spinella, 2004) found that impulsiveness as measured by the BIS scale correlates highly with activities which link to prefrontal cortex function, which as highlighted in Chapter 3 is the area of the brain that is linked to impulse control. These findings therefore support the validity of the BIS scale as a suitable measure of impulsivity in the context of intertemporal choices and delay of gratification.

The BIS is a 30 item scale scored using a 4-point scale and the final measure is a summation of all 30 items. In general a score in excess of 72 indicates a highly impulsive individual, scores from 52 to 72 are considered to indicate normal levels of impulsivity, while those who score lower than 52 may either be exhibiting over-control, or alternatively they have been dishonest in the completion of the questionnaire (Stanford *et al.*, 2009:387). Although initially theorised to contain only one dimension, the BIS has subsequently been shown to have three components namely: Attentional Impulsiveness, Motor Impulsiveness, and Non-Planning Impulsiveness (Patton *et al.*, 1995). Attentional impulsiveness refers to an inability to concentrate, motor impulsiveness refers to taking actions without thinking, and non-planning impulsiveness refer to a lack of foresight and planning for the future (Stanford *et al.*, 2009). The scale has high internal consistency as demonstrated across a number of different populations where Cronbach’s alphas of between 0.79 and 0.83 were recorded (Patton *et al.*,

1995). Test-retest reliability has also been established over a one month time period (Spearman's Rho 0.83) (Stanford *et al.*, 2009:387).

The validity of the construct has been established in the context of comparisons with other self-reported measures of impulsivity (Stanford *et al.*, 2009:387) as well as in its ability to differentiate between control groups and individuals suffering from conditions associated with low impulse control, such as drug and early onset-alcohol dependence (Dom, D'haene, Hulstijn & Sabbe, 2006; Lane, Moeller, Steinberg, Buzby & Kosten, 2007). As mentioned above, the validity of the BIS as it relates to prefrontal cortex related impulse control has also been established (Spinella, 2004).

The BIS has been used in numerous studies focussing mainly on substance abuse and mood disorders. However the instrument has also been used extensively on so-called "normal" populations where approximately 60 studies have made use of the scale on topics ranging from executive functioning and decision making to understanding the genetic basis of impulsivity (for a detailed review of the use of the BIS-11 refer to Stanford *et al.*, 2009). While there is widespread use of the BIS in many different contexts, it would appear that its use in a financial decision making context is more limited. One study that uses the BIS in this context considers the impact of impulsivity on individual debt levels. The study finds high levels of impulsivity correspond to high levels of unsecured debt (Ottaviani & Vandone, 2011).

Given the clear focus of the BIS scale on impulsivity relevant to delay of gratification, its long history of use in measuring impulsivity, and high levels of reliability and validity across a number of populations, the BIS scale was used in this study as a measure of self-reported impulsivity. This study made use of the BIS-11 version of the measure which is the most up to date and psychometrically sound version of the scale (Stanford *et al.*, 2009:391).

4.3.1.1.3 Summary of measures of bounded willpower

As outlined above, the present study made use of the CFC 14-item self-reported measure for time orientation (Appendix A: Part C Questions 1 to 14) and the BIS self-reported measure for impulsivity (Appendix A: Part D Questions 1 to 30). These measures collectively provide an indication of the level of bounded willpower of individuals.

4.3.1.2 Predictor variables group two: bounded rationality

As highlighted in Chapter 3, it is anticipated that the computational complexity of preservation decisions has an adverse impact on individuals with low levels of education, or low levels of financial literacy. Therefore the questionnaire needed to elicit information about general education levels and financial literacy.

There are a number of ways in which financial literacy can be determined ranging from self-reported measures, using level of education as a proxy and asking specific financial literacy related questions. There are however drawbacks to some of these approaches. Self-reported measures have been shown to overestimate financial literacy levels in those who have low actual levels of financial literacy (Agnew & Szykman, 2005:62) and using education as a proxy works well for establishing basic levels of financial literacy, but fails to properly account for more advanced levels of financial literacy where those with university degrees do not necessarily show high levels of sophisticated financial literacy (Van Rooij, Lusardi & Alessie, 2011:456). The use of specific financial literacy questions appears to overcome these issues, however, using only a few questions to assess financial literacy has been criticised for not providing a wide enough measure of financial literacy (Huston, 2010:309). Therefore, it would appear that a more robust approach would involve the use of a number of questions to assess levels of financial literacy.

There are a few studies that have developed tests of financial literacy involving a number of questions, however some of the tests only assess higher levels of financial literacy, such as understanding the working of financial instruments (Agnew & Szykman, 2005, 2011), rather than a more general understanding of financial topics. Another approach has been developed by Lusardi and Mitchell (2007b, 2007c, 2007a, 2009) who, over a number of years, developed questions to assess more basic financial literacy levels as part of their work on retirement savings decisions. These questions have been used in a number of surveys in the USA and internationally (Lusardi & Mitchell, 2009) including South Africa (Shambare & Rugimbana, 2012). Lusardi and Mitchell (2009) subsequently constructed a financial literacy index which consists of basic financial literacy questions and more sophisticated questions to assess the level of financial knowledge. All of the questions used in the index were piloted in other surveys before being included in the index.

Construct validity of the financial literacy index has been established through a principal component factor analysis (Lusardi & Mitchell, 2009). The factor analysis of the questions confirms two distinct factors related to basic knowledge and sophisticated knowledge,

allowing a differentiation to be made between basic financial literacy and more advanced literacy levels. Additionally, from a validity perspective, there is a strong correlation between subjective assessment of financial knowledge and both the basic and sophisticated financial literacy indices. Confirming findings of previous studies, this financial literacy index was found to increase with age and education.

The financial literacy index has been used, with slight variations, in other studies both within a retirement context (Bateman, Eckert, Geweke, Louviere, Thorp & Satchell, 2011; van Rooij, Lusardi & Alessie, 2012) and to investigate stock market participation (Van Rooij *et al.*, 2011). These studies confirm the findings that financial literacy levels increase with age, income and education levels. Furthermore, these studies find that financial literacy levels appear to be related to financial decision making ability with those displaying low levels of literacy less likely to invest in stocks (Van Rooij *et al.*, 2011), and retirement wealth increasing with financial literacy levels (Bateman *et al.*, 2011; van Rooij *et al.*, 2012).

As there is no standard test of financial literacy (Huston, 2010), and given that the abovementioned financial literacy test overcomes many of the problems with other methods of assessing financial literacy and demonstrates validity in the measurement of financial literacy, the current study made use of the financial literacy questions developed by Lusardi & Mitchell (2009) to assess financial literacy levels. Some modifications were required to terminology used in the questions which were not appropriate in a South African context, for example the use of “mutual fund” was altered to “unit trust”. In addition to the financial literacy questions, a self-reported assessment of financial knowledge was included, along with a question regarding highest level of education qualification obtained.

While the financial literacy index gives an indication of how likely it is that an individual was able to make an optimal preservation decision, it has been suggested as discussed in Chapter 3, that when individuals are faced with complex problems they look for external cues or turn to external advisors (Akerlof & Shiller, 2009:119; Benartzi & Thaler, 2007:94). Therefore questions were included to determine whether individuals consulted external advisors regarding the preservation decision. The individual was asked whether they followed anyone’s advice when making their decision and specifically who had provided the advice so that a distinction could be made regarding advice from a credible source (with the requisite financial background or understanding of the preservation decision) and advice from those with no financial background.

Therefore the bounded rationality aspect of this study included the score on the financial literacy index (Appendix A: Part E Questions 1 to 13), a self-assessment of financial knowledge (Appendix A: Part A Question 2), a self-reported highest level of education (Appendix A: Part A Question 5), and the answers to questions regarding decision assistance when making the preservation choice (Appendix A: Part B Question 4).

4.3.1.3 Predictor variables group three: rational factors

In order to assess rationality of preservation decisions, socioeconomic and demographic variables associated with the life cycle hypothesis of saving needed to be assessed, as well as measures of liquidity constraints. As discussed in Chapter 3, this requires information about a number of variables such as age, financial need, marital status and reason for leaving a job which provided information regarding consumption smoothing and potential liquidity constraints. In addition, the assessment of what the funds were used for would also assist in understanding the preservation decision. Each aspect is considered in further detail below.

As outlined in Chapter 3, age can be an ambiguous factor given the interrelatedness of age and levels of self-control. Therefore, a decision by a young person to take a cash payment is only considered rational once bounded willpower is controlled for. In general if rational factors drive preservation decisions, it would be expected that levels of preservation would increase as a function of age. In order to adjust age to reflect the age of the respondent at the time of the job move, information was collected regarding how long ago the individual moved jobs.

Liquidity constraints are assessed in terms of salary level, net asset value of the individual, reasons for leaving previous employer, and marital status. In this respect individuals with low salary levels and low net asset values are expected to be liquidity constrained. In addition, as individuals are sometimes reluctant to provide information regarding salary levels, additional questions were included to assess the level of financial need of individuals without explicitly requesting salary information. The questions used were adapted from a questionnaire prepared by the World Bank for a study of financial literacy in Russia (Mundell, Markov & Shulga, 2008).

Additional indications of liquidity constraints related to an individual leaving employment for a worse job opportunity, or without another job to move to and whether the individual was divorced, separated or widowed which could also indicate liquidity constraints.

The questions used to gather this information were as follows:

- Age: Appendix A: Part A Question 1
- How long ago job move took place: Appendix A: Part B Question 1
- Self-assessed financial situation: Appendix A: Part A Questions 3 and 4
- Reason for leaving previous employer: Appendix A: Part B Question 8
- Relationship status: Appendix A: Part F Question 3
- Salary and Net Asset Value: Appendix A: Part F Questions 5 to 7.

In addition, questions were included to assess any changes in financial circumstances during the time period since the individual left their previous employer which provided the ability to adjust the variables collected in the questionnaire to assess the individual's financial circumstances at the time of the preservation decision. (Appendix A: Part B Questions 6 and 7).

While it is not a predictor variable regarding whether an individual preserved or did not preserve funds, another factor which could potentially provide insight into the preservation decision would be related to the use of funds. As predicted by the LCH individuals could make use of funds to facilitate consumption smoothing behaviour. Existing studies of preservation decisions were used to assist with the categories for uses of funds (Poterba *et al.*, 1998). (Refer to Appendix A: Part B Question 5).

4.3.1.4 Outcome variable: preservation decision

To collect the information for the outcome variable for this study, questions needed to be included to determine what action the individual took when they moved jobs in respect to their accumulated retirement funds. Information regarding the amount of funds available in the pension or provident fund at the time of job move was also collected as a number of other studies, as highlighted in Chapter 3, have found that this is a potential predictor of preservation. (Appendix A: Part B Questions 2 & 3).

4.3.1.5 Structure and order of questionnaire

The factors taken into account with respect to the structure and order of the questionnaire were as follows: First, the self-reported measure of financial literacy was placed before the financial literacy test to ensure that answers were not influenced by performance on the test (Lusardi & Mitchell, 2009:14). Second, it is recommended that a survey begin with questions

that are not of a personal nature and that are easy to answer and linked to the subject matter that the respondent has been briefed on in the introduction to the survey (Fanning, 2005). Therefore the structure of the questionnaire was as follows:

- Part A collected non-sensitive general demographic information and a question concerning a self-assessment of level of financial knowledge.
- Part B collected information regarding the actual preservation decision made by the individual and related questions such as fund amount, use of funds, reason for leaving job, advice sought etc.
- Part C contained the CFC questions.
- Part D contained the BIS questions.
- Part E collected information regarding bounded rationality using the financial literacy index.
- Part F collected more sensitive general demographic information (e.g. salary band, net asset value).

See Appendix A for the complete questionnaire.

4.3.1.6 Reliability and internal validity of questionnaire

The reliability of a questionnaire implies that it consistently produces the same results. From the perspective of this study the majority of the questionnaire was based on standardised measures which have been tested for reliability as discussed in detail above. The reliability of these existing measures was again tested in the context of this study using Cronbach's alpha and factor analysis, results of these assessments are contained in Chapter 5.

From a validity perspective, research designs are generally assessed in terms of two key elements, namely internal and external validity. Internal validity considers the ability of the research design to test the specific research hypothesis, and external validity considers whether the findings can be generalised to other settings and to the broader population (Bordens & Abbott, 2011:114).

There are numerous techniques for reducing errors associated with internal validity such as ensuring questions are effectively written to capture the appropriate construct (Fowler & Cosenza, 2008), using pilot testing to discover if there are problems with the questions, or alternatively using existing instruments whose construct validity has been previously

established. This study used a combination of the above approaches to ensure internal validity, as the majority of the questionnaire used pre-existing measures whose validity had already been established as discussed in detail in section 4.3.1.1 and 4.3.1.2. The additional factual questions which were included were assessed in pilot testing to ensure the questions were clear and that there were no concerns with them. Issues regarding the external validity of this study are addressed in the data collection section below.

4.3.2 Data collection

4.3.2.1 Sample selection

As this was an exploratory study which allowed testing of the variables identified in the conceptual model, the ability to generalise to a broader population was of secondary importance. The nature of an analytical survey is the focus on associations and explanations, rather than on representativeness (Oppenheim, 1992:21). The primary goal of the study was to test relationships and associations between the predictor variables identified in the conceptual model, and the outcome variable which is whether the individual chose to preserve funds when they moved jobs.

Therefore, of key importance in this study was the identification of individuals who were active members of employer sponsored retirement or pension funds and who had made at least one job move in the recent past (less than five years ago) as this facilitated the collection of reliable information regarding the outcome variable. The relatively short time frame was created to ensure that individuals had proper recollection of their decision (as individuals hopefully were able to recall the decision they made if the job move occurred recently), and that the factors being tested in the model had not changed dramatically, as may be the case over longer time periods.

Due to the difficulties in accessing a database of all active retirement fund members who have made at least one job move recently, probability sampling in the form of random selection was not possible. Therefore a non-probability sampling procedure was implemented. A key consideration was that the sample met the criteria described above (previously an active member of pension/provident fund and moved jobs recently), and that there was sufficient heterogeneity in the predictor variables to allow testing of the conceptual model. This required a range of ages, salary levels and educational backgrounds (both field of study and level of qualification).

For the purpose of this study given the above factors as well as time and cost constraints, the sample was drawn from academic and non-academic staff members employed by the University of Pretoria (UP). The reason for selecting UP staff is that it was possible to access data regarding the date they commenced employment at UP and therefore this enabled the selection of a sample of individuals who had moved to UP in a given time frame. In addition, there was sufficient variability in the demographics of the staff complement to allow for testing of associations and relationships which would not necessarily have been the case in other employment environments. However, one drawback was that it was not possible to determine whether these staff members had previously been members of provident or pension funds at their previous employer prior to distributing the questionnaire. Therefore staff members who were part of the sample but who had not previously been a member of a pension or provident fund were identified only after the questionnaires were returned and the responses to questions concerning the preservation decision were analysed (further detail is contained in Chapter 5).

4.3.2.2 Recruitment of participants

The University of Pretoria provided a list of employees who have joined UP in the past five years and were still currently employed at the university to provide the basis for inclusion in the sample. This information was obtained in the form of title, initials, surname and work contact details. In addition demographic information was also included to allow an assessment of the heterogeneity of the sample to be made.

The original list of 2207 staff members was then limited to UP employees located on the Main and South Campuses of the University to facilitate the collection of information within a reasonable time frame and to minimise the costs of collecting the data, this reduced the list to 882. The list was then further reduced to exclude 166 temporary part-time employees, leaving a total of 716 employees to be contacted to complete the questionnaire. The demographics of the staff forming this sample are contained in Table 4.1.

The sample displayed variety in terms of gender, race, age and job grade. It is important to note that while the survey was conducted at an academic institution, academic teaching staff account for less than a third of the overall sample. However, that being said, given the nature of the academic environment in terms of staff being encouraged to pursue further studies, and staff rebates on university fees, it was anticipated that there might be a higher level of academic qualifications than would be expected in other work environments.

Table 4.1: Demographics of staff identified as forming part of the sample (n = 716)

Gender	
Female	54.5%
Male	45.5%
Race	
African	41.9%
White	44.4%
Coloured	9.1%
Indian	4.6%
Age	
20 – 29 years old	20%
30 – 39 years old	39.2%
40 – 49 years old	26.3%
50 – 59 years old	12.2%
60 years and older	2.4%
Job Grade	
1-3 (Senior Management)	1.1%
4-6 (Professionally qualified and mid management)	10.9%
7-9 (Skilled technical and junior management)	42.7%
10-12 (Skilled technical)	35.6%
13-17 & 99 (Semi-skilled)	9.6%
Teaching versus non-teaching	
Teaching	29.3%
Non-teaching	70.7%

Source: UP Staff lists

4.3.2.3 Data collection procedure

4.3.2.3.1 Pilot study

A pilot study was carried out to determine whether there were any issues with the survey that could lead to problems when the full study was carried out. Feedback from the study indicated that some of the words used in the BIS statements were difficult to understand (particularly for those individuals whose first language was not English), in particular statement 26 “I often have extraneous thoughts when thinking.” Despite this feedback, a decision was made to leave the BIS statements unchanged, as it was felt that any modification to the statements would impact on the previously determined measures of reliability and validity of the BIS scale. Feedback from the pilot study also indicated the need for an open ended question to include additional information about the factors which influenced the decision to preserve or not. Therefore, the final questionnaire included an open ended question which allowed respondents to detail specific factors which played a role in their preservation decision. This question was included to determine if there were issues outside of the conceptual model which were raised by individuals.

4.3.2.3.2 Full study

The full study was carried out using a delivery and collection approach (Gray, 2009:230) to encourage higher response rates. This approach requires that the questionnaire is physically delivered to the respondent, and then an arrangement is made to collect the completed questionnaire from the respondent. The above approach implies that hard copies of the questionnaire are distributed, rather than using electronic or online survey collection methods. This has the added benefit of allowing data to be collected from individuals who do not have an email address or access to a computer.

The survey data was collected at the University of Pretoria Main and South campuses in Pretoria. Thirteen field workers were hired to assist with the delivery and collection of the questionnaires. The list of 716 staff was divided into 13 collection groups of approximately 55 staff members clustered in terms of the buildings where the staff were located to facilitate quicker delivery and collection. The field workers were briefed regarding the research project and requested to deliver and collect questionnaires from each staff member on their specific list (field workers were provided with the staff member's title, initial and surname as well as a physical location (room number and building)). Potential respondents were then directly approached by the field workers and requested to complete a self-administered questionnaire. Each participant was provided with correspondence outlining the purpose of the survey and the voluntary nature of the study and was requested to confirm their willingness to participate.

The delivery and collection of questionnaires took place from 25 February 2013 to 14 March 2013. The majority of the questionnaires were delivered in the first week (94%) and the majority of collection occurred within the first two weeks (64% collected in week one and 33% in week two). A small minority of collections occurred in the third week (approximately 3%).

Of the total sample of 716 staff members, 73.5% (526 staff members) were located by the field workers and asked to complete the questionnaire. The balance of the sample could not be found during the data collection period for a variety of reasons ranging from staff being away on leave, or not in the office when the field workers were delivering to a specific building (field workers were requested to attempt to find individuals on a few occasions at different times to try and contact as many staff members as possible), or they could not be located as they had moved to a new position at UP on one of the other campuses or had left the University in the recent past. Of those approached, 432 completed and returned the

questionnaire. This gives a response rate of 82% of those who were contacted to complete the questionnaire, and 60% of the total sample of 716. While field workers were instructed to point out that the consent block needed to be ticked by the respondent if they chose to participate, and where possible the field workers were requested to confirm this had been done when they collected the completed questionnaire, a small minority of respondents (fourteen respondents) did not tick the consent block, and therefore these questionnaires were excluded from any further analysis resulting in a sample size of 418. However, as there was no way of knowing beforehand whether a staff member who had joined UP in the past five years had previously been a member of a pension or provident fund (and therefore would have made a preservation decision when moving jobs), not all of the collected questionnaires could be used for the purposes of this study. Approximately one third of the collected questionnaires were completed by staff members who indicated that this was their first job, or they were not members of a pension or provident fund at their previous employer reducing the final sample for analysis to 256.

4.3.2.3.3 Analysis of respondents

Table 4.2 provides information regarding the characteristics of those who responded versus the total sample to provide an overview of any non-response bias. The characteristics for the full staff list of 716 were included in the staff data lists provided by UP while the characteristics for the respondents were as per the self-reported demographic information contained in the questionnaires. The self-reported demographic information in the questionnaires tied back to the demographic information from the original lists provided by UP and none of the differences were statistically significant as highlighted in Table 4.2. The sample size for each characteristic differed as a result of missing data in the self-reported measures and the exclusion of the 14 questionnaires where the consent blocks had not been ticked. Job grade information and information regarding teaching versus non-teaching staff was not captured in the questionnaire responses.

The tests of statistical significance between respondents and the full staff list were carried out using the Z-test of proportions for those variables with only two categories and Chi-squared tests for multiple category variables. A significance level of 5% was used (two-tailed for the Z-test of proportions, Chi-squared test is non-directional).

Table 4.2: Comparison of demographic information as per original staff lists with self-reported demographic information

Characteristic	Staff list information n = 716	Questionnaire self-report	Difference	P-value
Gender		n=417		
Female	54.5%	58.8%	-4.3%	
Male	45.5%	41.2%	4.3%	
				0.161
Race		n=409		
African	41.9%	41.3%	0.6%	
White	44.4%	44.0%	0.4%	
Coloured	9.1%	9.8%	-0.7%	
Indian	4.6%	4.9%	-0.3%	
				0.976
Age Bracket		n=416		
20 - 29	20.0%	18.5%	1.5%	
30 - 39	39.2%	39.7%	-0.5%	
40-49	26.3%	27.9%	-1.6%	
50-59	12.2%	11.1%	1.1%	
60+	2.4%	2.9%	-0.5%	
				0.895

Source: SPSS output

To determine whether there were any significant differences between all respondents, and those respondents who were included in the analysis for this study based on having made a preservation decision when last moving jobs, an analysis of the demographic variables of each group was carried out. Table 4.3 provides an overview of the demographic variables of the final sample used in the analysis compared to the variables of all the respondents. As can be seen, the differences in gender are not significant. The differences in race result in a p-value of just over 0.05 while age bracket differences result in a p-value of 0.05. The major difference in age bracket arises from the reduction of those in the 20 – 29 age bracket for the final sample for analysis. This is not unexpected given that the sample for analysis excludes those respondents who indicated that this was their first job and those who did not have a retirement fund at their previous employer, which would be applicable to many in this age bracket (50 respondents aged 20 – 29 reported that this was their first job or that they were not members of a retirement fund at their previous job).

Table 4.3: Comparison of demographic information as per self-reported demographic information with self-reported demographics of final sample for analysis

Characteristic	Questionnaire self-report	Questionnaire self-report sample for analysis	Difference	P-value
Gender	n=417	n=256		
Female	58.8%	60.9%	-2.1%	
Male	41.2%	39.1%	+2.1%	
				0.575
Race	n=409	n=250		
African	41.3%	39.6%	1.7%	
White	44.0%	43.6%	0.4%	
Coloured	9.8%	13.2%	-3.4%	
Indian	4.9%	3.6%	1.3%	0.0504
Age Bracket	n=416	n=254		
20 - 29	18.5%	9.8%	8.7%	
30 - 39	39.7%	42.9%	-3.2%	
40-49	27.9%	32.7%	-4.8%	
50-59	11.1%	11.8%	-0.7%	
60+	2.9%	2.8%	0.1%	
				0.05

Source: SPSS output

4.3.2.3.4 Data coding and capturing

Following on from the data collection phase of the study, each questionnaire was reviewed and coded according to the pre-specified coding structure. All variables had been assigned unique identifiers in the questionnaire and this process involved transferring these codes (as indicated by the respondent's choices) into the variable boxes on each page of the questionnaire. In addition, during this coding process, additional coding categories were created for questions where there had been an option of "Other – Please specify". The questions where this was relevant were in Part B, and related to Question 3, which requested information regarding what individual's had done with their accumulated retirement savings; Question 4, where individuals identified who they had sought advice from prior to making their preservation decision; Question 5 which asked for information regarding what they had done with the cash withdrawal; and Question 8 which requested information regarding the reason for leaving their prior job. In addition, Question 9, which was the open ended question regarding factors which played a role in their preservation decision, was also coded in terms

of the main themes highlighted by individuals. Further details regarding the coding of all of the above are contained in Appendix B.

All coded data was then captured electronically to facilitate further statistical analysis. The statistical software package used for data analysis was IBM SPSS Statistics version 21.

Due to the nature of this study the sample was not selected to be representative of a particular population, but rather to display a range of ages, education levels and salaries, a decision was taken that missing item response data for a question related to a particular variable would result in the case-wise removal of the respondent from statistical tests regarding that particular variable. This was deemed preferable to averaging scores or assuming various values for missing data points.

4.3.3 Data analysis

4.3.3.1 Overview

For the purpose of this study, the data was analysed to determine the relative importance of rational and behavioural factors in preservation decisions. As the outcome variable was dichotomous (whether an individual preserved funds or not) and the predictor variables were a combination of interval and categorical, binary logistic regression was used to analyse the data in this study.

The binary logistic regression model is used as a statistical technique to determine the odds of preservation occurring as levels of the predictor variables change. This analysis method is similar to the ordinary least squares regression technique, however it allows for a dichotomous outcome variable and can accommodate categorical predictor variables (Menard, 2010:2). This study therefore made use of logistic regression to test models with variables related to the various parts of the conceptual model. Models were constructed using a purposeful selection model building approach (Hosmer, Lemeshow & Sturdivant, 2013:89; Hosmer & Lemeshow, 2000:92).

The following sections contain more detail regarding the binary logistic regression model and then provide an overview of the model building approach adopted in the study and the data analysis techniques used to test statistical significance of the models and individual variables. Lastly the nature of the variables used in this study and assumptions and limitations of the data analysis technique are addressed.

4.3.3.2 Binary logistic regression model

The logistic regression model is a type of generalised linear model (GLM) and, as detailed by Azen and Walker (2011), has the following three components:

Random component:

The logistic regression function has a binary response variable such that $Y = 1$ or 0 . The purpose of the logistic regression is to model the probability that $Y = 1$ as a function of the various predictor (independent) variables.

Systematic component:

The linear function is in the form $\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p$ where α and $\beta_1, \beta_2, \dots, \beta_p$ are fixed coefficients and X_1, X_2 etc represent the predictor (independent) variables.

Link function:

Due to the binary nature of the outcome variable a transformation is required to create the final logistic regression model. The link function which allows this transformation is the logit function which is the natural log of the odds that $Y = 1$. This function is presented in the following equation: $\text{logit}[P(Y=1)] = \text{logit}(\pi) = \ln(\pi/(1-\pi))$, with π representing the probability that $Y = 1$. The part of the equation shown by $(\pi/(1-\pi))$ represents the odds of the event occurring (i.e. the odds that $Y = 1$).

Combining the three components creates the logistic regression model:

$$\text{logit}(\pi) = \ln(\pi/(1-\pi)) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p$$

In general the interpretation of the above would be that for a given β the natural logarithm of the odds of $Y = 1$ increases by that β value for a one unit increase in the predictor variable. As this is not necessarily as intuitive as the interpretation of a normal linear regression equation, the logistic regression is usually explained in terms of odds ratios. (Azen & Walker, 2011:182).

The log odds are the beta coefficients of the above equation. To interpret the direct impact of a predictor variable, X , on Y , requires the exponentiation of the regression coefficient, β , using the exponential function $\exp(x) = e^x$, i.e. e^β . The resultant value is known as the odds ratio, which describes the relationship between the predictor variable and the outcome. Odds ratios range from 0 to infinity. An odds ratio of one implies that there is no association between the variable and the outcome in terms of odds (this corresponds to a zero beta value as $e^0 = 1$). Odds ratios greater than one imply that as the variable increases in value, the odds

that $Y = 1$ increase, whereas a value less than one implies that an increase in the variable decreases the odds that $Y = 1$ (Menard, 2010:93). A distinction is made between unadjusted odds ratios, where there is only one predictor variable in the equation and no controls or interactions are included, and adjusted odds ratios which reflect the contribution of the particular variable in a multivariate logistic model where other variables are included in the model (Meyers, Gamst & Guarino, 2013:532).

The equation can be restated as follows to solve for determining the probability (P) of the outcome variable (Y) occurring:

$$P(Y) = e^{(\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p)} / (1 + e^{(\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p)})$$

This equation can be simplified to

$$P(Y) = 1 / (1 + e^{-(\alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p)})$$

4.3.3.3 Process for model building and comparison

In general, stepwise regression techniques in a logistic regression context are recommended for exploratory studies where no existing theory guides variable selection (Menard, 2010:119). For theory testing a better approach is to include variables that are of theoretical importance in a controlled model building approach. Therefore, following the latter approach, the purposeful selection model building technique (Hosmer *et al.*, 2013:89; Hosmer & Lemeshow, 2000:92) is followed in this study for constructing multivariate models of behavioural and rational variables. In terms of this approach a bivariate analysis of all theoretically important variables is first carried out to determine statistical significance as standalone predictors. The analysis techniques to determine statistical significance of individual predictor variables are addressed in section 4.3.3.3.2.

Thereafter all variables found to be significant, using a cut-off p-value of 0.25, are included in the multivariate model. This high p-value is recommended to ensure that suppressor effects are not missed where variables only become significant once other variables are introduced or controlled for. The significance of all variables is then reassessed in the combined model and those that are no longer significant are removed. However following the recommendation of Agresti (1996:214), variables that are theoretically important are kept in the model to reduce bias in other estimates. In addition, the beta coefficients of variables remaining in the model are assessed to determine if major increases or decreases (in excess of 20%) have occurred following the removal of non-significant variables as this gives an indication that variables need to be added back as they act as effect moderators or controls (Hosmer *et al.*, 2013:92;

Hosmer & Lemeshow, 2000:97). Lastly variables that were not initially included in the model are added to test if they are statistically significant in the presence of other variables (once again to ensure suppressor effects are taken into account) - this produces a main effects model. Thereafter interaction effects are assessed (refer to section 4.3.3.3.3 for further information) and interaction terms added if necessary to produce a preliminary final model which is then assessed to determine model adequacy and fit. The tests to evaluate the overall model are discussed in section 4.3.3.3.1.

4.3.3.3.1 Overall model evaluation

Rather than trying to find the least squares, as in the case with linear regression, logistic regression focuses on maximum likelihood approach which aims to determine the model which will best predict the probability of the outcome variable occurring based on the information gathered in terms of predictor variables (Hosmer & Lemeshow, 2000:7). There are generally two approaches for assessing the above, first is the use of the Wald statistic (similar to the t-test in linear regression), and second a likelihood ratio approach (similar to the F-test in linear regression) (Azen & Walker, 2011:189). In general the likelihood ratio approach is preferred given limitations of using the Wald statistic in logistic regression (Azen & Walker, 2011:190; Hauck & Donner, 1977), specifically in the case of smaller samples (Agresti, 1996:109). This study will make use of the likelihood ratio test.

The likelihood ratio test assesses the null hypothesis that all coefficients in the logistic regression equation are zero, versus the alternative hypothesis that at least one of the coefficients is significantly different from zero. The test determines the difference between the full model (with all predictor variables) and a model containing no predictor variables. If the difference is significant, the model containing the predictor variables provides a better prediction of the dependent variable outcome than a model with only the constant variable (Burns & Burns, 2009:574).

The likelihood ratio test statistic (G^2) is calculated as follows: $G^2 = -2\ln(L_0/L_1)$. Where L_0 is the maximum likelihood under the null hypothesis and L_1 is the maximum likelihood under the alternative hypothesis. The test statistic follows a chi squared distribution with degrees of freedom equal to the number of predictors (Azen & Walker, 2011:190).

In addition to the above model evaluation techniques, additional goodness of fit tests are available to enhance the analysis. There are two general methods of determining goodness of fit of the logistic model, first descriptive measures and second inferential tests. From the

perspective of descriptive measures, some of the more common reported measures include McFadden's R^2 (also known as the likelihood ratio), Cox and Snell R^2 and Nagelkerke R^2 (Peng & So, 2002:45).

While there is no one measure that is necessarily considered superior in all respects, Menard (2000:24) suggests the use of the likelihood ratio (McFadden's R^2) due to its intuitive interpretation as it measures the proportion by which the error term is reduced and the fact that it is independent of the base rate. McFadden R^2 is calculated as the difference between the -2 log-likelihood statistic of the initial model (with only a constant) and the -2 log-likelihood statistic of the new model (with predictor variables included) divided by the initial -2 log-likelihood statistic (Menard, 2000:19). Hensher and Johnson (1981:51) point out that there is a difference in interpretation of what constitutes a good score, as unlike in linear regression where R^2 values of in excess of 0.9 are considered good, for McFadden's R^2 a score between 0.2 and 0.4 provides indications of a very good fit. The likelihood ratio assesses the proportional reduction in residual variation and is comparable across models (Menard, 2010:55). This study therefore makes use of the McFadden R^2 to determine the goodness of fit of the logistic regression model, supplemented by information for the Nagelkerke R^2 which is commonly reported in logistic regression analysis.

Inferential tests include the Brown chi-squared test, the Pearson chi-squared test, the deviance based test and the Hosmer-Lemeshow test (Peng & So, 2002:44). The Hosmer-Lemeshow test considers the difference between observed and expected frequencies, a finding of non-significance supports that the model is a good fit (i.e. there are no significant differences between observed and expected frequencies) and will also be assessed in this study to confirm goodness of fit.

Additional assessments of model fit make use of classification tables to determine the number of correctly predicted outcomes using hit rate (the overall success rate of the model determined as the percentage of respondents correctly classified), sensitivity (outcomes correctly classified as an event), specificity (outcomes correctly classified as a non event), false positives and false negatives to classify outcomes (Peng & So, 2002). Unless necessitated by costs or risks associated with false negatives or false positives the general cut point for allocating an individual to one group or the other is 0.5, meaning that those respondents whose probability falls below 0.5 will be allocated to the reference group, and those with a probability in excess of 0.5 will be part of the target group (Meyers *et al.*, 2013:555). This study makes use of a cut point of 0.5.

When assessing the hit rate or success rate of the model, there are various views on what is regarded as a good model. In general the rule of thumb is that it should be at least 25% better than chance. In this regard if the outcome variable is heavily skewed to one category, it is difficult to achieve an outcome that is better than chance and therefore in this case it is suggested that the proportional by chance method is used to assess the model rather than a maximum chance approach. The proportional by chance method determines the base rate as the sum of the squared proportion of each group in the sample, whereas the maximum chance approach makes use of the proportion of chances in the larger group as the base rate (Hair, Black, Babin & Anderson, 2010:365).

A graphical representation of the classification table is known as the receiver operating characteristic (ROC) curve (Swets, 1988). An assessment of the area under the curve provides information regarding the accuracy of classification. If the area under the curve is 0.5 then no discrimination occurs (the outcome is due to chance), values between 0.6 and 0.7 indicate poor levels of discrimination, values between 0.7 and 0.8 are considered to provide acceptable discrimination, values between 0.8 and 0.9 demonstrate excellent discrimination and those between 0.9 and 1.0 show outstanding discrimination (Hosmer & Lemeshow, 2000:162; Meyers *et al.*, 2013:549).

Another important part of determining model fit is to assess residuals using standardised residual tests to determine cases for which the model is a poor fit (Field, 2012:292). In general it is expected that 1% of cases will have a standardised residual score that lies outside the range of -2.5 to +2.5 and 5% of cases would lie outside the range of -2. to +2. Cases where residuals are above three generally require further investigation to identify reasons for the poor model fit (Menard, 2010:134). This would require confirming that there are no data capturing errors, and assessing what factors result in a particular case not fitting the model.

4.3.3.3.2 Statistical significance of individual predictor variables

In order to determine the statistical significance of each predictor variable's coefficient in the model, the Wald test or the likelihood ratio test can again be utilised. There are however limitations in applying the Wald test (Hauck & Donner, 1977) and although it may work well for large samples, it is generally not appropriate for the sample sizes used in practice and therefore the likelihood ratio test is generally considered to be a better test (Agresti, 1996:109; Menard, 2010:99). This study makes use of both the Wald test and the likelihood-ratio test to assess the statistical significance of the predictor variables. The test uses the same

process as described in section 4.3.3.3.1 to compare the model with and without the inclusion of each predictor variable.

In addition, the odds ratio for a particular predictor, and its confidence interval (which is assessed in terms of the standard error of the logit coefficient) provides additional information regarding the usefulness of a predictor variable. The confidence interval should not contain a value of one as this would imply that the logit coefficient assumes a value of 0 (odds ratio = e^{β} and if $\beta = 0$, odds ratio = 1), meaning that it does not contribute to explaining the outcome variable (Field, 2012:289).

4.3.3.3.3 Control variables and interaction effects

In certain instances in this study, it was necessary to control for the impact of a specific variable, or group of variables to assess whether remaining variables retained their statistical significance. In order to control for the effect of variables in logistic regression, a sequential or block-wise entry approach is used where control variables are entered in the first block and then predictor variables in the second block. The model is then examined to determine if the predictor variables have a statistically significant impact despite the presence of control variables (Leech, Barrett & Morgan, 2011:136).

Interactions between predictors can also influence the logistic regression model and as discussed in section 4.3.3.3, their impact is assessed as part of the model building process. Generally it makes sense to test known theoretical interactions (where the impact of the predictor on the outcome variable depends on the value of another predictor have a combined impact on the outcome variable). Interactions are tested in logistic regression by adding the interaction term to the regression and determining if the interaction variable is significant. If it is not significant, the interaction term can be removed from the model (Menard, 2010:114).

4.3.3.4 Nature of variables

The dependant or outcome variable in this study was the preservation decision. It is a dichotomous variable as it was either a decision to preserve or not preserve accumulated funds. As per the conceptual model, the predictor variables or covariates are measures of bounded willpower, bounded rationality and rationality. Considering the discussion in the first part of this chapter, bounded willpower, bounded rationality and rationality were measured using a variety of methods which are discussed in more detail in the following sections.

4.3.3.4.1 Bounded willpower

The CFC scale provides two scores, one for the future subscale (seven questions) and one for the immediate subscale (seven questions). A five point scale was used resulting in scores for each subscale ranging from seven to 35. The scores for each individual are then averaged to determine a score ranging from one to five for each subscale. These average scores can be used in the form of interval data as the use of a full Likert scale, as opposed to individual Likert items, results in data that can be analysed as interval data (Carifio & Perla, 2007:115).

The BIS scale uses a four-point scale and there are 30 items leading to scores ranging from 30 to 120. In general studies using the BIS scale have three approaches to categorise the data. First, the approach used in most studies (see for example McLeish & Oxoby, 2007; Ottaviani & Vandone, 2011) is to use the index scores themselves in the form of interval data. Second individuals can be categorised as displaying high impulsivity (score 72 and above), normal levels of impulsivity (scores from 52 to 71) and low levels of impulsivity (scores below 52) (Stanford *et al.*, 2009). This categorisation provides ordinal data. Last, a median split approach can be adopted (Potts *et al.*, 2006) to categorise individuals as having high levels of impulsivity and low levels of impulsivity, which results in binary categorical data.

4.3.3.4.2 Bounded rationality

The financial literacy test has 13 items and therefore an individual score ranges from 0 to 13 providing interval data. In addition, the two subscales, basic financial literacy and sophisticated financial literacy, also provide scores out of five and eight respectively. From an analysis perspective, the aggregation of scores using factor analysis has been applied in some studies (Lusardi & Mitchell, 2009; van Rooij *et al.*, 2012; Van Rooij *et al.*, 2011), however, summing the scores on each section of the index and then standardising them has been found to preserve the relevant information for the analysis of financial literacy (Bateman *et al.*, 2011:50). This finding ties in with other studies which have found that simple additive approaches to financial literacy indices produce very similar results to more sophisticated weighted approaches (Behrman, Mitchell, Soo & Bravo, 2010:11).

Therefore for the purposes of this study each individual will have a score for the basic, sophisticated and total financial literacy questions calculated by summing the total correct answers of the individual. The scores will then be standardised using sample means and standard deviations to create three indices. The standardised index scores provide interval data.

The self-reported level of financial knowledge as well as highest education level provides ordinal data. The question regarding whether advice was sought create nominal categories.

4.3.3.4.3 Rational variables

The variables collected to determine the influence of consumption smoothing and liquidity constraints on preservation decisions provide the following type of data:

- Age (interval);
- Salary and net asset value (bands = ordinal) and ordinal data from the self-reported financial need questions;
- Relationship status (nominal)
- Reason for moving job (nominal) and
- Use of funds (nominal).

4.3.3.4.4 Other variables collected

The other variable collected in the questionnaire was categorised as follows:

- Amount of funds available when moving jobs (ordinal data).

4.3.3.5 Assumptions and limitations of logistic regression

The logistic regression method of analysis is very flexible as it does not require normal distributions of the predictor variables, nor does it require linear relationships or equal variances (Tabachnick & Fidell, 2001:517). However there are a number of assumptions and limitations to this model which need to be assessed (Field, 2012:273).

First, predictors must not be highly correlated as this distorts results and leads to high standard errors. Multicollinearity in this study was assessed by reviewing standard errors and where necessary assessing collinearity statistics such as the tolerance and VIF values and eigenvalues (Field, 2012:297). These issues, where relevant, are assessed in Chapter 5 and 6.

Second, sparseness of data needs to be assessed. In general as logistic regression makes use of Chi-squared distribution and tests, there should be no cells with frequencies less than one and no more than 20% of cells should have frequencies of less than five (Field, 2012:274). Therefore in this study cross tabs were used to assess cell frequency for all ordinal and nominal variables, based on this analysis certain categories were combined to eliminate low frequency cells. More detail regarding the specific changes made is contained in Chapter 5.

Third, while logistic regression does not require that there is a linear relationship between variables, it does require that all predictor variables that are entered as continuous variables (i.e. at an interval level) display a linear relationship with the log odds (or logit) of the dependant variable. If variables do not meet this requirement, they can still be used in the logistic regression, however they must be entered as categorical variables and dummy variables are required for each level of the variable. The resultant logistic regression model becomes more complex and difficult to interpret and the tests of the impact of the predictor variable are less powerful as a result of the inclusion of multiple parameters (for the dummy variables) rather than a single parameter (Agresti, 1996:191).

Ordinal data can therefore be input into logistic regression models as categorical data or interval data. However, in order to be used as interval data, it must meet the requirement for linearity of the logit. The combining of underlying ordinal categories is sometimes required in order to achieve linearity of the logit for ordinal variables (O'Connell & Amico, 2010:233).

There are a number of methods to assess linearity of the logit (Menard, 2010:108). For the purposes of this study, interval data was assessed using the Box-Tidwell test and ordinal data was assessed using a logit step test which graphically assessed whether the beta coefficients of the sub-categories of the ordinal variable followed a linear form. More information regarding the linearity of specific predictor variables is included in Chapter 5.

4.3.3.6 Other statistical procedures

In assessing relationships between various predictors a number of additional statistical tests were utilised. As the distributions of the majority of the variables used in this study did not meet the criteria of a normal distribution the tests utilised were non-parametric. Spearman's correlation coefficient (r_s) was used to assess associations between interval level data, while categorical data was assessed using Pearson's Chi-Square (χ^2). When the variables are a combination of interval and categorical data, the Kruskal-Wallis test (H) was used for multiple categories, supplemented by the Jonckheere-Terpstra test (J) for trends in the data, and the Mann-Whitney test (U) for variables that have only two categories (Field, 2012).

4.3.3.7 Sample size for logistic regression

There is no agreement on the correct approach to determining appropriate sample size for logistic regression (Demidenko, 2006:3394). There are a number of different approaches which are commonly adopted. One common approach suggested by Long (1997:54) requires

a minimum sample size of 100, with a rule of at least 10 observations for each parameter in the model, however, the complexity and specific data conditions might require larger samples. Based on the above, the sample size of 256 would be sufficient for a model that contained 25 predictors which is more than adequate for this study.

4.4 LIMITATIONS

As this is an exploratory study a convenience sample is used to allow for initial testing of the hypotheses. It is anticipated that the variability of sample constituents in terms of educational level, salary and other predictor variables of interest provides the necessary information to make an assessment of the validity of the proposed conceptual framework. Follow up studies will be required to allow generalisation to a broader population, however that is beyond the scope of this present study as it forms part of the validation and model testing phases of the Mitroff model (Mitroff *et al.*, 1974) which do not form part of this present study.

The questionnaire was only available in English as this allowed the use of previous reliability and validity tests of the CFC, BIS and Financial Literacy tests to be used as any translation may have undermined these instruments. However, as English is not necessarily the first language of many respondents, there may have been issues with understanding various questions and statements in the questionnaire.

In respect of the data analysis, the use of logistic regression emphasises prediction rather than causation. It is used to predict relationships between variables, but does not establish causation (Menard, 2010:4). Therefore the study establishes whether the predictor variables are associated with preservation decisions, however conclusions regarding causality are not be possible.

4.5 ETHICAL PROCEDURES

Approval from the Ethics Committee of the Faculty of Economic & Management Sciences was obtained prior to commencement of the empirical phase of the study. Approval was also obtained from the University of Pretoria to send the questionnaire to staff members, and to access the necessary staff records to construct the sample.

As personal information was requested in the survey, such as salary and net asset value, the anonymity of the respondents and confidentiality of their responses was a key concern in this study. For this reason, the questionnaires completed by each respondent did not contain information that could be used to identify them individually thereby assuring them of anonymity. In addition, all individual information received was kept confidential and

reporting only occurred at an aggregated level. Each respondent needed to provide informed consent and could stop participating in the study at any time.

4.6 CONCLUSION

The empirical phase of this study adopted an analytic survey approach where a questionnaire was designed to test the conceptual model developed in Chapter 3. The questionnaire was based on a combination of established psychometric tests and factual questions to measure the constructs of the conceptual model in light of actual preservation decisions made by individuals.

Data was collected from a sample of staff that had joined the University of Pretoria in the past five years. The data is analysed with logistic regression techniques to establish relationships between the predictor variables associated with bounded willpower, bounded rationality and rationality and preservation decisions made by the individual.

The following chapter (Chapter 5) presents the findings from the empirical study and contains the first part of the purposeful selection model building approach in that all predictor variables are assessed in terms of their standalone statistical significance as predictors of preservation. Chapter 6 provides an overview of the findings in terms of model building for this study. The findings from Chapter 5 and 6 are then analysed and discussed in Chapter 7.

CHAPTER 5 RESEARCH FINDINGS

5.1 INTRODUCTION

As discussed in Chapter 4, the purposeful selection approach to model building was used in this study. The first stage of this approach therefore focuses on bivariate relationships between variables and preservation decisions, and the second stage focuses on model building. In line with this, the research findings from this study are separated into two chapters. This chapter sets out the initial findings with regard to the bivariate relationships between each variable and the preservation decision, while Chapter 6 provides the findings of the logistic regression model building and hypothesis testing.

After an initial overview of the preservation decision and related information, this chapter provides information regarding the research findings for each category of predictor variables. Where relevant, an assessment of the reliability of the variable is undertaken. Thereafter an initial descriptive overview of responses is provided followed by a preliminary examination of the link between the variable and the preservation decision. Each variable is then assessed to determine its statistical significance as a standalone variable in a logistic regression equation linked to the preservation decision.

As the variables are assessed on a standalone basis with no controls or interactions with other variables, this analysis provides an unadjusted odds ratio which assists in preliminary evaluation of the role the variable plays in the preservation decision. Using existing theory to identify relevant associations, the relationship between the predictor and other variables is assessed to determine the extent to which the variable remains significant once other effects are controlled for. Chapter 6 then uses the variables and relationships identified in this chapter to build and compare various logistic regression models.

5.2 THE PRESERVATION DECISION

5.2.1 Categorising the outcome variable

As mentioned in Chapter 4, not all respondents had previously had to make a preservation decision. In the sample there were 27 individuals who indicated that this was their first job, while approximately 23% of individuals (95) indicated that they were not members of a pension or provident fund at their previous job. Table 5.1 illustrates the preservation decision of the respondents.

As per the coding discussed in Chapter 4, non-preservation of funds related to category one, while preservation of funds related to categories two, three and seven. Those respondents who were part of categories five, six, eight and nine could not be included in any further analysis as no preservation decision was made, or could be remembered, or the decision related to early retirement and not preservation as part of an ordinary job move (which was the focus of this study). In addition those who partially preserved (category four) could not be classified as either 100% preserved or 100% cash payout and were therefore excluded from this study. The sample of all those who made a valid preservation decision for the purposes of this study therefore amounted to 256 respondents.

Table 5.1: Preservation decision of respondents

	Frequency	Percent
1. Took full amount in cash	155	37.1
2. Moved full amount to new employer's pension/provident fund	32	7.7
3. Moved full amount to a preservation fund	64	15.3
4. Took some money in cash and moved the rest to new employer or into preservation fund	21	5.0
5. Could not take funds/Did not have access to funds	11	2.6
6. No pension / provident fund or first job	122	29.2
7. Left funds at previous employer's pension/provident fund	5	1.2
8. Can't remember	1	0.2
9. Early retirement	7	1.7
Total	418	100.0

Source: Survey instrument - SPSS output

Following the above classifications, the resultant split between individuals who preserved and did not preserve is shown in Table 5.2 indicating that the majority of respondents did not preserve their funds when moving jobs.

Table 5.2: Final classification of respondents who preserved versus those who did not

	Frequency	Percent
Preserved	101	39.5
Did not preserve	155	60.5
Total	256	100.0

Source: Survey instrument - SPSS output

Additional information collected regarding the preservation decision related to the use of funds and the amount of retirement funds available when the individual moved jobs. The responses to these questions are discussed in further detail below.

5.2.2 Use of funds

5.2.2.1 Descriptive analysis of use of funds

The respondents included in the analysis of use of funds totalled 155 which corresponded to those who had taken a full cash payout. As respondents were not restricted to only one answer, they could indicate a number of categories regarding use of funds, and for this reason there were 52 respondents who chose multiple uses (27 chose two uses; 18 chose three uses and 7 chose four uses) which accounts for the total of 239 reported uses of funds. As illustrated in Table 5.3, the most frequently reported use of funds was paying off short term debt, followed by the purchase of necessities and then the payment of long term debt.

Table 5.3: Uses of funds ranked highest to lowest

Uses of funds	Frequency	Percentage
Paid off short term debt (e.g. credit cards, store cards etc)	56	23.43%
Purchased necessities	42	17.57%
Paid off long term debt (e.g. home-loan)	27	11.30%
Invested in interest bearing account (e.g. money market, fixed deposit)	23	9.62%
Paid off medium term debt (e.g. car loan)	22	9.21%
Purchased a home	16	6.69%
Paid education expenses	15	6.28%
Purchased luxuries	12	5.02%
Started a business	7	2.93%
Invested in financial instruments (e.g. shares, unit trust, retail bonds)	6	2.51%
Renovated house	5	2.09%
Can't remember	5	2.09%
Purchased a new car	2	0.84%
Divorce needs	1	0.42%
TOTAL	239	100%

Source: Survey instrument - SPSS output

5.2.3 Amount of funds

5.2.3.1 Descriptive statistics and initial analysis of relationship with preservation decision

As set out in Table 5.4, 17.6% of respondents had amounts totalling less than R20,000, and at the other end of the scale 17.1% of respondents had amounts in excess of R500,000. The most common category was R100,000 – R500,000 which accounted for 32.2% of responses. There were 11 respondents who did not remember how much was available so they were excluded from the analysis of this variable.

Table 5.4: Amount of pension funds available at employer at the time of moving jobs

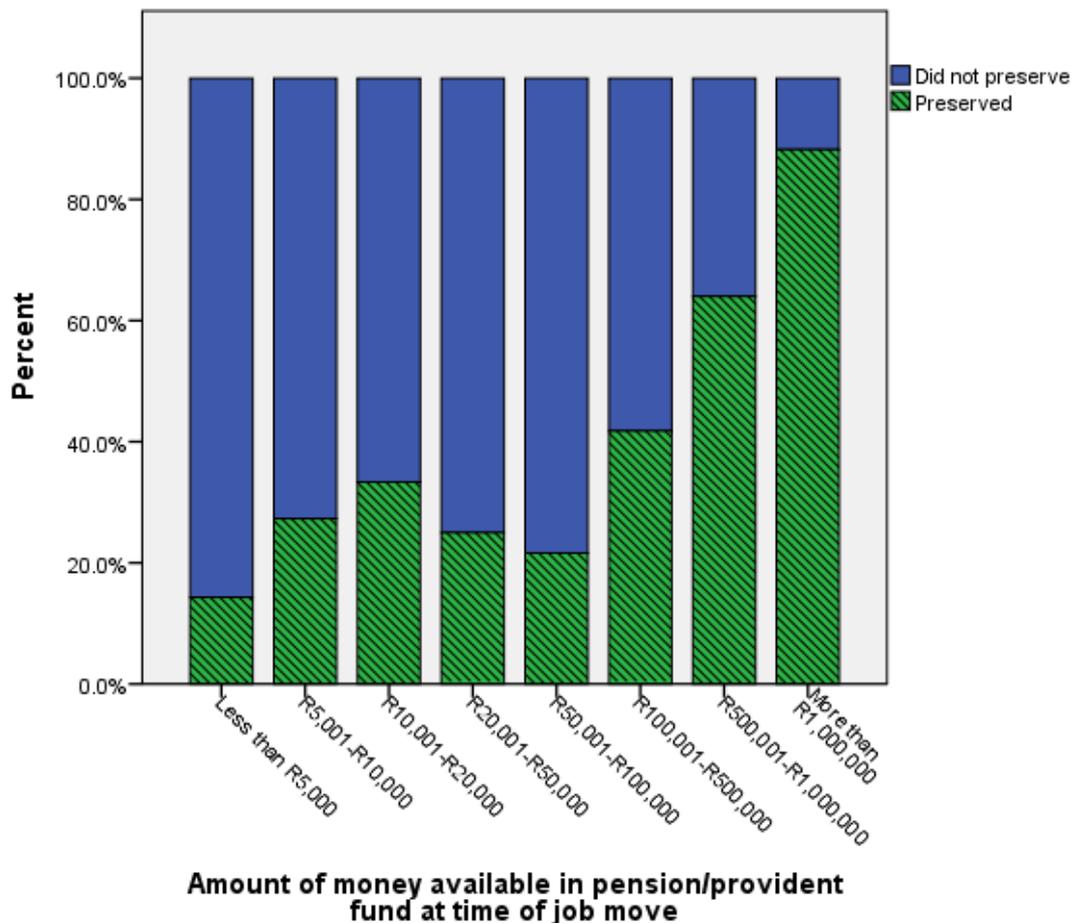
	Frequency	Percent	Cumulative Percent
Less than R5,000	14	5.7	5.7
R5,001-R10,000	11	4.5	10.2
R10,001-R20,000	18	7.3	17.6
R20,001-R50,000	44	18.0	35.5
R50,001-R100,000	37	15.1	50.6
R100,001-R500,000	79	32.2	82.9
R500,001-R1,000,000	25	10.2	93.1
More than R1,000,000	17	6.9	100.0
Total	245	100.0	

Source: SPSS output

As can be seen in Figure 5.1, the preservation of funds differed significantly depending on the amount of funds available. For amounts lower than R100,000 preservation levels of between 14% and 33% were observed. A closer analysis of amounts below R100,000 shows that small amounts of less than R5,000 were very unlikely to be preserved (85.7% took the amount in cash), amounts less than R50,000 are only preserved in about a quarter to a third of cases.

Average preservation levels increase to 42% for amounts above R100,000. The majority of respondents with amounts above R500,000 preserved their funds (64%), and very high preservation levels were seen above R1,000,000 where 88% of respondents preserved their funds. The differences between preservation levels across the various amounts of funds available was statistically significant ($\chi^2(7) = 37.123, p < 0.001$).

Figure 5.1: Relationship between amount of funds and preservation decision



Source: SPSS output

5.2.3.2 Nature of variable

As discussed in Chapter 4, the amount of funds is an ordinal variable. To see whether the variable could be used at an interval level in the logistic regression model, the linearity of the variable was assessed. In order to achieve linearity of the variable, the categories below R100,000 were combined, refer to Appendix C for further details regarding the revised classification.

5.2.3.3 Assessment of predictor variable as a standalone input

Tables 5.5 and 5.6 contain the evaluation of this variable as a standalone predictor of preservation. The statistical significance of the variable as a stand-alone input in the logistic regression equation revealed that the variable was significant (both Wald test and Likelihood ratio test) with an unadjusted odds ratio of 2.542 which indicates that when no other variables are assessed or controlled for, as the amount of funds increases from one bracket to the next (for example from below R100,000 to amounts totalling R100,000 – R500,000) the odds of

the person in the higher category preserving their funds is 2.542 times higher, this means that the odds of preserving are 154.2% $[(2.542 - 1) \times 100]$ more in the higher category than the lower category.

Table 5.5: Logistic regression: assessment of single variable test statistics

	Wald	Likelihood Ratio
Test statistic	29.920	36.145
Degrees of freedom	1	1
Significance	<0.001	<0.001

Source: SPSS output

Table 5.6: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Amount of funds	0.933	0.171	2.542	1.820	3.551

Source: SPSS output

5.2.3.4 Relationship with other factors

The amount of funds would be a function of an individual's salary and the length of time they worked at a particular company. Therefore it would be expected that those who earned higher salaries would have higher amounts, as would those who had worked longer at a particular company. While this study did not collect data regarding length of time at previous company, information regarding salary levels was collected. There was a statistically significant correlation between salary and amount of funds available ($r_s = .481$ p (one-tailed) < 0.001). It was also anticipated that age might be related to amount of funds, as those who were older were more likely to have had longer job tenure. Age at the time of job move was found to have a significant correlation with amount of funds ($r_s = .563$ p (one-tailed) < 0.001). However amount of funds remained a statistically significant predictor variable even after controlling for the impact of salary level and age.

5.2.3.5 Relationship between amount of funds available and use of funds

To conclude the analysis of amount of funds available, the various uses of funds for those who took a cash payout were related to amount of funds available to determine if uses varied depending on the amount of cash paid out to the individual. Table 5.7 contains an overview the use of funds categorised in terms of the amount of funds available. Categories for those with between R500,000 and R1,000,000 and those with funds in excess of R1,000,000 were combined for this analysis as there were only two individuals who took a cash payment when funds exceeded R1,000,000.

Table 5.7: Relationship between amount of funds available and use of funds

Use of funds	Amount of retirement funds available at time of job move			
	<R50,000	R50,001 – R100,000	R100,001 – R500,000	R500,000 +
Pay off long term debt	8.1%	8.0%	18.9%	8.7%
Pay off medium terms debt	3.5%	10.0%	14.9%	13.0%
Pay off short term debt	33.7%	18.0%	16.2%	17.4%
Buy necessities	24.4%	18.0%	9.5%	17.4%
Buy luxuries	5.8%	12.0%	1.4%	0.0%
Invest in interest bearing account	7.0%	14.0%	9.5%	8.7%
Invest in financial instrument	2.3%	4.0%	2.7%	0.0%
Purchased a home	2.3%	6.0%	8.1%	21.7%
Started a business	1.2%	2.0%	5.4%	4.3%
Paid education expenses	5.8%	6.0%	6.8%	4.3%
Other	1.2%	2.0%	5.4%	4.3%
Can't remember	4.7%	0.0%	1.4%	0.0%

Source: Survey instrument - SPSS output

As noted in section 5.2.2.1, multiple uses were provided therefore the above analysis is not reflective of one response per respondent, but rather the number of times that a particular use of fund was mentioned by respondents.

In general paying off debts, in particular short term debt, appears to be the most common use of funds. For amounts below R500,000 where there are low levels of preservation the most prevalent use of funds is to pay off debt or buy necessities. For amounts above R500,000 while paying off debts and purchasing necessities are still prevalent, purchasing a home becomes a more common use of funds.

5.3 PREDICTOR VARIABLES: BOUNDED WILLPOWER

5.3.1 Consideration of Future Consequences (CFC) scale

5.3.1.1 Assessment of reliability

The reliability of the CFC scale was assessed using Cronbach's alpha as well as by performing a factor analysis using principal component analysis.

The Cronbach's alpha scores are included in Table 5.8 and indicate high levels of reliability for both the total scale as well as the CFC immediate subscale and slightly lower, but still acceptable reliability for the CFC future subscale.

Table 5.8: Cronbach's alpha CFC scale and sub-scales

Scale	Cronbach's alpha
CFC Total	0.811
CFC Immediate subscale	0.817
CFC Future subscale	0.730

Source: SPSS output

A principal component analysis (PCA) of the 14 items in the CFC scale was carried out using oblique (oblimin) rotation due to the fact that the two subscales are negatively correlated (Costello & Osborne, 2005). The sampling adequacy was good with the Kaiser-Meyer-Olkin value equal to .826 (Kaiser, 1970) and correlations between items were sufficiently large to perform PCA (Bartlett's test of sphericity $\chi^2(91) = 1202, p < 0.001$). An initial analysis showed four components with eigenvalues in excess of one, however the scree plot's point of inflection was at the third data point which indicated that two factors should be retained (Cattell, 1966). As the eigenvalue extraction method may lead to over-extraction of factors

(Zwick & Velicer, 1986) particularly when individual communalities are less than 0.7, and average communalities are less than 0.6 (Field, 2012:641), which is the case in this study, and in light of the scree plot's inflection, two factors were extracted which explained 47.45% of the variance. Table 5.9 shows the factor loadings after rotation, factor loadings above 0.3 appear in bold.

Table 5.9: Pattern Matrix Factor Loadings of CFC scale items

	Component	
	1	2
Question 11	.812	-.093
Question 10	.755	-.126
Question 4	.731	-.119
Question 3	.727	-.228
Question 12	.726	.162
Question 9	.646	-.143
Question 5	.381	.327
Question 14	-.097	.729
Question 8	-.133	.703
Question 13	-.075	.688
Question 7	-.050	.603
Question 6	-.117	.594
Question 1	-.364	.519
Question 2	.174	.311

Source: SPSS output

All items loaded on their expected scale (component 1 factors all relate to the CFC Immediate subscale, and component 2 factors relate to the CFC Future subscale), with only

one factor with a cross loading in excess of 0.3. The results of the PCA in conjunction with the assessment of internal reliability provided by adequate Cronbach's alpha levels indicates that the CFC scale and its two sub-scales showed reliability for this data set and could be used in further analysis.

5.3.1.2 Descriptive statistics and initial analysis of relationship with preservation decision

Of the total sample of 256 respondents, 251 respondents answered all questions in the scale and were therefore included in the analysis of this predictor variable. Table 5.10 contains information about the mean scores and standard deviation of these respondents. The scale is measured as an average score out of five. In the CFC total scale, questions linked to immediate concerns are reverse coded, however in the CFC immediate subscale they are not reverse coded, therefore for the CFC total scale and CFC future subscale higher scores indicate higher levels of future orientation. The CFC immediate subscale shows higher scores for higher levels of present (immediate) orientation.

Table 5.10: Mean scores and standard deviations of CFC scale and subscales

	Scale	Mean	Standard Deviation
All valid responses (n = 251)	CFC Total	3.71	0.5749
	CFC Future	3.78	0.6143
	CFC Immediate	2.36	0.7855
Respondents who preserved funds (n = 100)	CFC Total	3.83	0.5254
	CFC Future	3.80	0.6046
	CFC Immediate	2.14	0.6623
Respondents who did not preserve funds (n = 151)	CFC Total	3.64	0.5943
	CFC Future	3.77	0.6223
	CFC Immediate	2.50	0.8289

(Survey instrument – SPSS output)

As can be seen from the Table 5.10 higher CFC total scores and lower CFC immediate scores were observed among those who preserved compared to those who did not preserve funds. CFC future scores were slightly higher for those who preserved funds.

The average CFC total scores of those who preserved (mean = 3.83) were significantly higher than those who did not preserve (mean = 3.64), $U = 6285$, $z = -2.249$, p (one-tailed) = 0.0125. The average CFC immediate subscale scores of those who preserved (mean = 2.14) were significantly lower than the scores of those who did not preserve (mean = 2.50), $U = 5809$, $z = -3.089$, p (one-tailed) = 0.001. The average CFC future subscale scores of those who preserved (mean = 3.80) were not significantly higher than the scores of those who did not preserve (mean = 3.77), $U = 7358$, $z = -0.342$, p (one-tailed) = 0.366.

5.3.1.3 Nature of variable

Using the Box-Tidwell test, all three scales were confirmed to be linearly related to the logit and were therefore treated as interval level variables in this study.

5.3.1.4 Assessment of the predictor variable as a standalone input

Table 5.11: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
CFC Total Scale	Test statistic	6.873	7.212
	Degrees of freedom	1	1
	Significance	= 0.009	= 0.007
CFC Future subscale	Test statistic	0.177	0.178
	Degrees of freedom	1	1
	Significance	0.674	0.673
CFC Immediate subscale	Test statistic	12.032	13.259
	Degrees of freedom	1	1
	Significance	= 0.001	<0.001

Source: SPSS output

The results in Table 5.11 show that, when assessing the impact of each of the three scales as standalone predictor variables in the logistic regression model, the CFC total scale and the CFC immediate subscale both make a significant contribution to the prediction as to whether someone preserves or does not preserve. However, the coefficient for the CFC future subscale is not significantly different from zero, and therefore does not assist in the prediction of the outcome variable.

Table 5.12: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
CFC Total subscale	0.622	0.017	1.862	1.170	2.963
CFC Future subscale	0.089	0.212	1.093	0.722	1.656
CFC Immediate subscale	-0.636	0.183	0.529	0.369	0.758

Source: SPSS output

As can be seen in Table 5.12, the CFC immediate subscale is negatively related to making a decision to preserve funds, as indicated by the negative beta coefficient, and the odds ratio below one. The odds ratio indicates that for every unit increase in the CFC immediate subscale average score, the odds of preserving decrease by 47.1% $[(0.529 - 1) \times 100]$. The CFC total subscale is positively related to taking a decision to preserve, in this case for every unit increase in the average score of the CFC total scale, an individual's odds of preserving increase by 86.2% $[(1.862 - 1) \times 100]$. The CFC future subscale is not significant using both the likelihood ratio and Wald test statistics, and the odds ratio confidence interval contains the value of 1.0 indicating that the beta coefficient would be zero in this instance and therefore does not contribute to predicting the outcome variable.

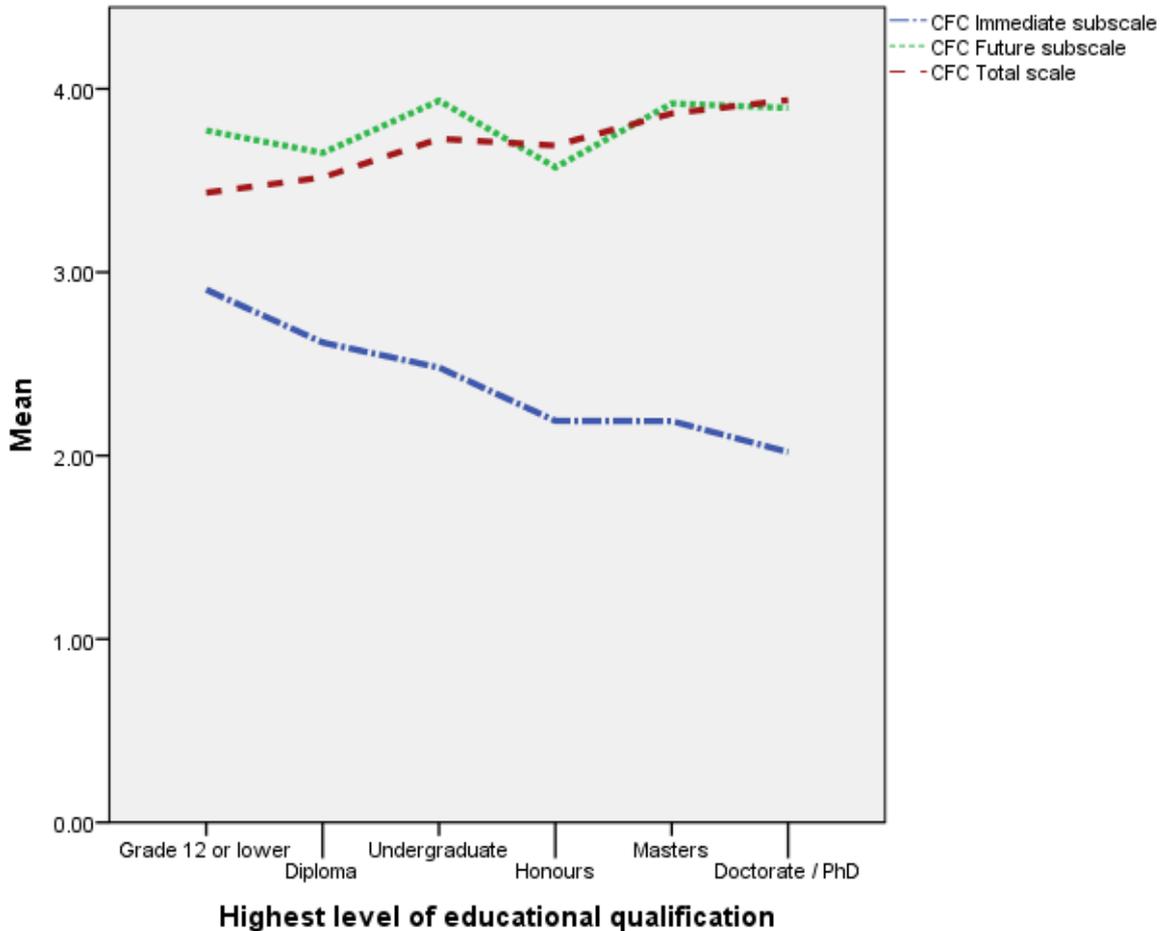
5.3.1.5 Relationship with other factors

As discussed in Chapter 3, time orientation has been linked to age and education. In this study, age shows a small, but statistically significant, negative correlation with the CFC immediate subscale ($r_s = -.128$ p (one-tailed) = .022). However the correlations between age and the CFC future subscale and the CFC total scale are not statistically significant. When age is controlled for, the CFC immediate subscale remains a significant predictor of preservation as does the CFC total scale.

In assessing the relationship between CFC scores and level of education, statistically significant differences are found in CFC immediate subscale scores across different levels of education ($H(5) = 26.337$, $p < 0.001$) as well as between the CFC total scale scores and different levels of education ($H(5) = 19.845$, $p = 0.001$). Jonckheere's test revealed a

significant trend in the data as higher education levels were associated with lower CFC immediate subscale scores ($J = 9560$, $z = -5.045$, $p < 0.001$), and higher CFC total scale scores ($J = 15576$, $z = 4.281$, $p < 0.001$). Figure 5.2 illustrates the relationship between education levels and CFC scores.

Figure 5.2: Relationship between education level and CFC scores



Source: SPSS output

However, when education level is controlled for, the CFC immediate subscale and the CFC total scale are no longer statistically significant predictor variables for preservation. In general, this would suggest that due to the moderate but significant relationship between CFC and education this results in a situation that when education is included in the model, CFC does not add enough to the predictive value of the model to be considered significant.

5.3.2 Barratt Impulsiveness Scale (BIS)

5.3.2.1 Assessment of reliability

The BIS scale provides both a total measure of impulsivity, and also has three subscales which provide insight into some underlying aspects being motor, non-planning and

attentional factors. However these three sub-factors are related and are seen as sub-factors to a more general measure of impulsivity (Miller, Joseph & Tudway, 2004:355) and in support of this, in the current study, each subscale has highly significant correlations with the total BIS score ($r_s > .80$, $p < 0.001$). In line with the approach adopted in previous exploratory studies which use the BIS scale as a measure of impulsivity (Ottaviani & Vandone, 2011:756) the full BIS scale will be used as the impulsivity variable for all statistical analysis. The BIS total scale showed high internal reliability with Cronbach's alpha = 0.838.

5.3.2.2 Descriptive statistics and initial analysis of relationship with preservation decision

In total 244 of the 256 respondents answered all questions in the scale and were therefore included in the analysis of this predictor variable. Table 5.13 contains information about the mean scores and standard deviation of these respondents. The scale is measured as a score between 30 and 120. In addition, as mentioned in Chapter 4, respondents can be categorised as exhibiting low (score below 52), normal (score from 52 – 71) or high (score in excess of 71) levels of impulsivity, Table 5.14 illustrates this categorisation. Alternatively, as illustrated in Table 5.15, a median split approach can be used to classify individuals as have high or low levels of impulsivity. In this sample the median score was 55, therefore those below this score were classified as displaying low levels of impulsivity and those scoring 55 and above were classified as displaying high levels of impulsivity.

Table 5.13: Mean scores and standard deviations of BIS Scale

	Mean	Standard Deviation
All valid responses (n = 244)	55.34	9.83
Respondents who preserved funds (n= 97)	53.00	9.03
Respondents who did not preserve funds (n = 147)	56.89	10.06

Source: Survey instrument - SPSS output

As can be seen from the Table 5.13, lower BIS total scores were observed among those who preserved compared to those who did not preserve funds. The BIS scores of those who preserved (mean = 53.00) was significantly lower than the scores of those who did not preserve (mean = 56.89), $U = 5449.5$, $z = -3.116$, p (one-tailed) = 0.001.

Table 5.14: Low, normal and high categorisation of respondents

	% with low score	% with normal score	% with high score
Respondents who preserved funds (n= 97)	49.5%	46.4%	4.1%
Respondents who did not preserve funds (n = 147)	29.9%	61.2%	8.8%

Source: Survey instrument - SPSS output

As illustrated in Table 5.14, when individuals were categorised as displaying high, medium and low levels of impulsivity differences in the percentage who were classified in each category were observed between those who preserved and did not preserve, these differences were found to be statistically significant $\chi^2(2) = 10.118, p = 0.006$.

Table 5.15: Median split categorisation of respondents

	% with low score	% with high score
Respondents who preserved funds (n= 97)	60.8%	39.2%
Respondents who did not preserve funds (n = 147)	42.2%	57.8%

Source: Survey instrument - SPSS output

When using a median split to categorise respondents there were again statistically significant differences between the percentages classified as having low or high impulsivity for those who preserved and those who did not preserve $\chi^2(1) = 8.129, p = 0.004$.

5.3.2.3 Nature of variable

Using the Box-Tidwell test, the BIS scale was confirmed to be linearly related to the logit and was therefore treated as an interval level variable in this study.

5.3.2.4 Assessment of the predictor variable as a standalone input

Each of the above methods to categorise individuals in terms of the BIS scale was assessed in terms of the individual impact in the logistic regression model. While all methods provided statistically significant prediction of the outcome variable, using both the likelihood ratio and Wald score to assess the variable's impact, the use of the BIS total score provided the best predictor variable and was therefore used in all further logistic regression analysis. As can be

seen in Table 5.16, both Wald and likelihood ratio test statistics confirm the statistical significance of the BIS score as a predictor of preservation.

Table 5.16: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
BIS Total Score	Test statistic	6.873	9.544
	Degrees of freedom	1	1
	Significance	= 0.009	= 0.002

Source: SPSS output

Table 5.17: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
BIS Total Score	-0.043	0.015	0.958	0.931	0.985

Source: SPSS output

Table 5.17 shows that the BIS total score is negatively related to the decision to preserve funds (negative beta coefficient and odds ratio below one). The unadjusted odds ratio can be interpreted as indicating that for every one unit increase in the overall BIS score, an individual's odds of preserving decrease by 4.2% $[(0.958 - 1) \times 100]$.

5.3.2.5 Relationship with other factors

As discussed in Chapter 3, impulsivity has been linked to age. In this study, age shows a small, but statistically significant, negative correlation with the BIS score ($r_s = -.155$ p (one-tailed) = .008).

In addition to assessing the relationship with age, given the findings in terms of the CFC scores, there could also potentially be a relationship between BIS scores and education level. Statistically significant differences were found between BIS score across various levels of education ($H(5) = 13.450$, $p = 0.02$). Jonckheere's test revealed a significant trend in the data as higher education levels were associated with lower BIS scores ($J = 10208$, $z = -3.064$, $p = 0.002$).

When age and education are controlled for, the BIS score remains a significant predictor of preservation.

5.3.3 Summary of findings: Bounded willpower

The CFC immediate subscale, CFC total scale and the BIS scores were found to be statistically significant predictor variables of preservation. These variables were also found to be related to age and education level.

5.4 PREDICTOR VARIABLES: BOUNDED RATIONALITY

5.4.1 Financial literacy scores

5.4.1.1 Assessment of reliability

In order to assess the nature of the underlying financial literacy questions, and to confirm the distinction between the basic financial literacy questions and the sophisticated financial literacy questions, a principal component analysis (PCA) of the 13 financial literacy questions was carried out using oblique (oblimin) rotation due to the fact that the two subscales are correlated (Costello & Osborne, 2005). The sampling adequacy was good, Kaiser-Meyer-Olkin = .798 (Kaiser, 1970) and correlations between items were sufficiently large to perform PCA (Bartlett's test of sphericity $\chi^2(78) = 465, p < .001$). An initial analysis showed three components with eigenvalues in excess of one, however the scree plot's point of inflection was at the third data point which indicated that two factors should be retained (Cattell, 1966). As the eigenvalue extraction method may lead to over-extraction of factors (Zwick & Velicer, 1986) particularly when individual communalities are less than 0.7, and average communalities are less than 0.6 (Field, 2012:641), which is the case in this study, and in light of the scree plot's inflection, two factors were extracted which explained 35.18% of the variance. Table 5.18 shows the factor loadings after rotation.

All items loaded on their expected scale (component 1 factors all relate to the sophisticated financial literacy questions, and component 2 factors relates to the basic financial literacy questions), with the exception of Question 5 (V80) which related to the concept of money illusion. Another study also found that the question relating to money illusion did not have a strong factor loading on either component (Bateman *et al.*, 2011), however in that study, the question was still included in the basic financial literacy index. For the purposes of this study, and in line with the approach adopted in a number of studies which make use of the basic and

sophisticated financial literacy index (Lusardi & Mitchell, 2009; van Rooij *et al.*, 2012; Van Rooij *et al.*, 2011) Question 5 was included as part of the basic financial literacy index.

Table 5.18: Pattern Matrix Factor Loadings of Financial Literacy items

	Component	
	1	2
V87 Highest volatility	.677	-.079
V81 Stock Market functioning	.622	.065
V88 Risk diversification	.566	-.094
V84 Safer company share versus unit trust	.529	-.121
V85 Riskier shares or bonds	.524	-.035
V86 Long period returns	.498	.098
V82 Unit trust knowledge	.458	-.068
V83 Interest rate bond price link	.446	.404
V80 Money illusion	.349	-.195
V76 Numeracy	.113	-.742
V77 Interest compounding	-.001	-.699
V79 Time value of money	.192	-.475
V78 Inflation	.390	-.432

Source: SPSS output

5.4.1.2 Descriptive statistics and initial analysis of relationship with preservation decision

All 256 respondents completed both the basic and sophisticated financial literacy part of the questionnaire and are therefore included in the analysis of this variable. Table 5.19 contains an overview of mean scores and standard deviations. For the total sample the average percentage score for the basic financial literacy questions (70.94%) was statistically significantly higher than for the sophisticated questions (50.58%) ($z = -9.739$, $p < 0.001$).

The average basic financial literacy percentage scores of those who preserved (mean = 74.85%) were significantly higher than those who did not preserve (mean = 68.39%), $U = 6610$, $z = -2.168$, p (one-tailed) = 0.015. The average sophisticated financial literacy percentage scores of those who preserved (mean = 55.2%) were significantly higher than the scores of those who did not preserve (mean = 47.74%), $U = 6439$, $z = -2.421$, p (one-tailed) = 0.0075. The average total financial literacy percentage scores of those who preserved (mean = 62.76%) were significantly higher than the scores of those who did not preserve (mean = 55.68%), $U = 6349$, $z = -2.565$, p (one-tailed) = 0.005.

Table 5.19: Mean and standard deviations of financial literacy percentage scores

	Basic financial literacy		Sophisticated financial literacy		Total financial literacy	
	Mean	Std dev	Mean	Std dev	Mean	Std dev
Total valid responses (n = 256)	70.94%	27.65	50.68%	25.69	58.47%	22.75
Preserved (n = 101)	74.85%	27.81	55.20%	26.47	62.76%	23.55
Did not preserve (n = 155)	68.39%	27.34	47.74%	24.82	55.68%	21.85

Source: Survey instrument - SPSS output

Table 5.20 illustrates percentage correct answers for each question. For the full sample, in general, higher scores were obtained for all the basic financial literacy questions compared to the sophisticated financial literacy questions, with the exception of Question 10. The easiest question was Question 1, relating to basic numeracy while the most difficult question was Question 8 which related to the impact of interest rates on bond prices.

For all the basic financial literacy questions, those who had preserved their funds obtained higher scores than those who had not preserved funds, except in the case of the money illusion question, where this was reversed. For the sophisticated financial literacy questions, again those who preserved had higher scores on all questions, except for the question regarding whether shares were riskier than bonds where the scores were reversed, and the question regarding the relationship between bond prices and interest rates where both group's scores were equal.

Table 5.20: All financial literacy questions: per cent correct by question

	Question	% correct (Total sample)	% correct (Preserved)	% correct (Did not preserve)
Basic Financial Literacy Questions	Numeracy (Q1)	84.8	86.1	83.8
	Interest compounding (Q2)	65.2	70.3	61.9
	Inflation (Q3)	69.9	82.2	61.9
	Time value of money (Q4)	68.8	71.3	67.1
	Money illusion (Q5)	66.0	64.4	67.1
Sophisticated Financial Literacy Questions	Stock Market function (Q6)	59.8	67.3	54.8
	Unit trust (Q7)	35.9	42.6	31.6
	Interest rate bond price (Q8)	16.8	16.8	16.8
	Safer share versus unit trust (Q9)	52.7	57.4	49.7
	Riskier shares or bonds (Q10)	67.6	67.3	67.7
	Long period returns (Q11)	37.1	43.6	32.9
	Highest volatility (Q12)	64.5	69.3	61.3
	Risk diversification (Q13)	71.1	77.2	67.1

Source: Survey instrument - SPSS output

Table 5.21 contains an overview of how many of the basic financial literacy questions each of the respondents answered correctly, 82% of respondents who preserved answered three or

more questions correctly with 38.6% answering all five correctly, while only 76.2% of those who did not preserve answered three or more questions correctly, with only 26.5% getting all questions correct.

Table 5.21: Responses to basic financial literacy questions categorised by preservation decision

No. of questions correct	0	1	2	3	4	5
Respondents who preserved	4.0%	5.0%	8.9%	15.8%	27.7%	38.6%
Respondents who did not preserve	3.2%	7.1%	13.5%	23.2%	26.5%	26.5%

Source: Survey instrument - SPSS output

Table 5.22 contains the same analysis for the sophisticated financial literacy questions. From a combined perspective, 68.4% of those who preserved answered four or more questions correctly. While only 54.1% of those who did not preserve answered four or more questions correctly. When compared with the basic questions, far fewer answered all sophisticated questions correctly (only 5% of those who preserved, and only 3.2% of those who did not preserve).

Table 5.22: Responses to sophisticated financial literacy questions categorised by preservation decision

No. of questions correct	0	1	2	3	4	5	6	7	8
Respondents who preserved	5.0%	7.9%	5.9%	12.9%	13.9%	20.8%	16.8%	11.9%	5.0%
Respondents who did not preserve	3.2%	11.0%	13.5%	18.1%	16.1%	14.8%	14.8%	5.2%	3.2%

Source: Survey instrument - SPSS output

As discussed in Chapter 4, the standardised scores of the basic, sophisticated and total financial literacy questions were used to create three financial literacy indices. High and significant levels of correlation were found between the total and sophisticated financial literacy indices ($r_s = .914$ p (one-tailed) $< .001$) and between the total financial literacy and basic financial literacy ($r_s = .769$ p (one-tailed) $< .001$) and lower, but still statistically significant levels of correlation were found between the sophisticated and basic financial literacy scores ($r_s = .460$ p (one-tailed) $< .001$).

5.4.1.3 Nature of variable

Using the Box-Tidwell test, all three of the financial literacy indices were confirmed to be linearly related to the logit and were therefore treated as interval level variables in this study.

5.4.1.4 Assessment of the predictor variable as a standalone input

As set out in Table 5.23, the total financial literacy index and the sophisticated financial literacy index are both statistically significant predictors as to whether someone preserves or does not preserve. However, using a 95% confidence interval, the coefficient for basic financial literacy index is not significantly different from zero, and therefore does not assist in the prediction of the outcome variable.

Table 5.23: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Total financial literacy standardised score	Test statistic	5.820	6.030
	Degrees of freedom	1	1
	Significance	p = 0.016	p = 0.014
Basic financial literacy standardised score	Test statistic	3.312	3.422
	Degrees of freedom	1	1
	Significance	p = 0.069	p = 0.064
Sophisticated financial literacy standardised score	Test statistic	5.091	5.221
	Degrees of freedom	1	1
	Significance	p = 0.024	p = 0.022

Source: SPSS output

Table 5.24: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Total financial literacy standardised score	0.109	0.045	1.115	1.021	1.218
Basic financial literacy standardised score	0.175	0.096	1.192	0.987	1.440
Sophisticated financial literacy standardised score	0.144	0.064	1.155	1.019	1.310

Source: SPSS output

As highlighted in Table 5.24, the total financial literacy score is positively related to making a decision to preserve funds. The odds ratio indicates that for every unit increase in the total financial literacy standardised score, the odds of preserving increase by 11.5%. The sophisticated financial literacy standardised score is also positively related to taking a decision to preserve, in this case for every unit increase in the standardised score of sophisticated financial literacy, an individual's odds of preserving increase by 15.5%. The basic financial literacy standardised score is not significant at the 5% level using both the likelihood ratio and Wald test statistics, and the odds ratio 95% confidence interval contains the value of 1.0 indicating that the beta coefficient would be zero in this instance and therefore does not contribute to predicting the outcome variable.

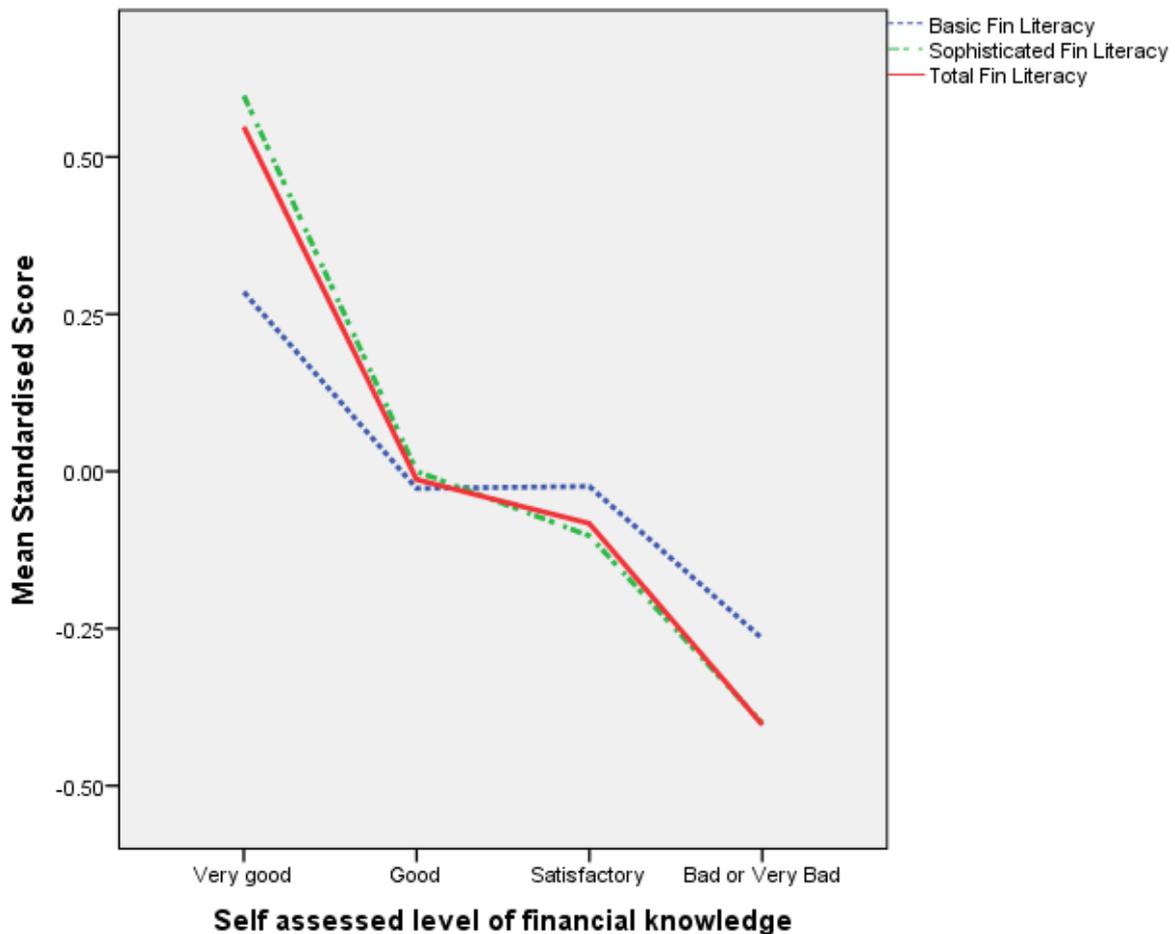
5.4.1.5 Relationship with other factors

As mentioned in Chapter 4, studies have found significant relationships between self-assessed measures of financial literacy and financial literacy test scores, and between levels of education and financial literacy test scores. The same relationships were found in this sample. There were statistically significant differences in financial literacy scores across the various levels of self-assessed financial literacy (Basic Financial Literacy $H(3) = 7.841$, $p = 0.05$;

Sophisticated Financial Literacy $H(3) = 17.052, p = 0.001$; Total Financial Literacy $H(3) = 17.057, p = 0.001$).

As illustrated in Figure 5.3 there was a large difference in scores (on all financial literacy indices) for those who considered their financial knowledge to be bad or very bad compared with those who considered their knowledge to be satisfactory. There was very little difference in the basic financial literacy test scores of those who rated themselves as having satisfactory or good levels of financial knowledge; however sophisticated test scores differed between these groups. There was a clear distinction on both basic and sophisticated financial literacy scores between those who believed they had very good financial knowledge and those who rated their knowledge as good.

Figure 5.3: Comparison of standardised financial literacy scores and self-assessed level of financial knowledge



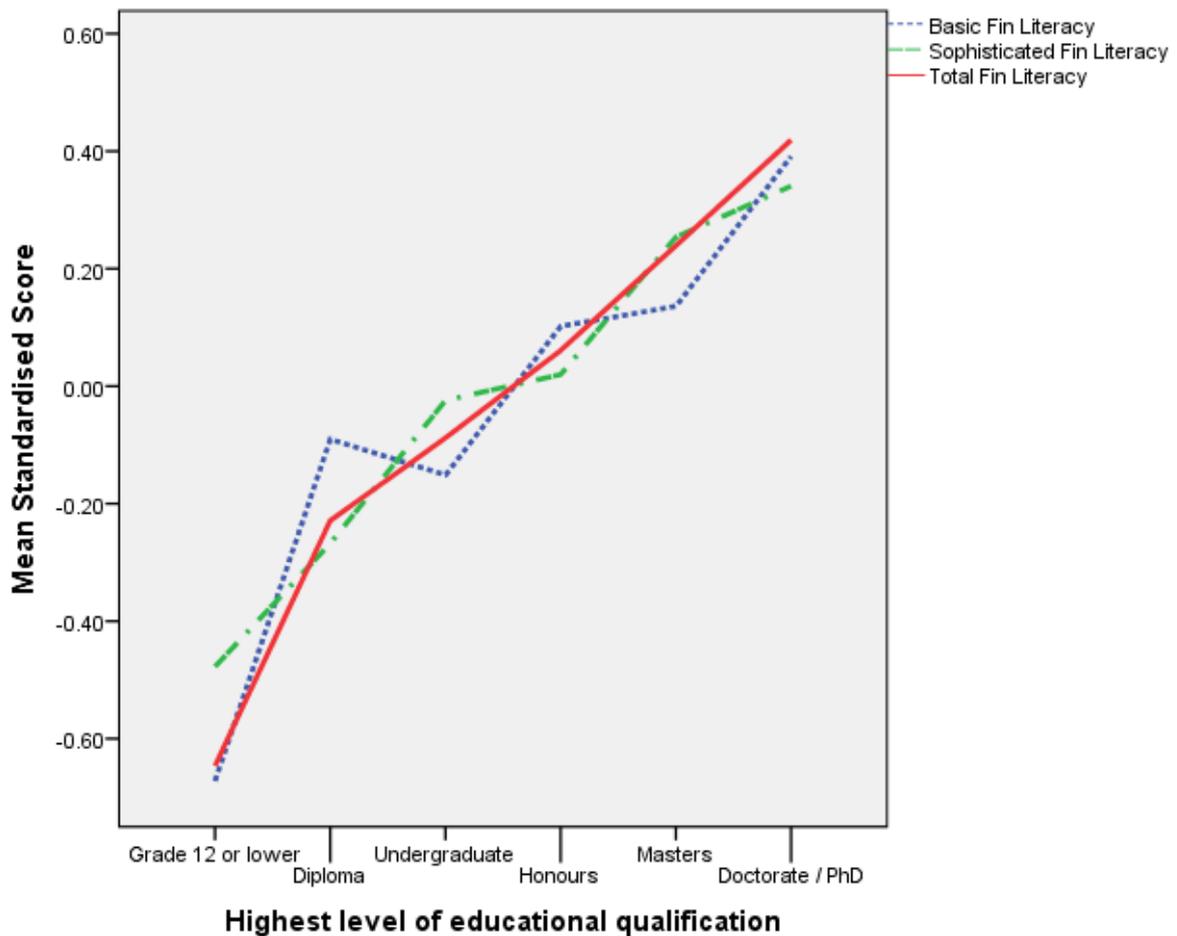
Source: SPSS output

There were also statistically significant differences in the standardised scores on the three financial literacy indices across various education levels (Basic Financial Literacy $H(5) =$

25.529, $p < 0.001$; Sophisticated Financial Literacy $H(5) = 18.225$, $p = 0.003$; Total Financial Literacy $H(5) = 25.658$, $p < 0.001$).

Total financial literacy scores showed a steady increase as educational qualification increased as illustrated in Figure 5.4. Basic financial literacy showed higher average scores for those who held diplomas versus those who held undergraduate degrees, and there was not much distinction between those with an honours or masters qualification. Sophisticated financial literacy scores increased across all educational qualification levels.

Figure 5.4: Comparison of standardised financial literacy scores and education level



Source: SPSS output

Age showed low but statistically significant correlations with total financial literacy ($r_s = .154$ p (one-tailed) = .007) and sophisticated financial literacy ($r_s = .137$ p (one-tailed) = .015). Correlations between age and basic financial literacy were low and not statistically significant.

When age and self-assessed level of financial knowledge are controlled for, total financial literacy remains a statistically significant predictor of preservation. However when education level is controlled for, financial literacy loses its statistical significance. In general, this would suggest that due to the moderate but significant relationship between financial literacy and education this results in a situation that when education is included in the model, financial literacy does not add enough to the predictive value of the model to be considered significant.

5.4.2 Self-assessed level of financial knowledge

Due to low frequencies of those reporting their financial knowledge level to be “very bad”, the categories for “bad” and “very bad” were combined to facilitate statistical analysis (refer to appendix C for details regarding coding). Just less than half of respondents in this sample indicated that their level of financial knowledge was “satisfactory”, with only a small minority (8.6%) indicating that they had bad or very bad levels of financial knowledge. As illustrated in Table 5.25 the self-assessed level of financial knowledge had very little impact on the preservation decisions of individuals. The differences between the categories were not statistically significant ($\chi^2(3) = 0.228, p = 0.973$).

Table 5.25: Self-assessment of level of financial knowledge compared with preservation decision

Self-assessed level of financial knowledge	Preservation Decision		Total
	Did not preserve	Preserved	
Very good	21	15	36
	58.3%	41.7%	14.1%
Good	50	30	80
	62.5%	37.5%	31.8%
Satisfactory	71	47	118
	60.2%	39.8%	46.1%
Bad or Very Bad	13	9	22
	59.1%	40.9%	8.6%
Total	155	101	256
	60.5%	39.5%	100%

Source: Survey instrument - SPSS output

The Wald statistic and the likelihood ratio statistic both confirmed that when self-reported level of financial knowledge was included as predictor variable in the logistic regression equation it did not provide any statistically significant predictive value regarding the preservation decision, as illustrated in Table 5.26 and Table 5.27.

Table 5.26: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Self-assessed financial knowledge	Test statistic	0.002	0.002
	Degrees of freedom	1	1
	Significance	p = 0.965	p = 0.965

Source: SPSS output

Table 5.27: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Self-assessed financial knowledge	0.007	0.153	1.007	0.747	1.358

Source: SPSS output

5.4.3 Education level

5.4.3.1 Descriptive statistics and initial analysis of relationship with preservation decision

A total of 254 respondents answered the question regarding highest level of educational qualification. Only one person reported having an education level of “some high school” so this response was combined with those who gave their education level as Grade 12. The sample in general displayed high levels of academic qualifications with more than half of the sample holding an honours degree and higher. Table 5.28 contains an overview of the level of education for the respondents in this study.

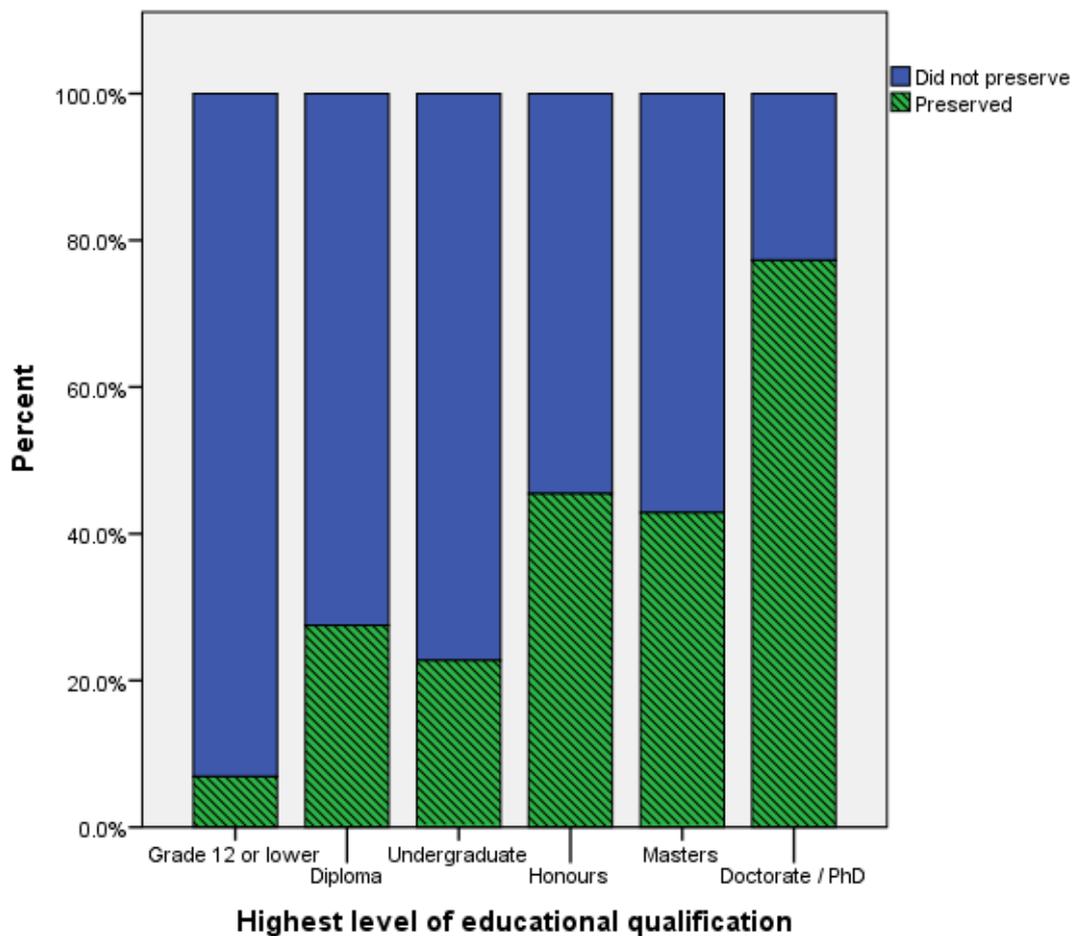
Table 5.28: Highest level of educational qualification

	Frequency	Percent	Cumulative Percent
Some high school	1	0.4	0.4
Grade 12 or lower	28	11.0	11.4
Diploma	40	15.7	27.2
Undergraduate	44	17.3	44.5
Honours	55	21.7	66.1
Masters	42	16.5	82.7
Doctorate / PhD	44	17.3	100.0
Total	254	100.0	

Source: Survey instrument - SPSS output

Figure 5.5 illustrates the large differences in preservation decisions across education levels. These differences were statistically significant ($\chi^2(5) = 47.827, p < 0.001$).

Figure 5.5: Preservation decision across various levels of education



Source: SPSS output

As little as 7% of those with an educational qualification of Grade 12 or lower preserved their funds, while at the other end of the spectrum, 77% of those with a doctorate preserved their funds. However, a much lower percentage of those who held masters and honours qualifications preserved funds (between 42% and 45%) with those holding diplomas and undergraduate degrees on average preserving between 23% and 28%.

5.4.3.2 Nature of variable

The educational categories were ordinal. In order to create a linear relationship with the logit, categories needed to be combined, the resultant classification is included in Appendix C. The adjusted categorisation was used for this variable in the logistic regression analysis.

5.4.3.3 Assessment of the predictor variable as a standalone input

As highlighted in Table 5.29, the education level of respondents was a highly significant predictor of whether an individual preserved funds or not, showing very high test statistics for both the Wald and likelihood ratio tests.

Table 5.29: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Highest educational qualification	Test statistic	39.146	50.073
	Degrees of freedom	1	1
	Significance	< 0.001	< 0.001

Source: SPSS output

Table 5.30: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Highest educational qualification	1.149	0.184	3.156	2.202	4.524

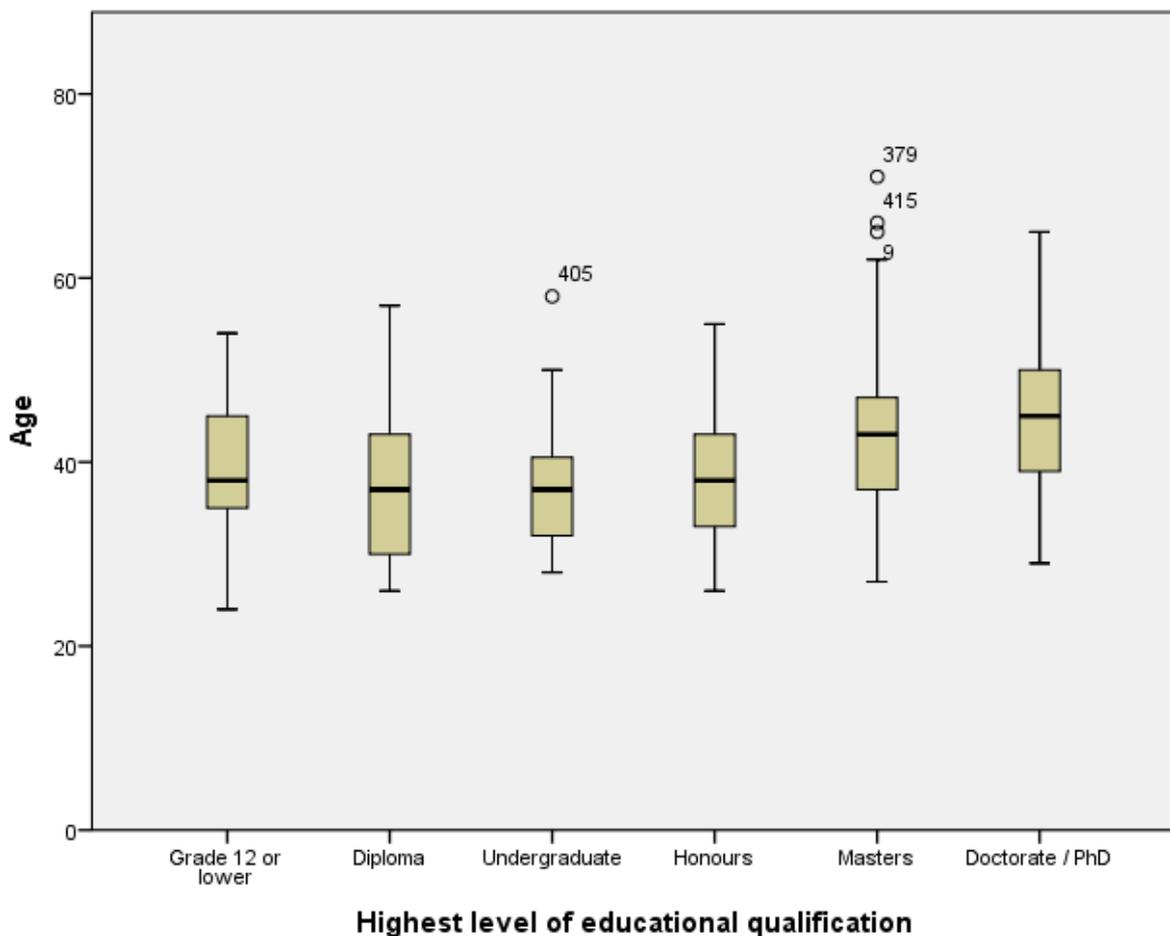
Source: SPSS output

When assessing the unadjusted odds ratio, Table 5.30 shows that for each increase in educational category (here represented by the revised categories discussed above) there is a 215.6% increase in the odds of preserving.

5.4.3.4 Relationship with other factors

Age would be expected to be related to educational level given the time taken to pursue various educational qualifications. There are statistically significant differences in age across various education levels ($H(5) = 26.69, p < 0.001$). The box plot in Figure 5.6 illustrates that the mean age of those who hold postgraduate qualifications shows an upward trend, however there are a range of ages for each educational qualification, and those holding the lowest level of educational qualification had higher average ages than those with diplomas and undergraduate degrees.

Figure 5.6: Relationship between age and educational qualification

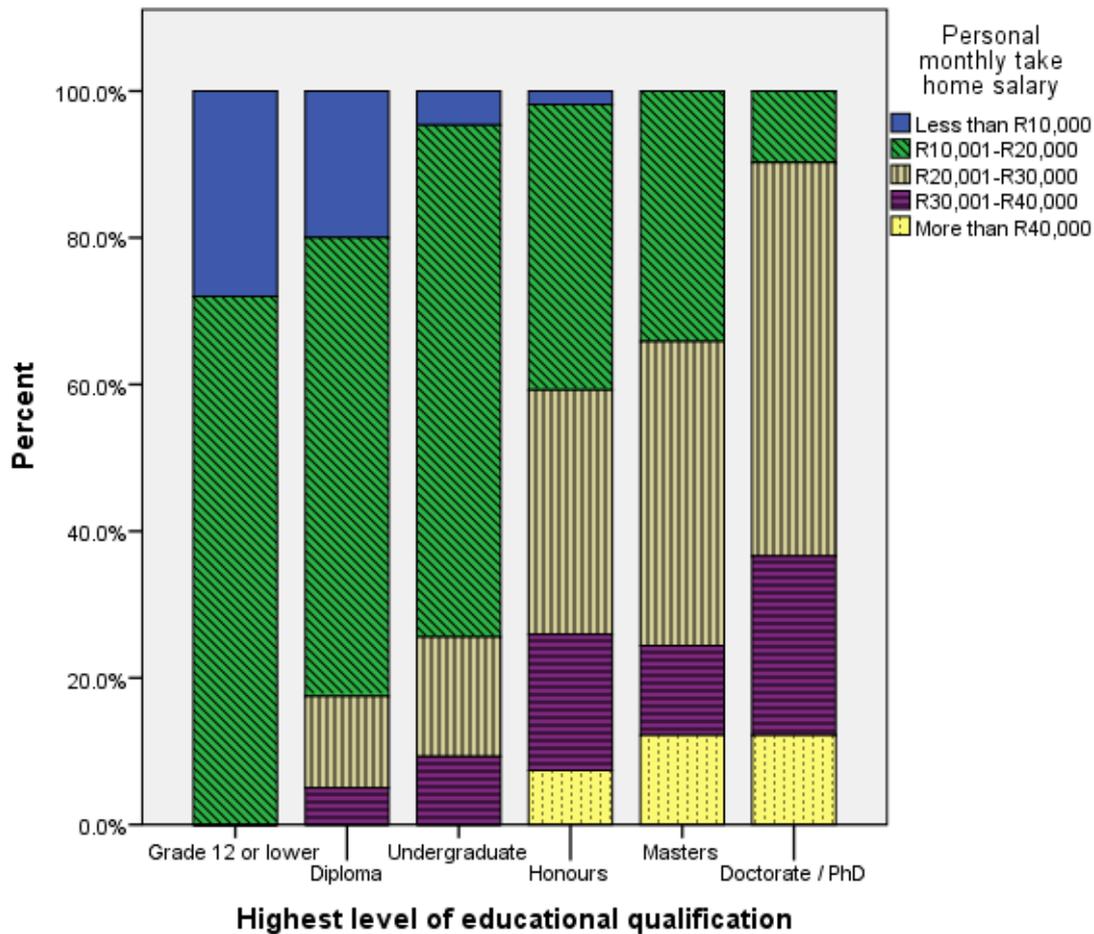


Source: SPSS output

Salary would also be expected to be linked to educational qualification, and this is observed in this sample, with statistically significant differences found between salary level and level of education ($\chi^2(20) = 105.534, p < 0.001$). Figure 5.7 illustrates that higher salaries are associated with higher educational qualifications, however, there are a range of salaries earned at each educational level, with the main distinction being that those who hold postgraduate qualifications are the only ones to earn in excess of R40,000 per month.

Despite these relationships, when age and personal salary levels are entered as control variables in the logistic regression model, education still remains a statistically significant predictor of preservation.

Figure 5.7: Relationship between salary and educational qualification



Source: SPSS output

5.4.4 Advice followed regarding preservation decision

5.4.4.1 Descriptive statistics and initial analysis of relationship with preservation decision

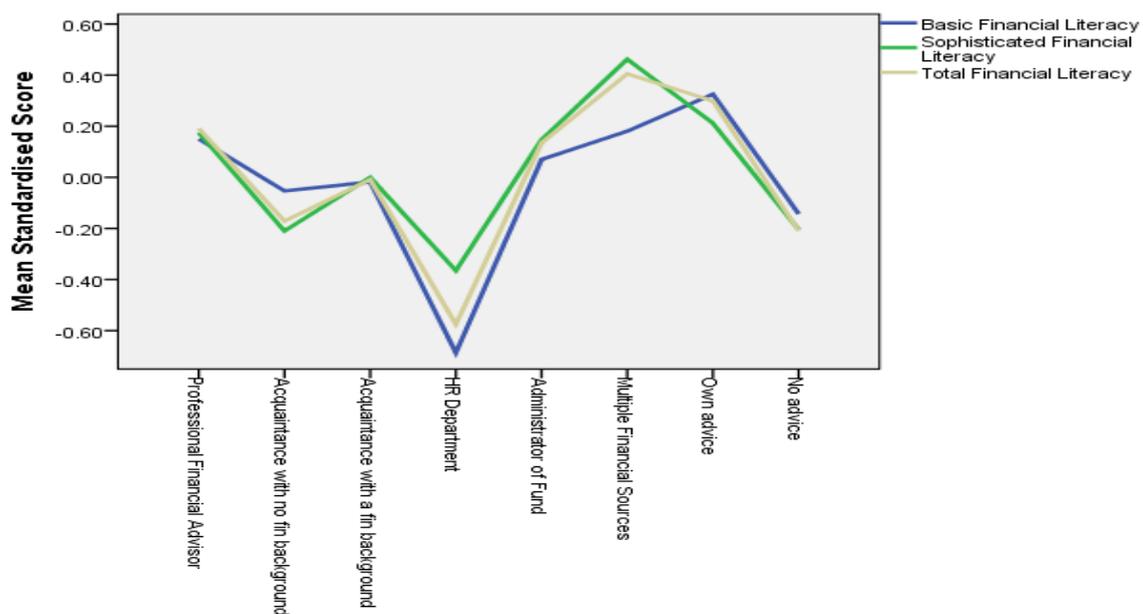
Table 5.31 highlights that 66% of respondents followed outside advice, 13% used their own advice and 21% followed no advice. If a distinction is made between following advice from someone with a financial background or knowledge of the preservation decision, then almost 60% of respondents followed this type of advice. If only professional advice is considered, i.e. from a financial advisor, HR department or administrator of fund, then this drops to 40%.

Table 5.31: Categories of advice: frequencies and percentages

	Frequency	Percent	Cumulative Percent
Professional Financial Advisor	66	25.8	25.8
Acquaintance with no financial background	21	8.2	34.0
Acquaintance with a financial background	40	15.6	49.6
HR Department	20	7.8	57.4
Administrator of Fund	17	6.6	64.1
Multiple Sources	5	2.0	66.0
Own advice	33	12.9	78.9
No advice	54	21.1	100.0
Total	256	100.0	

Source: Survey instrument - SPSS output

Figure 5.8: Comparison of financial literacy scores and advice followed

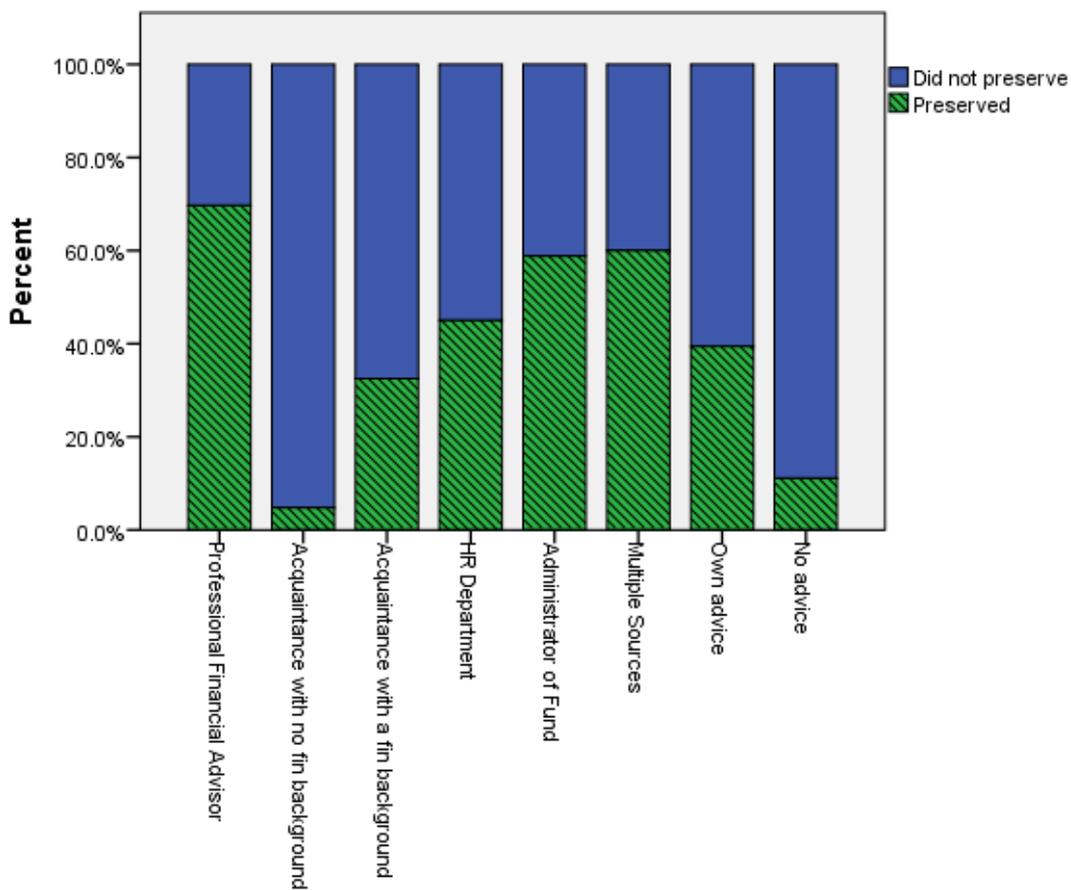


Source: SPSS output

When comparing the financial literacy levels of those who followed advice, Figure 5.8 illustrates that those with very low financial literacy scores in general received advice from the HR department of a company, while those who made use of their own advice generally had higher levels of financial literacy. Those who followed advice from a professional financial advisor had slightly better financial literacy scores. Those who did not ask for advice had lower financial literacy scores.

Figure 5.9 illustrates the different preservation decisions that were made based on the advice followed regarding these decisions.

Figure 5.9: Relationship between advice followed and preservation decision



Source: SPSS output

Those who had no advice, or took the advice of an acquaintance with no financial background or followed their own advice were far less likely to preserve their funds. Even following the advice of an acquaintance with a financial background resulted in low preservation levels. Much higher preservation was observed when professional advice was followed from either a financial advisor or the administrator of the fund, or the HR

department, or when a person consulted multiple sources (in all cases this included the advice of a professional financial advisor).

5.4.4.2 Nature of variable

As described in Chapter 4, advice is a nominal variable which was initially categorised into two main categories (following advice from professionals or someone with a financial background as one category and all other advice or following no advice as the other category). However in light of the above it would appear that another distinction should be drawn between professional advice and all other or no advice. Therefore an additional variable was created to distinguish between advice from a professional financial advisor, the administrator of the fund and the HR department, versus all other advice. Both categorisations are reviewed from the context of their significance as predictors in the logistic regression model.

5.4.4.3 Assessment of the predictor variable as a standalone input

As shown in Table 5.32, both categorisations of advice resulted in highly significant predictors in the logistic regression model.

Table 5.32: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
All financial advice.	Test statistic	31.516	36.070
	Degrees of freedom	1	1
	Significance	< 0.001	< 0.001
All professional advice.	Test statistic	40.214	43.967
	Degrees of freedom	1	1
	Significance	< 0.001	< 0.001

Source: SPSS output

Table 5.33 shows that, in terms of the odds ratio, the odds of someone who followed any professional or financial advice preserving funds were 431.9% higher than for someone who did not follow this type of advice. The odds of someone who followed professional advice preserving their funds were 492% higher than for someone who did not follow professional advice.

Table 5.33: Logistic regression: assessment of single variable beta coefficient and odds ratio

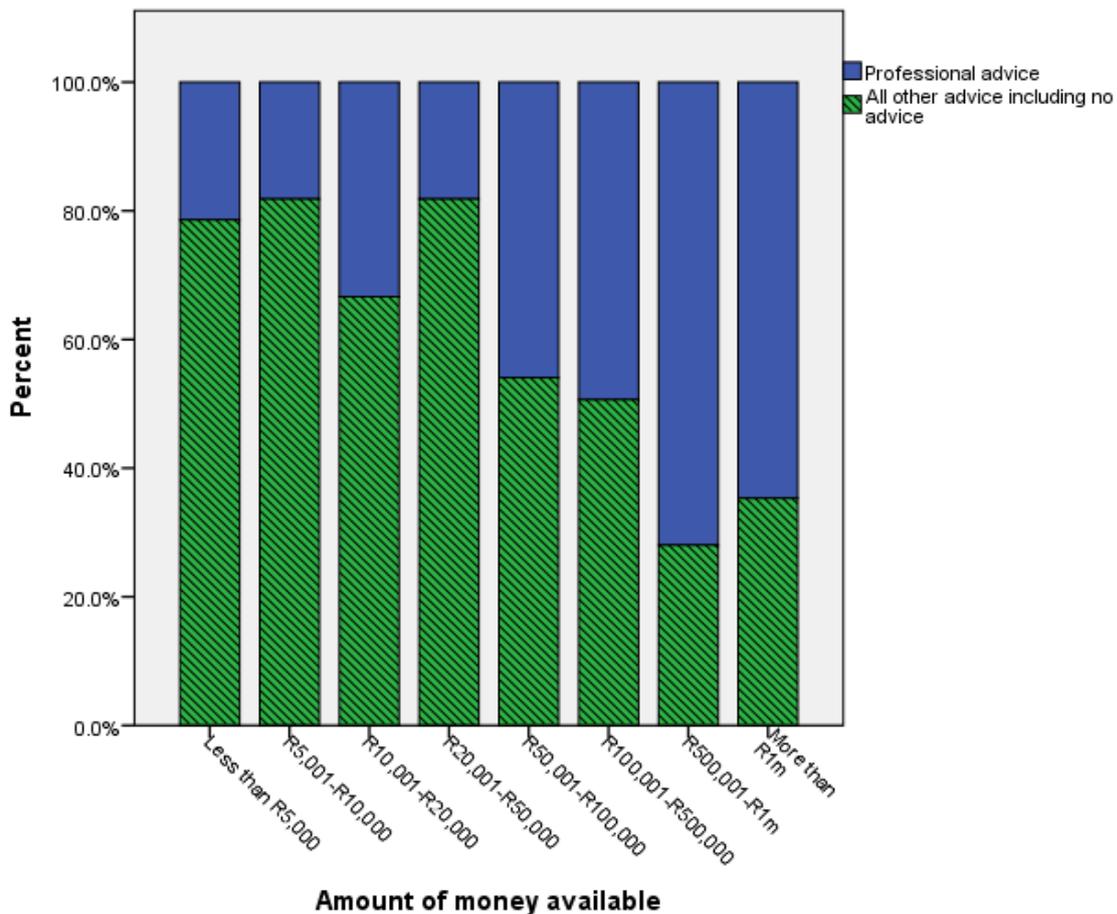
Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
All financial advice	1.671	0.298	5.319	2.968	9.534
All professional advice	1.779	0.281	5.924	3.418	10.267

Source: SPSS output

5.4.4.4 Relationship with other factors

In general it would be assumed that those with higher amounts of retirement funds available when they moved jobs might be more likely to follow professional advice.

Figure 5.10: Relationship between advice followed and amount of funds available

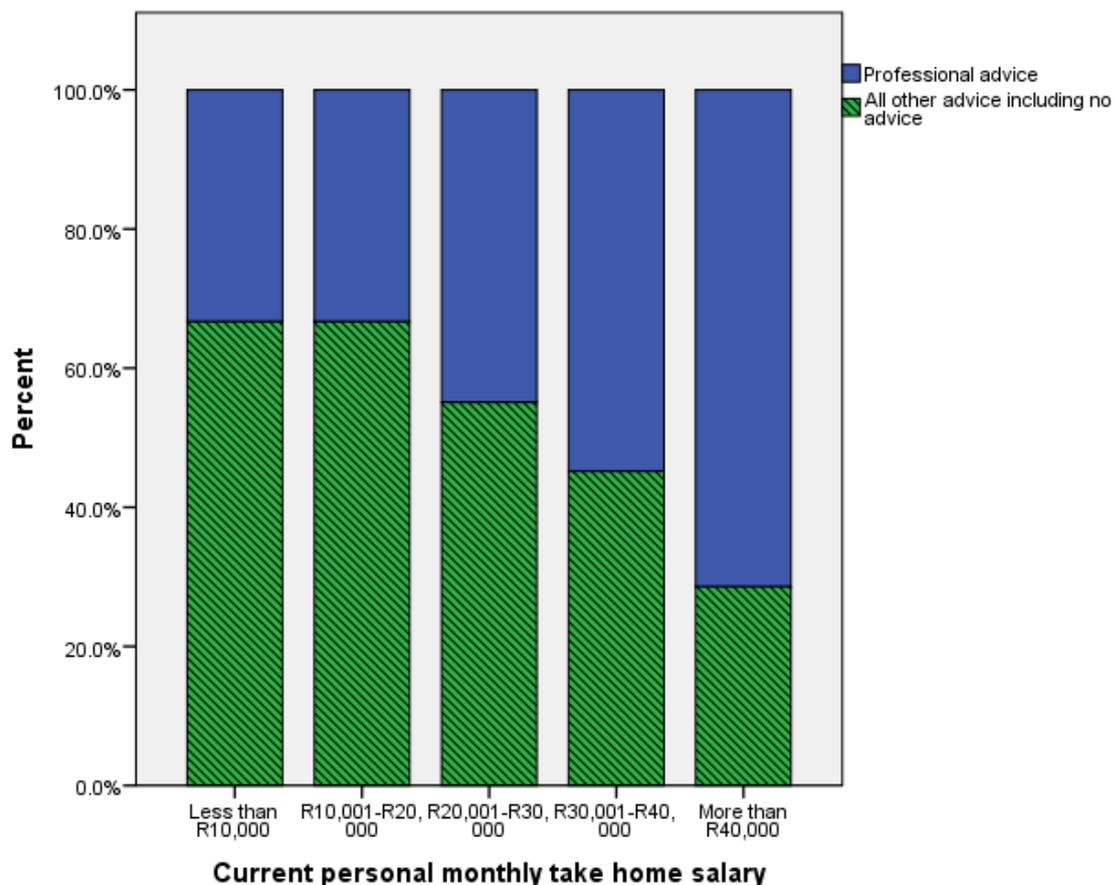


Source: SPSS output

Supporting this assumption, statistically significant differences were found between amounts available and following financial ($\chi^2(7) = 19,867, p < 0.006$) or professional advice ($\chi^2(7) = 30.519, p < 0.001$). Figure 5.10 illustrates the increasing number of respondents who followed financial advice as the amount of funds available increased. However, it is noted that professional financial advice was followed for all levels of amounts available, indicating that not only those with large amounts consulted professional sources for advice regarding what to do with their funds. Controlling for the effect of amount of funds available, following professional advice remained a highly significant predictor of preservation.

It would also be assumed that those earning higher salaries may be more likely to follow professional advice. Again this assumption is supported in that there are significant differences between salary levels and professional advice followed ($\chi^2(4) = 11.400, p = 0.022$).

Figure 5.11: Relationship between advice followed and personal salary



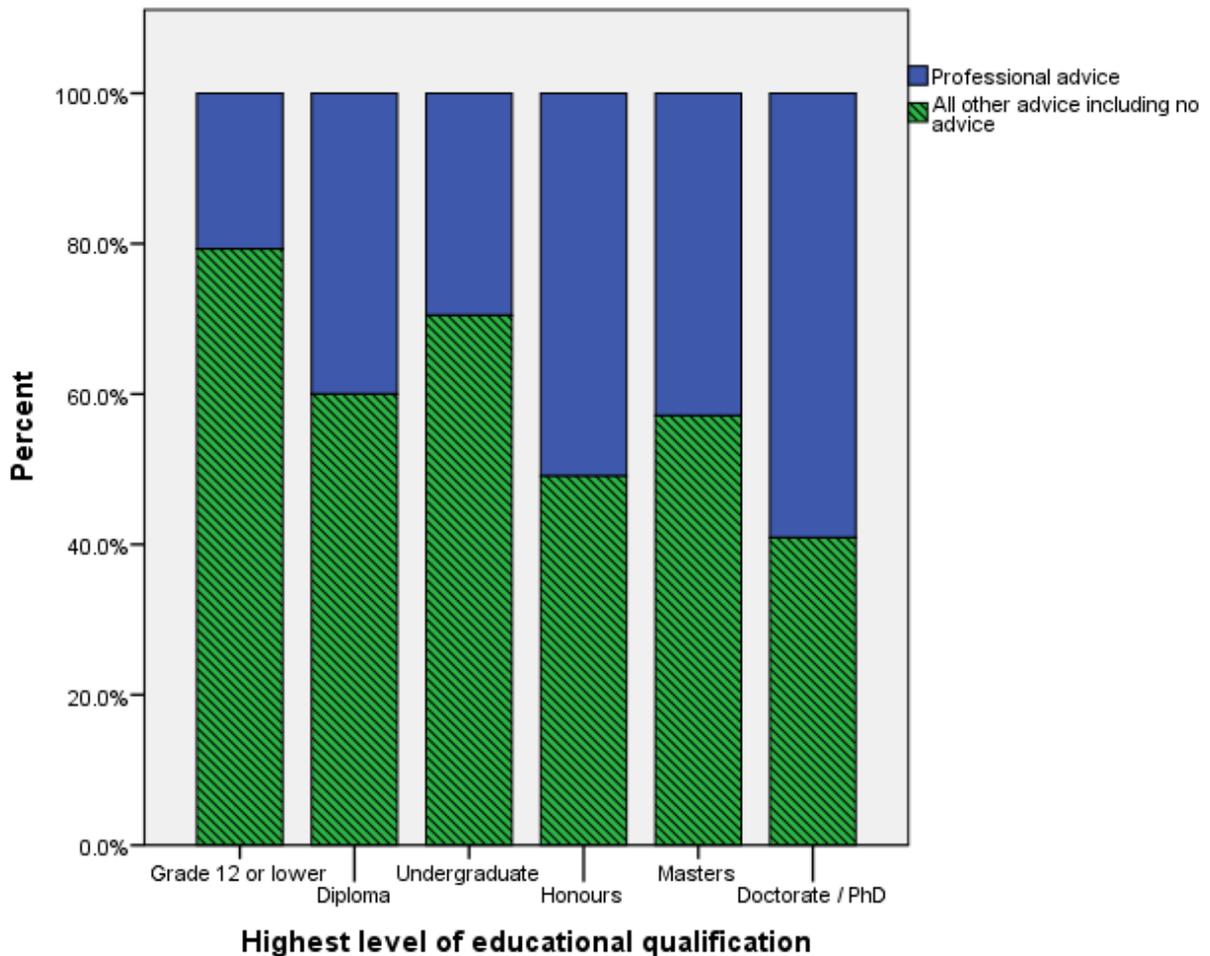
Source: SPSS output

Figure 5.11 illustrates the trend to follow professional advice at higher salary levels. Once again, it should be noted that following professional advice was not limited to higher salary

categories, and those earning lower salaries also followed advice of this nature. Once again controlling for salary levels, professional advice remains a highly significant predictor of preservation.

Relating whether someone followed financial advice and education levels, statistically significant differences were seen between education levels and whether professional advice was followed ($\chi^2(5) = 15.340$ $p = 0.009$). As illustrated in Figure 5.12, in general those with lower education levels were less likely to follow professional advice, however advice followed from a professional was still a statistically significant predictor of preservation even after controlling for education level.

Figure 5.12: Advice followed compared to education level



Source: SPSS output

5.4.5 Summary of findings: Bounded rationality

As standalone variables, both sophisticated and total financial literacy scores were statistically significant predictors of preservation. Education level as well as whether an

individual followed advice from a professional were also statistically significant predictors of preservation on a standalone basis.

Age, education and self-assessed levels of financial knowledge were all related to financial literacy scores. Age and salary levels were related to education. In addition salary levels, education and amount of funds available at the time of job move were related to advice followed.

5.5 PREDICTOR VARIABLES: RATIONAL FACTORS

5.5.1 Age

5.5.1.1 Descriptive statistics and initial analysis of relationship with preservation decision

In this study respondents were asked to provide their current age. In addition, information was collected regarding how long ago they had moved jobs to allow an estimation to be made regarding age at the time the respondent moved jobs. In total 254 respondents provided information regarding their age and 253 provided information regarding both their age and how long ago they had moved jobs. As shown in Table 5.34, the current mean age of the population was 40, and the estimated mean age when the respondents moved jobs was 37.

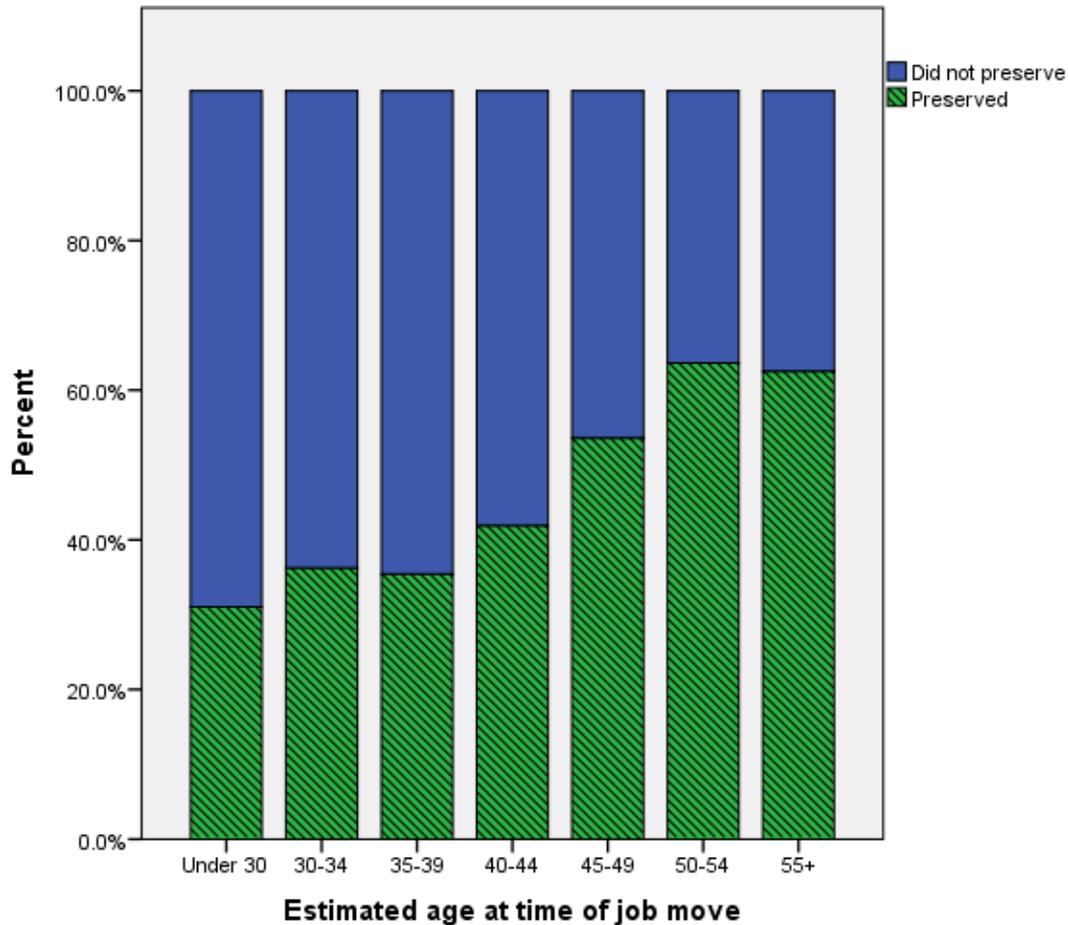
Table 5.34: Descriptive statistics of age

	Current age (n = 254)	Estimated age at time of job move (n = 253)
Mean	40.19	36.80
Standard deviation	8.656	8.387
Youngest	24	21
Oldest	71	66

Source: Survey instrument - SPSS output

Age brackets were used in order to assess the pattern of preservation across various ages; in Figure 5.13 the estimated age at time of job move is used. As there were very few respondents aged below 25 and above 60, combined categories were created for those with ages less than 30 and above 55 to facilitate statistical analysis (refer to appendix C for coding details).

Figure 5.13: Relationship between estimated age at time of job move and preservation decision



Source: SPSS output

As illustrated in Figure 5.13, there is a trend to higher levels of preservation as age increases. While the differences in preservation between the above mentioned age brackets are not statistically significant, the mean age of those who preserved (38.78) is statistically significantly different from the mean age of those who did not preserve (35.49) ($U = 5938$, $z = -3.052$, $p = 0.002$).

5.5.1.2 Nature of variable

Age is an interval variable. For the purpose of the logistic regression analysis age in years, and not the abovementioned age brackets, was used. The Box-Tidwell test confirmed that age was linearly related to the logit.

5.5.1.3 Assessment of the predictor variable as a standalone input

Table 5.35 shows that both actual age and estimated age at the time of job move are statistically significant predictors of preservation. As illustrated in Table 5.36, in both cases the odds of preserving increase with age, with every one year increase in age, the odds of preserving increase by just less than 5%.

Table 5.35: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Age	Test statistic	8.113	8.436
	Degrees of freedom	1	1
	Significance	p = 0.004	p = 0.004
Estimated age at time of job move	Test statistic	9.048	9.430
	Degrees of freedom	1	1
	Significance	p = 0.003	p = 0.002

Source: SPSS output

Table 5.36: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Age	0.044	0.015	1.045	1.014	1.076
Estimated age at time of job move	0.048	0.016	1.049	1.017	1.082

Source: SPSS output

Using the estimated age at the time of job move appears to provide a slightly better predictor variable and provides a more accurate assessment of age at the time that the preservation decision was made; therefore this variable was used as the age predictor variable in the model building process.

5.5.1.4 Relationship with other factors

Age could potentially have a relationship with salary level and net asset value as these would both generally increase with age. It was found that there were statistically significant differences between ages across the personal salary brackets, $H(4) = 31.683$, $p < 0.001$, as well as between ages across the NAV brackets, $H(6) = 36.778$, $p < 0.001$. In addition, as previously discussed in section 5.4.3.4, ages across educational brackets were statistically significantly different. When controlling for salary, NAV or education, age is no longer a statistically significant predictor of preservation.

As discussed in Chapter 3, age is thought to be related to both CFC and BIS scores. As mentioned in section 5.3.1.5 and 5.3.2.5 age showed low but statistically significant correlations with the CFC immediate subscale and the BIS score. However, age remained a statistically significant predictor of preservation once CFC and BIS were controlled for.

5.5.2 Salary and net asset value

In the questionnaire information was collected regarding personal salary levels, household salary levels and household net asset value. In the initial analysis of responses it was noted that household salary was misinterpreted in a number of cases as the bracket selected was less than the personal income bracket (30 respondents). In addition, a number of respondents answered “do not know” (14 respondents) or left this question out (10 respondents). This left a sample of only 202 to include in any analysis which used household salary as a variable.

There were also statistically significant levels of correlation between personal salary and household salary ($r_s = 0.733$, $p < 0.001$) which required the elimination of one of the measures from the logistic regression modelling process as using the two correlated variables in the logistic regression equation eliminated statistical significance of both variables. As there were other variables which were included that collected information about household financial status (household NAV) as well as self-assessments of financial situation, it was decided to exclude household salary as a variable and rather use personal salary.

5.5.2.1 Descriptive statistics and initial analysis of relationship with preservation decision

A total of 250 respondents answered the question regarding personal take-home salary, however four of these respondents provided a response of “do not know” and therefore the analysis of this variable could only be carried out for 246 respondents. Table 5.37 provides an overview of responses. Only a small minority of respondents earned less than R10,000 and

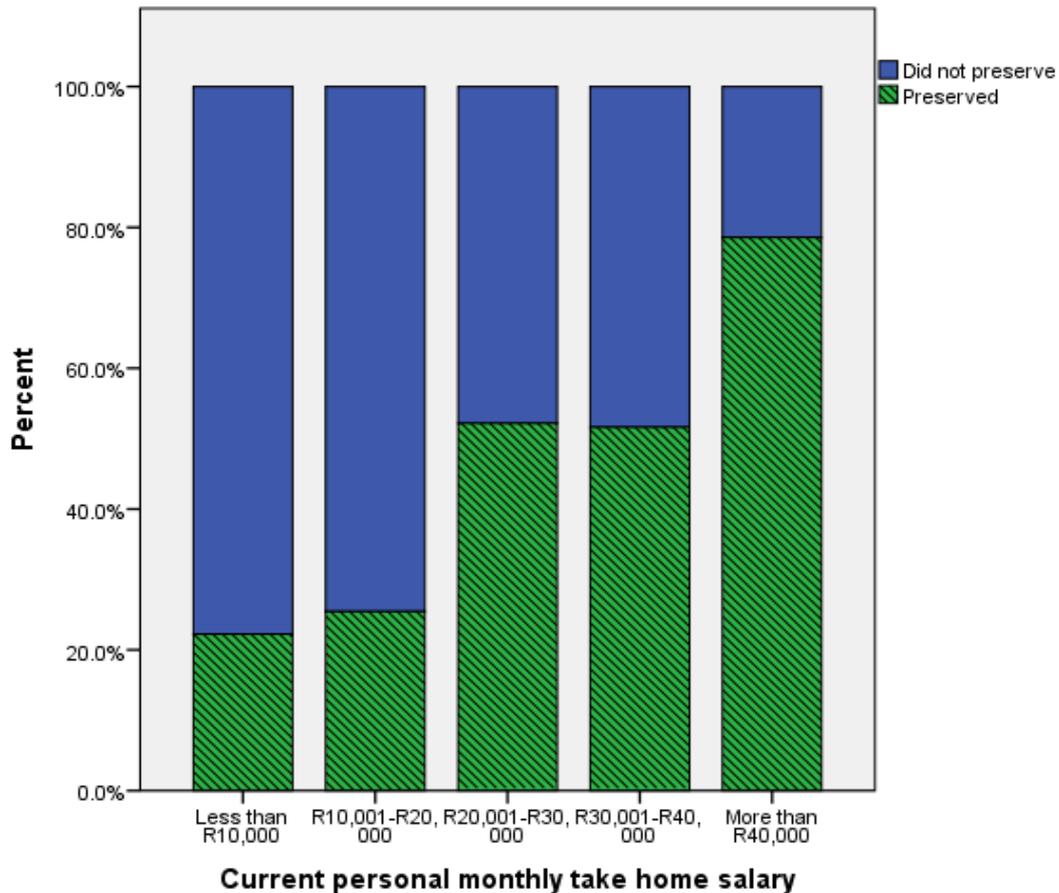
more than R40,000 therefore the categories below R10,000 were combined and those above R40,000 were also combined to facilitate further statistical analysis (refer to Appendix C for further detail). Approximately half of the respondents earned salaries less than R20,000, with only a small minority (6%) earning above R40,000.

Table 5.37: Descriptive statistics personal take-home salary

	Frequency	Percent	Cumulative Percent
Less than R5,000	2	.8	.8
R5,001-R10,000	16	6.4	7.2
R10,001-R20,000	114	45.6	52.8
R20,001-R30,000	69	27.6	80.4
R30,001-R40,000	31	12.4	92.8
R40,001-R50,000	8	3.2	96.0
More than R50,000	6	2.4	98.4
Do not know	4	1.6	100.0
Total	250	100.0	

Source: Survey instrument - SPSS output

Figure 5.14: Relationship between salary levels and preservation



Source: SPSS output

As illustrated in Figure 5.14, there were statistically significant differences regarding the preservation decision across various salary levels ($\chi^2(4) = 27.258, p < 0.001$). It should be noted that these salary levels reflect current salary, and not the salary the individual was earning at the time they made the preservation decision. However this was controlled for in the logistic regression modelling process through the use of a control variable which compared current salary to prior salary earned at the time of the job move.

From the perspective of household NAV, while 250 respondents provided an answer to the question regarding household net asset value, of those, 30 stated that they did not know what their net asset value was. Therefore only 220 responses could be analysed for this variable. Table 5.38 provides an overview of the responses.

Table 5.38: Descriptive statistics household net asset value

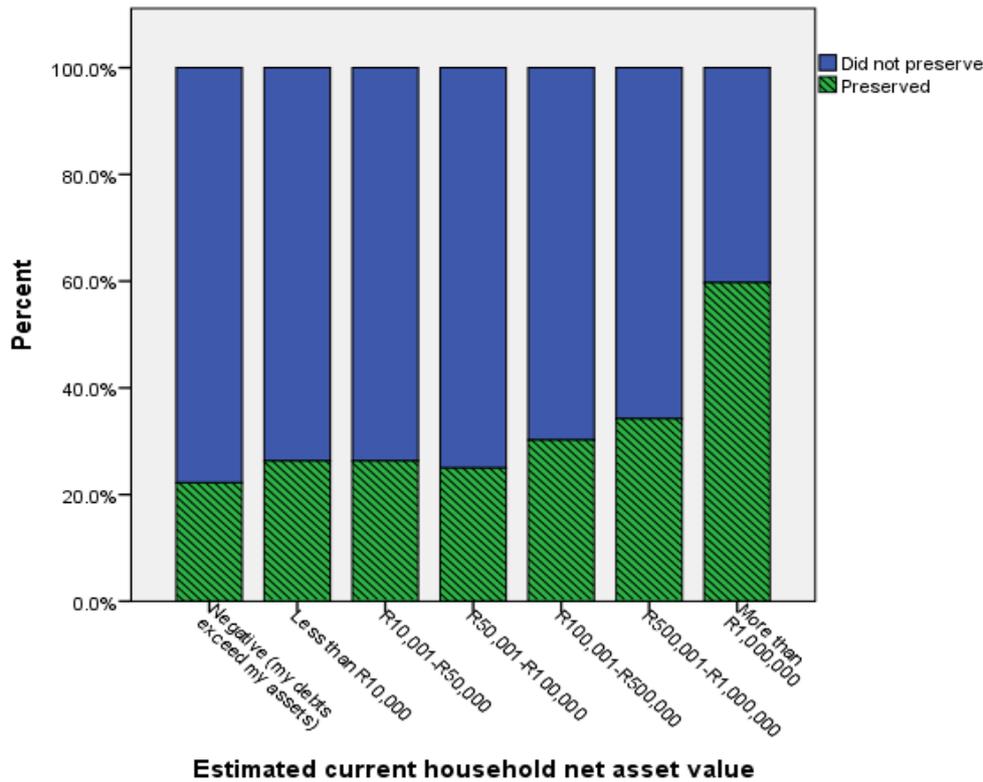
	Frequency	Percent	Cumulative Percent
Negative (my debts exceed my assets)	9	3.6	3.6
Less than R10,000	19	7.6	11.2
R10,001-R50,000	19	7.6	18.8
R50,001-R100,000	20	8.0	26.8
R100,001-R500,000	43	17.2	44.0
R500,001-R1,000,000	38	15.2	59.2
More than R1,000,000	72	28.8	88.0
Do not know	30	12.0	100.0
Total	250	100.0	

Source: Survey instrument - SPSS output

Figure 5.15 illustrates the differences in preservation levels at various levels of net asset values. These differences were statistically significant ($\chi^2(6) = 20.017, p = 0.003$). Only 22% of those with a negative net asset values preserved funds. Levels of preservation were not much higher for net asset values between R0 and R500,000 where between 25% and 30% preserved funds. Those with assets between R500,000 and R1,000,000 showed slightly higher preservation levels (34%) while approximately 60% of those with a NAV in excess of R1million preserved their funds.

It should be noted that these net asset value levels reflect current values, and not the value at the time the respondent made the preservation decision. However this was controlled for in the logistic regression modelling process through the use of a control variable which compared current financial situation to prior financial situation at the time of the job move.

Figure 5.15: Relationship between net asset value and preservation



Source: SPSS output

5.5.2.2 Nature of variable

Both personal salary and net asset value are ordinal variables. Combining categories resulted in linear relationships with the logit (refer to Appendix C for coding of new categories).

5.5.2.3 Assessment of the predictor variable as a standalone input

Table 5.39: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Personal Salary	Test statistic	22.478	25.852
	Degrees of freedom	1	1
	Significance	$p < 0.001$	$p < 0.001$

Source: SPSS output

Table 5.39 shows that personal salary was a statistically significant predictor of preservation. As highlighted in Table 5.40, the odds of preserving increased as salary increases. A move

from one salary band to the next increases the odds of preserving by 172.6% (note this is for the reclassified salary bands see Appendix C for full details).

Table 5.40: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Personal Salary	1.003	0.212	2.726	1.801	4.127

Source: SPSS output

As seen in Table 5.41, NAV was a statistically significant predictor of preservation. Table 5.42 shows that the odds of preserving increase as household NAV increases. A move from one NAV band to the next increases the odds of preserving by 63.0% (note this is for the reclassified NAV bands see Appendix C for further detail).

Table 5.41: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Household NAV	Test statistic	16.563	17.701
	Degrees of freedom	1	1
	Significance	p < 0.001	p < 0.001

Source: SPSS output

Table 5.42: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Household NAV	0.489	0.120	1.630	1.288	2.063

Source: SPSS output

As data collected referred to current salary and NAV there needed to be a control for any changes in salary since the job move, as salary at the time of job move was more relevant in the preservation decision. Therefore an assessment of changes in salary and financial

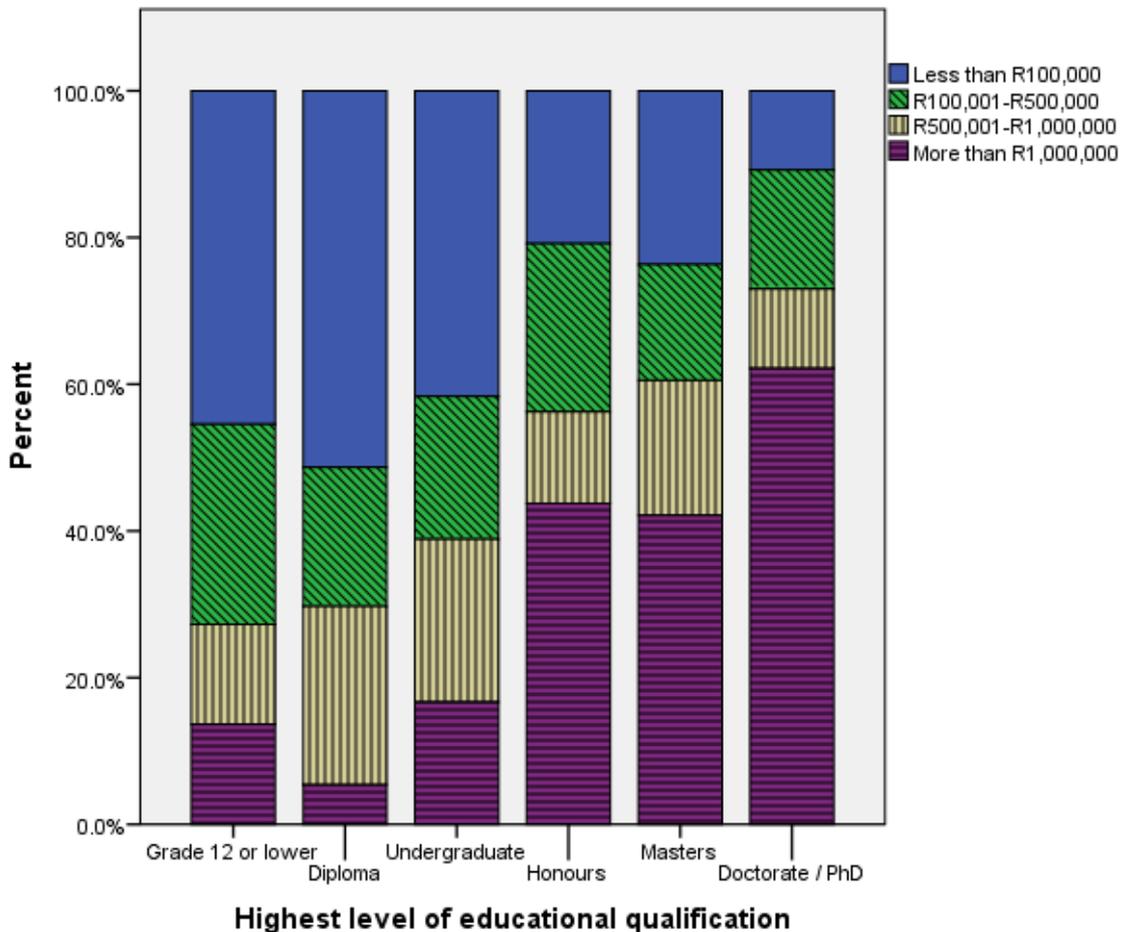
situation since the time of job move were controlled for. Despite these controls personal salary and NAV remained statistically significant predictors of preservation.

5.5.2.4 Relationship with other factors

As previously discussed in sections 5.4.3.4 and 5.5.1.4 salary was related to age, amount of funds available and education levels. When age was controlled for, salary still remained a statistically significant predictor of preservation, however when education levels and amount of funds were controlled for, salary was no longer a statistically significant predictor of preservation as a result of the interrelationships between these variables.

Net asset values across various education levels were also found to be statistically significantly different ($\chi^2(15) = 46.218, p < 0.001$).

Figure 5.16: Relationship between education level and NAV

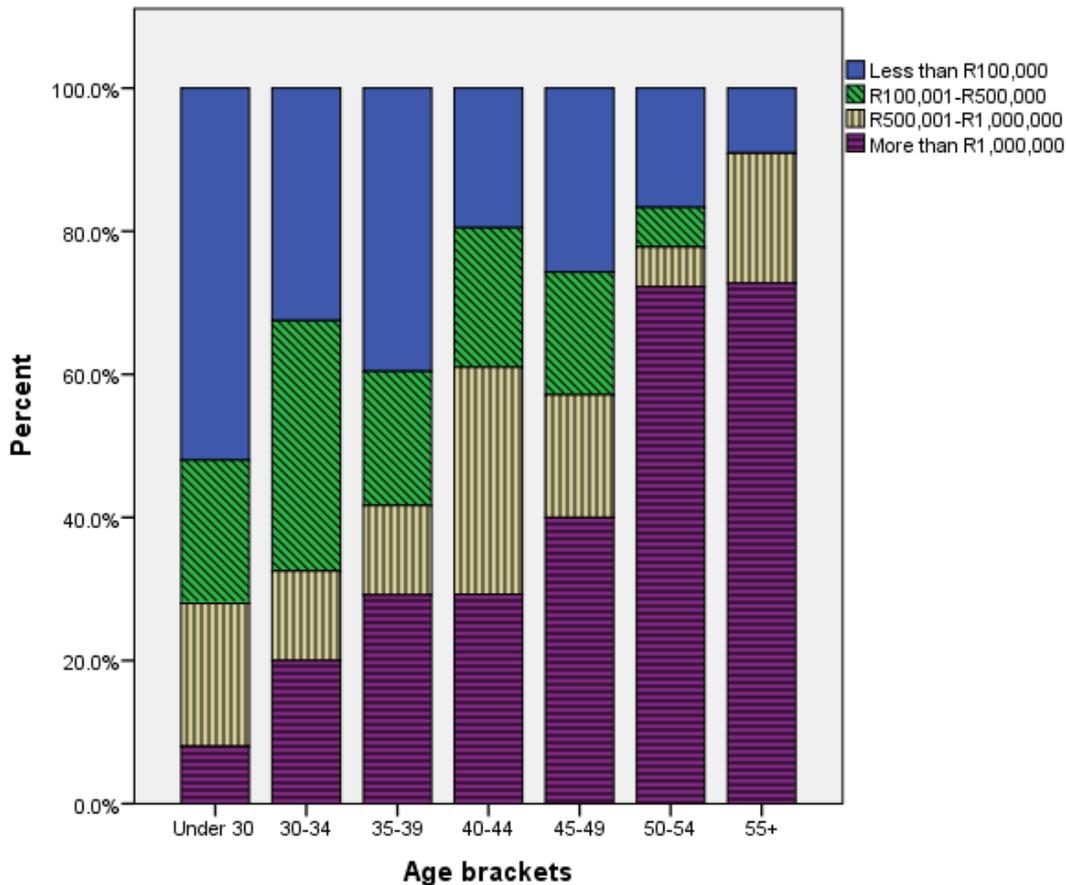


Source: SPSS output

The trend to higher NAV for those with higher levels of educational qualifications is illustrated in Figure 5.16. However there are a range of NAVs across all levels of educational qualifications.

Age also showed statistically significant differences across NAV brackets ($H(3) = 31.578, p < 0.001$). As illustrated in Figure 5.17, the majority of those over age 50 had net asset values in excess of R1,000,000. While most of those under 30 had net asset values lower than R100,000. When age and education were controlled for, NAV remained a statistically significant predictor of preservation.

Figure 5.17: Relationship between age and net asset value



Source: SPSS output

5.5.3 Self-reported assessment of financial situation

5.5.3.1 Descriptive statistics and initial analysis of relationship with preservation decision

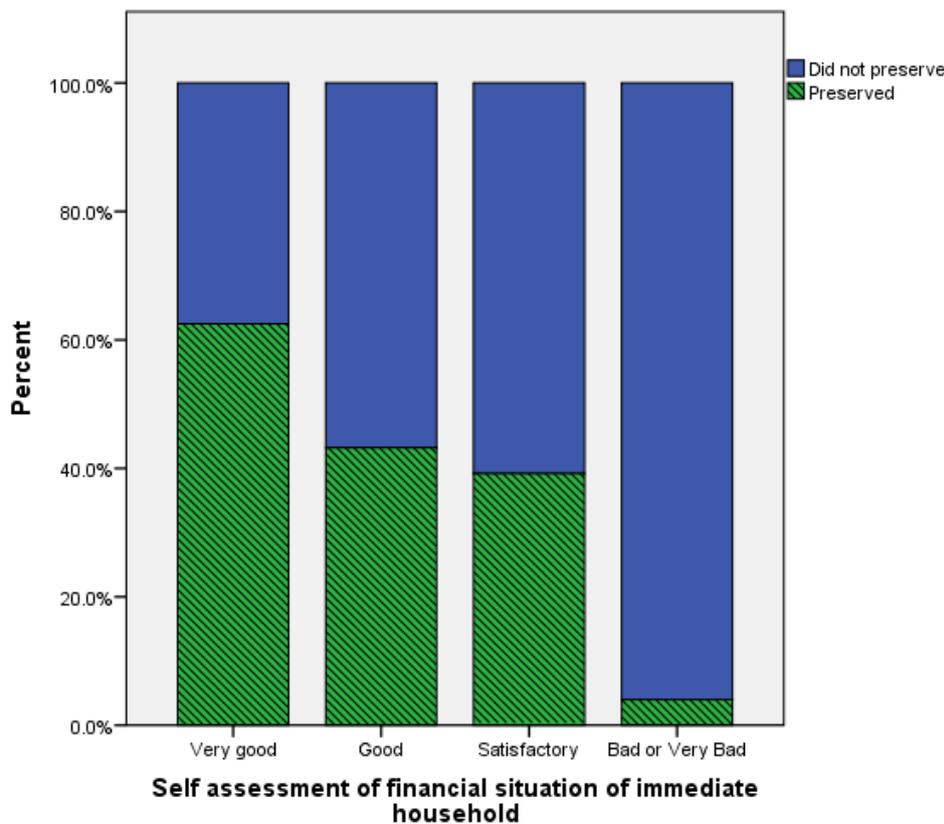
There were 255 respondents who provided information on their own assessment of their financial situation. As shown in Table 5.43, approximately half of these respondents assessed their situation as satisfactory. Only a small minority (less than 10%) rated their financial situation as bad or very bad. These two categories were combined to facilitate further statistical analysis (refer to Appendix C for further details).

Table 5.43: Self-assessment of financial situation

	Frequency	Percent	Cumulative Percent
Very good	24	9.4	9.4
Good	81	31.8	41.2
Satisfactory	125	49.0	90.2
Bad	21	8.2	98.4
Very bad	4	1.6	100.0
Total	255	100.0	

Source: Survey instrument - SPSS output

Figure 5.18: Relationship between self-assessed financial situation and preservation



Source: SPSS output

As illustrated in Figure 5.18 there were significant differences between preservation based on self-assessed financial circumstances. These differences were statistically significant ($\chi^2(3) = 19.007, p < 0.001$). Only 4% of those who classified themselves as having a bad or very bad financial situation preserved, however 62% of those who rated their financial situation as “very good” preserved funds.

Table 5.44 contains an overview of the responses to the question regarding which group a respondent felt best described their financial situation. A total of 253 individuals provided information for this question. Very few identified with the lowest category, and to assist with

statistical analysis Group 1 was combined with Group 2 (see Appendix C for further details). Just over 70% of respondents associated with the highest three categories of financial groupings.

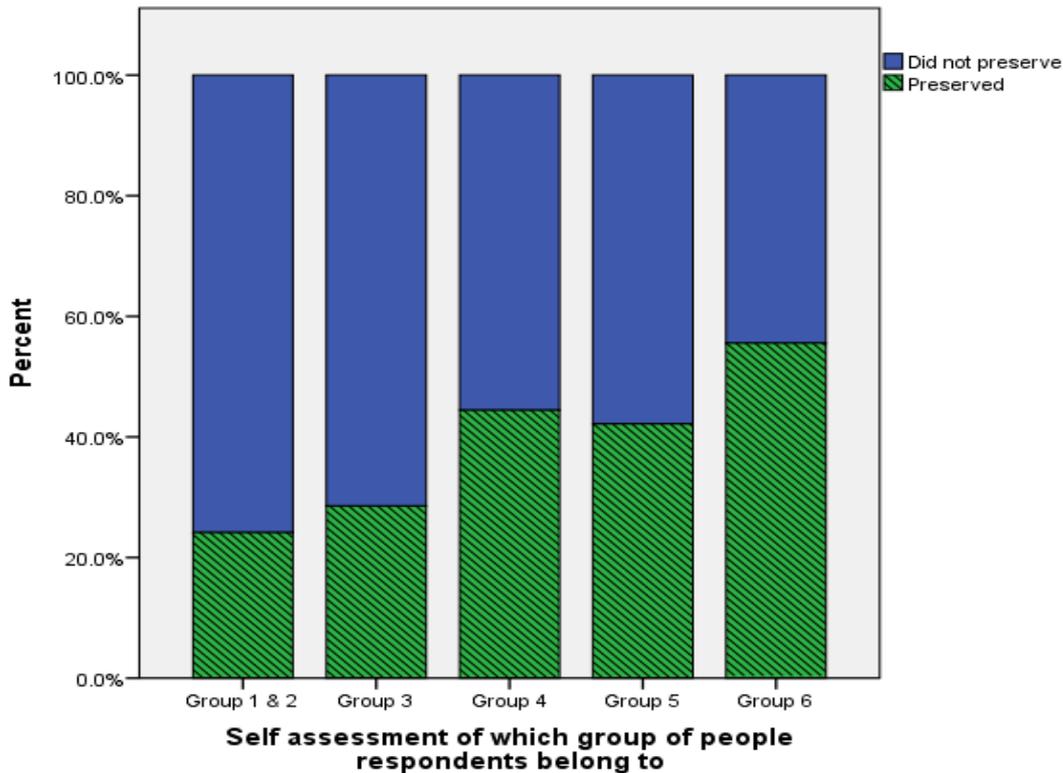
Table 5.44: Descriptive statistics of self-assessed financial group

Group	Description of group	Frequency	Percent	Cumulative Percent
1	We hardly make ends meet. We do not even have enough money for food.	5	2.0	2.0
2	We have enough money to buy food but buying clothes causes financial difficulties	24	9.5	11.5
3	We have enough money to buy food and clothes but the purchase of durable goods is problematic	42	16.6	28.1
4	We have no trouble buying durable goods, but the purchase of an expensive thing like a car is hard for us	90	35.6	63.6
5	We can afford expensive things such as buying a car	83	32.8	96.4
6	We can afford to buy very expensive things	9	3.6	100.0
	Total	253	100.0	

Source: Survey instrument - SPSS output

When preservation decisions were evaluated for each grouping there were higher levels of preservation for the more financially secure groups as illustrated in Figure 5.19, however, differences between groups were not statistically significant ($\chi^2(4) = 7.111, p = 0.130$).

Figure 5.19: Relationship between preservation decision and self-assessed financial group



Source: SPSS output

5.5.3.2 Nature of variable

For both self-assessed financial situation and self-assessed financial grouping the variables are ordinal. Self-assessed financial situation is linearly related to logit. For self-assessed financial group to be linearly related to the logit, Groups three and four needed to be combined (refer to Appendix C for further details).

5.5.3.3 Assessment of the predictor variable as a standalone input

Table 5.45: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Self-assessed financial situation	Test statistic	13.471	14.391
	Degrees of freedom	1	1
	Significance	$p < 0.001$	$p < 0.001$

Source: SPSS output

Table 5.46: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Self-assessed financial situation	-0.633	0.172	0.531	0.379	0.745

Source: SPSS output

Table 5.45 shows that the self-assessed financial situation of the respondent is a statistically significant predictor of preservation. In Table 5.46 it can be seen that the odds of preserving decrease as self-assessed financial situation worsens. A move from one category to the next lower category decreases the odds preserving by 46.9%.

Table 5.47: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Self-assessed financial group	Test statistic	6.427	6.981
	Degrees of freedom	1	1
	Significance	p = 0.011	p = 0.008

Source: SPSS output

Table 5.48: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Self-assessed financial group	0.494	0.195	1.638	1.119	2.400

Source: SPSS output

The self-assessed financial grouping of the respondent is a statistically significant predictor of preservation as shown in Table 5.47. Table 5.48 shows that the odds of preserving increased as self-assessed financial grouping improved. A move from one category to the next higher

category increases the odds of preserving by 63.8% (note this uses the reclassified groups, refer to Appendix C for further detail).

5.5.3.4 Relationship with other factors

Self-assessed financial situation was significantly different for various salary levels ($\chi^2(12) = 40.745$, $p < 0.001$) and NAV levels ($\chi^2(18) = 36.866$, $p = 0.003$). Self-assessed financial grouping was also significantly different across various salary levels ($\chi^2(16) = 48.375$, $p < 0.001$) and NAV levels ($\chi^2(24) = 69.948$, $p < 0.001$). Self-assessed financial situation was significantly different across various levels of education ($\chi^2(15) = 29.846$, $p = 0.012$) as was self-assessed financial grouping ($\chi^2(20) = 62.394$, $p < 0.001$). If salary, NAV and education are controlled for, only self-assessed financial situation remained a statistically significant predictor of preservation. Neither of the self-assessed measures were related to age.

5.5.4 Reason for leaving job

5.5.4.1 Descriptive statistics and initial analysis of relationship with preservation decision

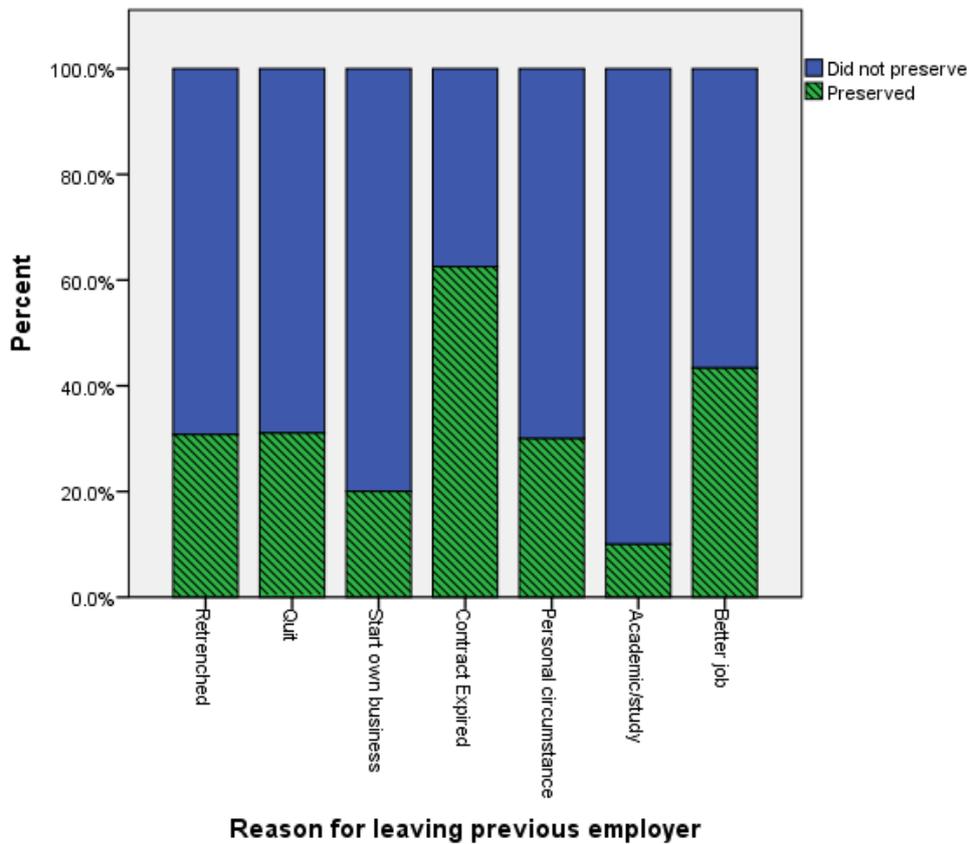
Chapter 4 contains details of the coding and classification of reasons given by the respondent for leaving their previous job. There were 255 respondents who provided answers to this question. A large majority (70%) left for a better job opportunity. Table 5.49 provides an overview of responses.

Table 5.49: Descriptive statistics of reason for job move

	Frequency	Percent	Cumulative Percent
Retrenched	13	5.1	5.1
Quit without another job	29	11.4	16.5
Start own business	5	2.0	18.4
Contract Expired	8	3.1	21.6
Personal circumstance	10	3.9	25.5
Academic/study	10	3.9	29.4
Better job opportunity	180	70.6	100.0
Total	255	100.0	

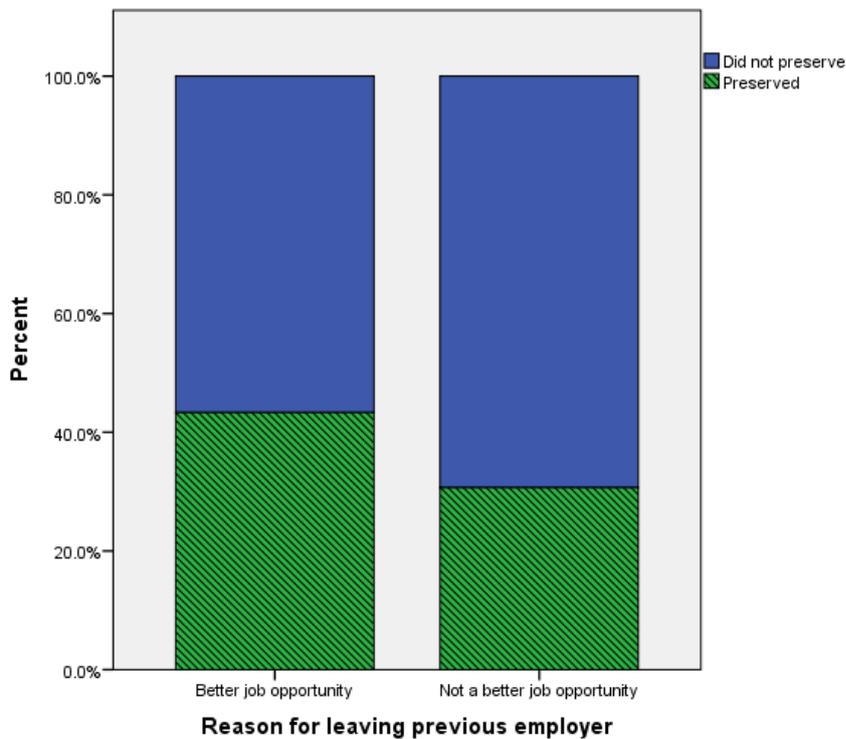
Source: Survey instrument - SPSS output

Figure 5.20: Relationship between preservation decision and reason for leaving job



Source: SPSS output

Figure 5.21: Relationship between leaving for a better job and preservation



Source: SPSS output

As can be seen from Figure 5.20, those who left their job for a better job opportunity on averaged preserved more than those who had quit without another job to move to, were retrenched, were starting their own business or moving to an academic environment to pursue further studies. The differences between the various categories and preservation levels were not statistically significant ($\chi^2(5) = 4.567$ $p = 0.471$). An anomaly appears to be those who left their job as a result of their contract expiring where high preservation levels were found. However this only related to eight individuals in the overall sample.

As discussed in Chapter 4, the categorisation applied to job moves related to whether an individual moved to a better job or not. Figure 5.21, based on this categorisation shows differences in levels of preservation, however these are not significant at a 95% confidence level ($\chi^2(1) = 3.551$ $p = 0.06$).

5.5.4.2 Nature of variable

The variable is nominal, and became binary when responses were combined into the two categories.

5.5.4.3 Assessment of the predictor variable as a standalone input

As seen in Table 5.50 and Table 5.51, the inclusion of moving for a better job opportunity is not a statistically significant predictor of preservation as a standalone input in the logistic regression model at a 95% confidence level. However it is only slightly outside this confidence level.

Table 5.50: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Leaving for a better job	Test statistic	3.513	3.624
	Degrees of freedom	1	1
	Significance	$p = 0.061$	$p = 0.057$

Source: SPSS output

Table 5.51: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Leaving for a better job	0.547	0.292	1.729	0.975	3.065

Source: SPSS output

5.5.4.4 Relationship with other factors

It was thought that salary levels might be related to moving to a better job. It was found that for respondents earning above R10,000 per month, approximately 70% indicated they have moved to a better job. However for those earning less than R10,000 per month almost 94% indicated they had moved to a better job, this difference was statistically significant ($\chi^2(1) = 5.60, p = 0.018$). It was found that once salary is added as a control variable, moving for a better job opportunity becomes a statistically significant predictor of preservation.

5.5.5 Relationship status

A total of 256 respondents provided information on their relationship status. Table 5.52 contains an overview of responses.

Table 5.52: Relationship between preservation decision and relationship status

	Preservation decision		Total
	Did not preserve	Preserved	
Married / in a long term relationship	108	77	185
	58.4%	41.6%	
			72.3%
Single	35	19	54
	64.8%	35.2%	
			21.1%
Divorced / Separated or widowed	12	5	17
	70.6%	29.4%	
			6.6%
Total	155	101	256
	60.5%	39.5%	100.0%

Source: Survey instrument - SPSS output

Just over 72% of the respondents were married or in a long term relationship, 21% were single and only a small minority were divorced or separated (16 respondents) or widowed (1 respondent). These last categories were combined to assist with statistical analysis (refer to Appendix C for more detail). While there were differences in preservation levels based on relationship status, with those who were married being more likely to preserve (41%), while those who were divorced, separated or widowed preserving the least (30%), however these differences were not statistically significant ($\chi^2(2) = 1.494$, $p = 0.474$).

As shown in Table 5.53 and Table 5.54, as a variable in logistic regression model relationship status is also not significant and the odds ratio confidence intervals include a value of 1.

Table 5.53: Logistic regression: assessment of single variable test statistics

Variable		Wald	Likelihood Ratio
Relationship status	Test statistic	1.480	1.525
	Degrees of freedom	2	2
	Significance	$p = 0.477$	$p = 0.466$

Source: SPSS output

Table 5.54: Logistic regression: assessment of single variable beta coefficient and odds ratio

Variable	Beta coefficient	Standard Error	Unadjusted Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Married vs. single	0.537	0.553	1.711	0.579	5.056
Married vs. divorced/separated/widowed	0.265	0.604	1.303	0.399	4.254

Source: SPSS output

5.5.6 Summary of findings: Rational factors

Age, personal salary, household NAV, self-assessed financial situation and self-assessed financial grouping were all statistically significant predictors of preservation. The reason for moving jobs was not significant as a standalone variable but became significant in the presence of other variables, in particular salary levels.

Age was related to salary and NAV level and showed low but statistically significant correlations with CFC immediate and BIS scores. Salary and NAV were related to age and education level. Self-assessed financial situation and financial grouping were related to salary levels and NAV.

5.6 CONCLUSION

This chapter has set out the preliminary findings of the empirical phase of the study. Predictor variables originating from the conceptual model were assessed to determine their standalone significance as predictors of preservation. The theoretical relationships between variables were also assessed to determine any possible associations between predictor variables.

The next chapter moves on to the findings from the model building and hypothesis testing of combinations of predictor variables and the eventual construction of a combined model which best predicts preservation decisions.

CHAPTER 6 MODEL BUILDING AND HYPOTHESIS TESTING

6.1 INTRODUCTION

Following on from the initial findings in Chapter 5, which contained information regarding the bivariate relationships between the predictor variables and preservation, this chapter provides the findings from the logistic regression model building process.

Models are first constructed for the predictor variables as per the three components of the conceptual model being bounded willpower, bounded rationality and the rational factors related to the LCH and liquidity constraints. Thereafter a combined model of behavioural factors is assessed relative to a model of rational factors. The chapter concludes with the construction of a combined model containing the best predictors of preservation behaviour.

6.2 LOGISTIC REGRESSION MODEL: BOUNDED WILLPOWER

6.2.1 Hypothesis: bounded willpower

H_0 : A model containing bounded willpower variables will not differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

H_1 : A model containing bounded willpower variables will differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

6.2.2 Model building for bounded willpower

Using the purposeful selection approach, the initial variables included in the model were all variables that had been shown to have a statistically significant bivariate relationship with preservation. As discussed in Chapter 4, this included all variables which as standalone predictor variables had p-values of less than 0.25 in terms of the likelihood ratio test statistic. As illustrated in Table 6.1, the variables meeting this criterion were the CFC immediate and the CFC total scores.

Table 6.1: Summary of bivariate analysis: bounded willpower variables

Variables $p < 0.25$	Variables $p > 0.25$
CFC immediate subscale score ($p < 0.001$)	CFC future subscale average score ($p = 0.673$)
CFC total scale score ($p = 0.007$)	
BIS total score ($p = 0.002$)	

Source: SPSS output

In the multivariate model the CFC total scale and the BIS total score were no longer statistically significant predictors of preservation both when tested with the Wald test statistic and the likelihood ratio test. As the CFC total scale and the CFC immediate subscale showed very high and statistically significant correlations, ($r_s = -.863$ p (one-tailed) < 0.001), and there were also high and statistically significant correlations between the CFC immediate subscale and the BIS score ($r_s = .556$ p (one-tailed) < 0.001) it would appear that when the three predictors are included in the same model, these variables did not add enough to the model to remain significant predictors. However, due to its theoretical significance, the BIS score was retained in the model in addition to the CFC immediate scale predictor which had retained its significance in the multivariate model. Therefore the main effects model contained the CFC immediate subscale and the BIS score.

As discussed in Chapter 3, age is considered to be related to measures of future orientation, with the level of future orientation increasing as age increases, and with levels of impulsivity, where impulsivity declines as individuals age. In order to determine whether this led to an interaction effect in this study, age and CFC and BIS measures were input as interaction variables into the logistic regression model to determine if the interaction terms was statistically significant. It was found that the interactions terms were not statistically significant. Education could also potentially impact on time orientation and impulsivity therefore an interaction term was added for education and the CFC and BIS measures and it was confirmed that there was not a statistically significant interaction effect. Therefore the preliminary final model again only contained two predictor variables, the CFC immediate subscale average score and the BIS total score.

No control variables related to bounded rationality or socioeconomic and demographic variables related to rational factors were added at this stage of model building as the model only related to measures of bounded willpower. Control variables were introduced when the combined model was built.

In assessing the model adequacy and fit, Table 6.2 sets out the information regarding the specific details of the predictors included in the model while Table 6.3 provides information regarding overall model fit. Tables 6.4 and 6.5 provide classification and predictive information. Due to the case wise removal of all responses missing bounded willpower variables, the number of respondents included in this model was 243.

Table 6.2: Bounded willpower predictors in the logistic regression model

Variable	Beta coefficient (SE)	Significance (Wald statistic)	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
CFC Immediate subscale (X ₁)	β ₁ : -0.474 (0.221)	χ ² (1) = 4.606 p = 0.032	0.623	0.404	0.960
BIS Total Score (X ₂)	β ₂ : -0.023 (0.017)	χ ² (1) = 1.759 p = 0.185	0.977	0.945	1.011
Constant	1.947 (0.810)				

Source: SPSS output

The resultant logistic regression equation is as follows:

$$\ln(\pi/(1-\pi)) = 1.947 - 0.474X_1 - 0.023X_2$$

Therefore the probability of preservation can be determined as follows:

$$P(Y) = 1/(1 + e^{-(1.947 - 0.474X_1 - 0.023X_2)})$$

Due to the inclusion of a non-significant predictor variable, the interpretation of the preservation is hindered by the fact that the beta coefficient for the BIS measure is not statistically significantly different from zero. Therefore in order to interpret the probability of preservation, it is assumed that the BIS beta value is zero. Therefore, if someone scores an average of five on the CFC immediate scale (high concern with the present), then the probability that person preserves $P(Y) = 1/(1 + e^{-(1.947 - 0.474(5)}) = 0.3958 = 39.58\%$, whereas if someone scores an average of one on the CFC immediate scale (low concern with the present) then the probability that person preserves is 81.35%.

As highlighted in Table 6.3, the likelihood ratio test statistic confirms that the overall model is statistically significantly different from a model with only the constant term. The Hosmer and Lemeshow test shows non-significance, as explained in Chapter 4, this indicates that the model fit is good as there is not a significant difference between the observed and expected frequencies. Both R² measures are low, indicating that only a small amount of variance is

explained by the model. There are no residual cases with values outside of two standard deviations.

Table 6.3: Assessment of overall bounded willpower model

Test	Value	Significance
Likelihood Ratio test statistic	14.492 (df = 2)	p = 0.001
Hosmer and Lemeshow test	14.059 (df = 8)	p = 0.08
McFadden's R ²	0.043	
Nagelkerke R ²	0.078	
Residuals	None	

Source: SPSS output

Table 6.4: Classification table of bounded willpower model

Measure	Value
Sensitivity	26.8%
Specificity	83.6%
False positives	73.2%
False negatives	16.4%
Area under the ROC curve	0.625
Cut value = .500	

Source: SPSS output

Table 6.5: Assessment of predictive success rate of bounded willpower model

	Percentage predicted	Improvement
Success rate	60.9%	
Base model rate	60.1%	1.4%
Proportional by chance model rate	52.0%	17.0%

Source: SPSS output

As highlighted in Table 6.4, there are a high number of false positives in the model. The area under the ROC curve indicates that the model provides poor discrimination between groups. In addition, as set out in Table 6.5, the predictive success rate of the model is only slightly better than the base model and just under 20% better than the proportional by chance model, which is less than the 25% which is generally expected of a good model.

6.2.3 Hypothesis testing relating to bounded willpower

Based on the likelihood ratio test statistic ($G^2(2) = 14.492, p = 0.001$), the null hypothesis is rejected as the model with bounded willpower variables provides better predictions of preservation behaviour than a model without them.

6.3 LOGISTIC REGRESSION MODEL: BOUNDED RATIONALITY

6.3.1 Hypothesis: bounded rationality

H_0 : A model containing bounded rationality variables will not differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

H_1 : A model containing bounded rationality variables will differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

6.3.2 Model building for bounded rationality

Using the purposeful selection approach, the initial variables included in the model, shown in Table 6.6, were all variables that had a statistically significant bivariate relationship with preservation, using a cut-off p-value of 0.25 for the likelihood ratio test statistic.

Table 6.6: Summary of bivariate analysis: bounded rationality variables

Variables $p < 0.25$	Variables $p > 0.25$
Total financial literacy index score ($p=0.014$)	Self-assessed level of financial knowledge ($p=0.965$)
Basic financial literacy index score ($p=0.064$)	
Sophisticated financial literacy index score ($p=0.022$)	
Level of education ($p < 0.001$)	
Professional advice ($p < 0.001$)	

Source: SPSS output

In the multivariate model educational qualification and whether an individual followed the advice of a professional remained statistically significant predictors. However all the financial literacy indices scores were no longer statistically significant predictors of preservation both when tested with the Wald test statistic and the likelihood ratio test. As the total and sophisticated financial literacy indices showed very high statistically significant correlations and there were also high and statistically significant correlations between the total and basic financial literacy indices each variable was separately assessed in terms of its significance as part of the overall model. None of the three indices of financial literacy remained significant once education and advice were included in the model. However, due to the theoretical significance of financial literacy, and the fact that as a standalone variable it has statistical significance, it was important to retain a financial literacy predictor variable in the equation to reduce potential bias in the other predictors. In order to assess which of the financial literacy indices should be retained in the model, the Wald and likelihood ratio test statistics were compared for each index. Both of these test statistics indicate that as a standalone variable the total financial literacy score provides the best model fit for determining who preserves and does not preserve, therefore, the total financial literacy score was retained as a predictor in the model. Therefore the main effects model contained the level of education, professional advice and total financial literacy scores as predictor variables.

Testing for interaction effects were based on relationships between variables as highlighted in Chapter 5. No statistically significant interactions were found between financial literacy and age, or level of education. No statistically significant interaction effects were found between age and education or between salary or NAV and education. No statistically significant interaction effects were found between amount of funds and advice followed or between salary and advice followed. Therefore the preliminary final model contained the same three predictor variables as the main effects model.

No bounded willpower or socioeconomic and demographic variables related to rational factors were added as controls at this stage of model building as the model only related to measures of bounded rationality. Control variables were introduced when the combined model was built.

In assessing the model adequacy and fit, Table 6.7 sets out the information regarding the specific details of the predictors included in the model while Table 6.8 provides information regarding overall model fit. Table 6.9 and 6.10 provide classification and predictive

information. Following case wise removal of missing respondents, the number of respondents included in this model was 254.

Table 6.7: Bounded rationality predictors in the logistic regression model

Variable	Beta coefficient (SE)	Significance (Wald statistic)	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Highest educational qualification (X_1)	β_1 : 1.051 (0.200)	$\chi^2(1) = 27.510$ $p < 0.001$	2.862	1.932	4.239
Professional financial advice (X_2)	β_2 : 1.631 (0.306)	$\chi^2(1) = 28.320$ $p < 0.001$	5.109	2.802	9.316
Total financial literacy index (X_3)	β_3 : 0.116 (0.156)	$\chi^2(1) = 0.546$ $p = 0.460$	1.123	0.826	1.526
Constant	-4.041 (0.603)				

Source: SPSS output

The resultant logistic regression equation is as follows:

$$\ln(\pi/(1-\pi)) = -4.041 + 1.051X_1 + 1.631X_2 + 0.116X_3$$

Therefore the probability of preservation can be determined as follows:

$$P(Y) = 1/(1 + e^{-(4.041 + 1.051X_1 + 1.631X_2 + 0.116X_3)})$$

Due to the inclusion of a non-significant predictor variable, the interpretation is hindered by the fact that the beta value for the financial literacy measure is not statistically significantly different from zero. Therefore in order to interpret the probability of preservation, it is assumed that the financial literacy beta value is zero. Therefore, if someone holds a Grade 12 or lower qualification and did not follow professional advice, then the probability that person preserves is:

$$P(Y) = 1/(1 + e^{-(-4.041 + 1.051(1) + 1.631(0))}) = 0.0479 = 4.79\%$$

If someone holds a Grade 12 or lower qualification and did follow professional advice, then the probability that person preserves is 20.44%. Whereas the probability of someone holding a doctorate degree who did not follow advice preserving funds is 54.07% and if they followed professional advice the probability of preservation is 85.74%.

Table 6.8: Assessment of overall bounded rationality model

Test	Value	Significance
Likelihood Ratio test statistic	80.664 (df = 3)	p < 0.001
Hosmer and Lemeshow test	10.373 (df = 8)	p = 0.240
McFadden's R ²	0.237	
Nagelkerke R ²	0.369	
Residuals	9 cases (3.5%)	8 greater than 2.5 less than 3. 1 greater than 3

Source: SPSS output

As can be seen from the likelihood ratio test statistic in Table 6.8, the overall model is statistically significantly different from a model with only the constant term. The Hosmer and Lemeshow test shows non-significance indicating that the model fit is good. Both R² measures are within the range of 0.2 to 0.4 which indicates a good level of fit. There are nine residual cases with values outside of two standard deviations. As this was not a model with all predictor variables included, the presence of residuals was not unexpected and these cases were not investigated further (detailed analysis of the residuals was only carried out for the combined logistic regression model).

As highlighted in Table 6.9, there are high levels of both sensitivity and specificity in the model. The area under the ROC curve indicates that the model provides excellent discrimination between groups. In addition, as set out in Table 6.10, the predictive success rate of the model is 22.7% better than the base model and 42.4% better than the proportional by chance model, which is more than the 25% that is generally expected of a good model.

Table 6.9: Classification table of bounded rationality model

Measure	Value
Sensitivity	62.0%
Specificity	82.5%
False positives	38.0%
False negatives	17.5%
Area under the ROC curve	0.811
Cut value = .500	

Source: SPSS output

Table 6.10: Assessment of predictive success rate of bounded rationality model

	Percentage predicted	Improvement
Hit rate	74.4%	
Base model hit rate	60.6%	22.7%
Proportional by chance model hit rate	52.3%	42.4%

Source: SPSS output

6.3.3 Hypothesis testing relating to bounded rationality

Based on the likelihood ratio test statistic ($G^2(3) = 80.664, p < 0.001$), the null hypothesis is rejected as the model with bounded rationality variables provides better predictions of preservation behaviour than a model without them.

6.4 LOGISTIC REGRESSION MODEL: RATIONAL FACTORS

6.4.1 Hypothesis: rational model

H_0 : A model containing rational variables will not differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

H_1 : A model containing rational variables will differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

6.4.2 Model building for rational factors

As shown in Table 6.11, using the purposeful selection approach, the initial variables included in the model were all variables that had been shown to have a statistically significant bivariate relationship with preservation, using a cut-off p-value of 0.25 in terms of the likelihood ratio test statistic.

Table 6.11: Summary of bivariate analysis: rational variables

Variables $p < 0.25$	Variables $p > 0.25$
Estimated age at time of job move ($p = 0.002$)	Relationship status ($p = 0.466$)
Personal salary ($p < 0.001$)	
Household NAV ($p < 0.001$)	
Self-assessed financial situation ($p < 0.001$)	
Self-assessed financial grouping ($p = 0.008$)	
Reason for leaving job ($p = 0.057$)	

Source: SPSS output

In the multivariate model, age, household NAV and self-assessed financial grouping were no longer statistically significant predictors of preservation both when tested with the Wald test statistic and the likelihood ratio test. However when age is added as a variable to the new smaller model it is statistically significant ($p = 0.046$) and therefore it is retained in the model. Therefore the main effects model contained age, personal salary, self-assessed financial situation and reason for leaving job as predictor variables.

The interactions between age and salary and between age and education were not statistically significant. The interaction between reason for leaving and salary were not statistically significant and neither was the interaction between salary and self-assessed financial situation. Therefore the preliminary final model contained the same four predictor variables as the main effects model.

No control variables related to bounded willpower or bounded rationality were added at this stage of model building as the model only related to socioeconomic and demographic variables associated with the rational model. However, as mentioned in Chapter 5, the salary information and financial situation requested in the questionnaire were based on current circumstances. Therefore in order to control for any changes since the respondent moved

jobs, two control questions were included which requested information on the change in salary and financial circumstance since the job move. When the control variables regarding change in salary and financial situation since job move are included in the model, the control variables themselves are not statistically significant, they did however have a slight impact on the beta coefficients and odds ratios of the salary and financial situation variables in the equation. The beta coefficient for personal salary is 4.5% lower and the beta coefficient for self-assessed financial situation is 10% lower. However as discussed in Chapter 4, only control variables which result in a marked change in the beta coefficients, usually more than 20%, are required to be included in model. Therefore, the control variables in this instance are excluded. The final model contains only the four statistically significant predictor variables.

In assessing the model adequacy and fit, Table 6.12 sets out the information regarding the specific details of the predictors included in the model while Table 6.13 provides information regarding overall model fit. Table 6.14 and 6.15 provide classification and predictive information. The number of respondents included in this model following case wise removal of missing responses was 241.

Based on the information in Table 6.12, the resultant logistic regression equation is as follows:

$$\ln(\pi/(1-\pi)) = -3.052 + 0.038X_1 - 0.535X_2 + 0.866X_3 + 0.796X_4$$

Therefore the probability of preservation can be determined as follows:

$$P(Y) = 1/(1 + e^{-(-3.052 + 0.038X_1 - 0.535X_2 + 0.866X_3 + 0.796X_4)})$$

Therefore, if someone is 25 years old, with a self-assessed financial situation of “bad” who did not leave for a better job, and whose personal salary is less than R10,000, then the probability that person preserves $P(Y) = 1/(1 + e^{-(-3.052 + 0.038(25) - 0.535(4) + 0.866(0) + 0.796(1))}) = 0.0309 = 3.09\%$

If someone is 50 years old, with a self-assessed financial situation of “very good” who left for a better job, and whose personal salary is more than R40,000, then the probability that person preserves $P(Y) = 1/(1 + e^{-(-3.052 + 0.038(50) - 0.535(1) + 0.866(1) + 0.796(4))}) = 0.914 = 91.40\%$

Table 6.12: Rational predictors in the logistic regression model

Variable	Beta coefficient (SE)	Significance (Wald statistic)	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Estimated age at time of job move (X ₁)	β_1 : 0.038 (0.019)	$\chi^2(1) = 3.995$ p = 0.046	1.039	1.001	1.078
Self-assessed financial situation (X ₂)	β_2 : -0.535 (0.197)	$\chi^2(1) = 7.396$ p = 0.007	0.586	0.398	0.861
Reason for leaving job (X ₃)	β_3 : 0.866 (0.330)	$\chi^2(1) = 6.876$ p = 0.009	2.378	1.245	4.544
Personal salary (X ₄)	β_4 : 0.796 (0.236)	$\chi^2(1) = 11.385$ p = 0.001	2.217	1.396	3.520
Constant	-3.052 (1.014)				

Source: SPSS output

Table 6.13: Assessment of overall rational model

Test	Value	Significance
Likelihood Ratio test statistic	44.049 (df = 4)	p < 0.001
Hosmer and Lemeshow test	12.185 (df = 8)	p = 0.143
McFadden's R ²	0.137	
Nagelkerke R ²	0.226	
Residuals	5 cases (2.1%)	5 greater than 2.5 less than 3.

Source: SPSS output

In Table 6.13, the likelihood ratio test statistic shows that the overall model is statistically significantly different from a model with only the constant term. The Hosmer and Lemeshow

test shows non-significance indicating that the model fit is good. The McFadden R^2 measure is below the range of 0.2 to 0.4, however the Nagelkerke R^2 is higher and falls into this range which indicates a good level of fit. There are five residual cases with values outside of two standard deviations, as mentioned above; residuals are only investigated in detail in the final combined model.

Table 6.14 shows that there are high levels of specificity in the model, while sensitivity is fair, however the number of false positives is fairly high. The area under the ROC curve indicates that the model provides acceptable discrimination between groups. The predictive success rate of the model, as contained in Table 6.15, is just less than 20% better than the base model and just less than 40% better than the proportional by chance model, which is more than the 25% which is generally expected of a good model.

Table 6.14: Classification table of rational model

Measure	Value
Sensitivity	54.7%
Specificity	84.2%
False positives	45.3%
False negatives	15.8%
Area under the ROC curve	0.743
Cut value = .500	

Source: SPSS output

Table 6.15: Assessment of predictive success rate of rational model

	Percentage predicted	Improvement
Success rate	72.6%	
Base model rate	60.6%	19.8%
Proportional by chance model rate	52.2%	39.0%

Source: SPSS output

6.4.3 Hypothesis testing relating to the rational model

Based on the likelihood ratio test statistic ($G^2(4) = 44.049$, $p < 0.001$), the null hypothesis is rejected as the model with rational factors provides better predictions of preservation behaviour than a model without them.

6.5 COMPARISON OF RATIONAL VERSUS BEHAVIOURAL MODELS

6.5.1 Introduction

In order to assess whether a combined model of behavioural factors provided better predictions of preservation decisions than a model with only rational variables, the first step was to construct a behavioural model. To achieve this, the models for bounded rationality and bounded willpower were combined. Information regarding the combined behavioural model is set out in section 6.5.2.

In order to assess whether the model of behavioural factors provided better predictions of preservation than a model with only socioeconomic and demographic variables associated with the rational model, the block-wise entry or sequential logistic regression technique was used. This entails entering all socioeconomic and demographic variables associated with the rational model in the first block of variables and then entering the behavioural variables in the second block of variables. The difference in the log likelihood ratio between steps is tested to determine statistical significance. The hypothesis tested by this approach is contained in section 6.5.3, and the results of the test are contained in section 6.5.4.

6.5.2 Combined model of behavioural predictors

All variables used in the final bounded rationality and bounded willpower models were included in the combined model. An overview and assessment of the resultant model is contained in Tables 6.16 to 6.19. The number of respondents included in this model was 241.

As can be seen in Table 6.16, in the combined model the CFC immediate subscale, the BIS score and the total financial literacy index are not statistically significant predictors of preservation.

Table 6.16: Behavioural predictors in the logistic regression model

Variable	Beta coefficient (SE)	Significance (Wald statistic)	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
CFC immediate subscale average score (X_1)	β_1 : 0.110 (2.68)	$\chi^2(1) = 0.167$ $p = 0.682$	1.116	0.660	1.888
BIS score (X_2)	β_2 : -0.028 (0.020)	$\chi^2(1) = 1.917$ $p = 0.166$	0.973	0.936	1.011
Highest educational qualification (X_3)	β_3 : 1.050 (0.211)	$\chi^2(1) = 24.804$ $p < 0.001$	2.858	1.890	4.320
Professional financial advice (X_4)	β_4 : 1.452 (0.315)	$\chi^2(1) = 21.198$ $p < 0.001$	4.273	2.303	7.929
Total financial literacy index (X_5)	β_5 : 0.106 (0.158)	$\chi^2(1) = 0.444$ $p = 0.505$	1.111	0.815	1.516
Constant	-2.710 (1.141)				

Source: SPSS output

The likelihood ratio test statistic in Table 6.17 confirms that the overall model is statistically significantly different from a model with only the constant term. The Hosmer and Lemeshow test shows non-significance indicating that the model fit is good. Both R^2 measures are within the range of 0.2 to 0.4 which indicates a good level of fit. There are six residual cases with values outside of two standard deviations (residuals are only investigated in detail in the final combined model).

Table 6.17: Assessment of overall behavioural model

Test	Value	Significance
Likelihood Ratio test statistic	73.806 (df = 5)	p < 0.001
Hosmer and Lemeshow test	9.258 (df = 8)	p = 0.321
McFadden's R ²	0.228	
Nagelkerke R ²	0.357	
Residuals	6 cases (2.5%)	3 greater than 2.5 less than 3. 3 greater than 3

Source: SPSS output

Table 6.18: Classification table of behavioural model

Measure	Value
Sensitivity	62.5%
Specificity	81.4%
False positives	37.5%
False negatives	18.6%
Area under the ROC curve	0.810
Cut value = .500	

Source: SPSS output

Table 6.19: Assessment of predictive success rate of behavioural model

	Percentage predicted	Improvement
Hit rate	73.9%	
Base model hit rate	60.2%	22.8%
Proportional by chance model hit rate	52.1%	41.9%

Source: SPSS output

Table 6.18 shows that there are high levels of both sensitivity and specificity in the model. The area under the ROC curve indicates that the model provides excellent discrimination between groups. In addition, as highlighted in Table 6.19, the predictive success rate of the model is 22.8% better than the base model and 41.9% better than the proportional by chance model, which is more than the 25% which is generally expected of a good model.

6.5.3 Hypothesis: comparison of behavioural and rational models

H_0 : A model containing behavioural variables will not differ from a model with rational variables with respect to predicting whether an individual preserved retirement funds.

H_1 : A model containing behavioural variables will differ from a model with rational variables with respect to predicting whether an individual preserved retirement funds.

6.5.4 Hypothesis testing relating to model comparison

It was found that after controlling for all rational factors, behavioural factors were still found to make a statistically significant contribution to the prediction of preservation. Therefore, based on the likelihood ratio test statistic ($G^2(5) = 34.262, p < 0.001$) the null hypothesis is rejected as the model with behavioural variables provides better predictions of preservation behaviour than one with only socioeconomic and demographic variables related to the rational model.

In addition, the model with behavioural factors appears to be a better standalone model predicting preservation behaviour compared to the rational model as it has a higher likelihood ratio statistic, better indications of model fit for both the McFadden R^2 and the Nagelkerke R^2 values, and better discrimination between groups as measured by the area under the ROC curve.

6.6 BUILDING A COMBINED MODEL

6.6.1 Introduction and overview of approaches

In order to build a combined model to determine the most important predictors of preservation, whether rational or behavioural, two approaches were followed. The first approach used purposeful selection to construct a model from scratch using all variables found to be significant in the bivariate analysis and then only included variables that were statistically significant in the multivariate model in the final model (i.e. without adding back any variables to act as controls and effect moderators).

The second approach also follows purposeful selection using all variables found to be significant in the bivariate analysis. However, in addition to those variables found to be statistically significant in the multivariate model, variables are added back to the final model to act as controls and effect moderators to ensure that all theoretically significant variables remain in the final model. This ensures that statistically significant predictor variables do not provide biased estimates of the probability of preservation.

In both models the variable for amount of funds available at the time of job move was included as it was a statistically significant predictor of preservation, as highlighted in Chapter 5. This variable had not been included in the model of behavioural factors or the model of rational factors as elements from both of these models could play a role in influencing this variable but at the same time it did not fit theoretically into a particular model (this is discussed in further detail in Chapter 7).

6.6.2 Hypothesis: combined model

H₀: A model containing variables associated with the preservation decision will not differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

H₁: A model containing variables associated with the preservation decision will differ from a model with only the constant term with respect to predicting whether an individual preserved retirement funds.

6.6.3 Combined model approach one

6.6.3.1 Model building

Using the purposeful selection approach, the initial variables included in the model were all variables that had been shown to have a statistically significant bivariate relationship with preservation, using a cut-off p-value of 0.25 in terms of the likelihood ratio test statistic. Table 6.20 provides details of all variables classified in terms of the above criterion.

Table 6.20: Summary of bivariate analysis: combined model

Variables p<0.25	Variables p>0.25
CFC immediate subscale score (p<0.001)	CFC future subscale score (p=0.673)
CFC total scale score (p=0.007)	Self-assessed financial knowledge (p=0.965)
BIS score (p=0.002)	Relationship status (p=0.466)
Total financial literacy index (p=0.014)	
Sophisticated financial literacy index (p=0.022)	
Basic financial literacy index (p=0.064)	
Level of education (p<0.001)	
Professional advice (p<0.001)	
Estimated age at time of job move (p=0.002)	
Personal salary (p<0.001)	
Household NAV (p<0.001)	
Self-assessed financial situation (p<0.001)	
Self-assessed financial group (p=0.008)	
Reason for leaving job (p=0.057)	
Amount of funds available (p<0.001)	

Source: SPSS output

In the multivariate model only the following variables remained statistically significant predictors of preservation: Education level, professional advice followed and the amount of funds available when moving jobs.

All other variables were removed and their non-significance confirmed tested with the Wald test statistic and the likelihood ratio test, with the exception of moving to a better job which when assessed in terms of the likelihood ratio test was found to be statistically significant and was therefore added back to the model. A backward stepwise logistic regression analysis confirmed the inclusion of this variable and the other three above-mentioned variables as predictors in a combined model. Therefore the main effects model had amount of funds

available, education level, professional advice and reason for leaving job as predictor variables.

No statistically significant interactions were found between variables; therefore the preliminary final model contained the same predictor variables as the main effects model.

In assessing the model adequacy and fit, Table 6.21 sets out the information regarding the specific details of the predictors included in the model while Table 6.22 provides information regarding overall model fit. Tables 6.23 and 6.24 provide classification and predictive information. The number of respondents included in this model was 242.

Table 6.21: Main predictors in logistic regression combined model

Variable	Beta coefficient (SE)	Significance (Wald statistic)	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Education level (X ₁)	β ₁ : 0.888 (0.211)	χ ² (1) = 17.782 p < 0.001	2.431	1.609	3.673
Professional advice (X ₂)	β ₂ : 1.512 (0.327)	χ ² (1) = 21.329 p < 0.001	4.537	2.388	8.619
Reason for leaving job (X ₃)	β ₃ : 0.910 (0.365)	χ ² (1) = 6.204 p = 0.013	2.484	1.214	5.082
Amount of funds available (X ₄)	β ₄ : 0.581 (0.197)	χ ² (1) = 8.753 p = 0.003	1.789	1.217	2.629
Constant	-5.238 (0.728)				

Source: SPSS output

The resultant logistic regression equation is as follows:

$$\ln(\pi/(1-\pi)) = -5.238 + 0.888X_1 + 1.512X_2 + 0.910X_3 + 0.581X_4$$

The probability of preservation can be determined as follows:

$$P(Y) = 1/(1 + e^{-(-5.238 + 0.888X_1 + 1.512X_2 + 0.910X_3 + 0.581X_4)})$$

Therefore, if someone holds a Grade 12 or lower educational qualification, did not follow advice, did not leave for a better job and had funds less than R100,000 then the probability that person preserves is: $P(Y) = 1/(1 + e^{-(-5.238 + 0.888(1) + 1.512(0) + 0.910(0) + 0.581(1)}) = 2.26\%$

If someone holds a Grade 12 or lower educational qualification, did follow advice, did leave for a better job and had funds less than R100,000 then the probability that person preserves is 20.64%

If someone holds a doctorate, did not follow advice, did not leave for a better job and had funds more than R1,000,000 then the probability that person preserves is:

$$P(Y) = 1/(1 + e^{-(-5.238 + 0.888(4) + 1.512(0) + 0.910(0) + 0.581(4))} = 65.43\%$$

If someone holds a doctorate, did follow advice, did leave for a better job and had funds more than R1,000,000 then the probability that person preserves is 95.52%

6.6.3.2 Interpretation of odds ratios

Holding all other variables in the equation constant:

- Each increase in level of education (reclassified as per Appendix C) increases odds of preserving by 143%
- Following professional financial advice increased odds of preserving by 354% compared to someone who did not follow professional advice
- If person left for a better job odds of preserving increased by 148% compared to someone who did not leave for a better job.
- For each increase in the level of amount of funds available (reclassified as per Appendix C) odds of preserving increased by 79%.

As highlighted in Table 6.22, the overall model is statistically significantly different from a model with only the constant term. The Hosmer and Lemeshow test shows non-significance indicating that the model fit is good. The McFadden R^2 measure is within the range of 0.2 to 0.4 which indicates a good level of fit, and the Nagelkerke R^2 is higher than this range. There are 10 residual cases with values outside of two standard deviations. All cases were assessed and it was established that there were no data capturing errors.

Table 6.22: Assessment of overall combined model: approach one

Test	Value	Significance
Likelihood Ratio test statistic	89.683 (df = 4)	p < 0.001
Hosmer and Lemeshow test	2.145 (df = 8)	p = 0.951
McFadden's R ²	0.278	
Nagelkerke R ²	0.421	
Residuals	10 cases (4.1%)	8 greater than 2.5 less than 3. 2 greater than 3

Source: SPSS output

The residuals above three were inspected and in both of the cases these individuals displayed low CFC immediate and BIS scores which could account for the decision to preserve the funds. In addition, the seven cases which fell between 2.5 and 3 were inspected; in five of the cases the respondents had received assistance from an acquaintance with a financial background which appeared to assist in the decision to preserve. The other three cases showed low CFC immediate scores or low BIS scores which could account for the decision to preserve in circumstances where amounts were low and no advice was followed.

Table 6.23: Classification table of combined model: approach one

Measure	Value
Sensitivity	67.7%
Specificity	83.9%
False positives	32.3%
False negatives	16.1%
Area under the ROC curve	0.833
Cut value = .500	

Source: SPSS output

Table 6.23 shows that there are high levels of specificity in the model, while sensitivity is good, however there are still quite a number of false positives. The area under the ROC curve

indicates that the model provides excellent discrimination between groups. As illustrated in Table 6.24, the predictive success rate of the model is 26.2% better than the base model and 47.5% better than the proportional by chance model, which is more than the 25% which is generally expected of a good model.

Table 6.24: Assessment of predictive success rate of combined model: approach one

	Percentage predicted	Improvement
Success rate	77.7%	
Base model rate	61.6%	26.2%
Proportional by chance model rate	52.7%	47.5%

Source: SPSS output

6.6.3.3 Hypothesis testing

Based on the likelihood ratio test statistic ($G^2(4) = 89.683, p < 0.001$), the null hypothesis is rejected as the model with variables associated with the preservation decision, provides better predictions of preservation than a model without them.

6.6.4 Combined model approach two

6.6.4.1 Model building

The model uses the same initial steps as the first approach as all statistically significant variables from the bivariate analysis phase of model evaluation are included in the model.

In the multivariate model only the following variables remained statistically significant predictors of preservation: Education level, professional advice followed and the amount of funds available when moving jobs. All other variables were removed and their non-significance confirmed tested with the Wald test statistic and the likelihood ratio test, except for the variable associated with moving to a better job, which was found to be statistically significant when tested with the likelihood ratio statistic, and it was therefore added back to the model.

However, when comparing the smaller model with the model containing all variables, there were large changes in the beta coefficients of education and advice. As discussed in Chapter 4, this indicates that some of the non-significant variables that were removed provided important adjustments to the effects of the variables remaining in the model. Therefore an

assessment needed to be made regarding which variables had a role to play in the adjustment. Given the analysis of statistically significant relationships between various predictor variables, the variables included in the final bounded willpower, bounded rationality and rational model were added back to ensure that all theoretically significant variables remained in the final model.

The following variables were added back to the model: age, personal salary, self-assessed financial need, BIS score, CFC immediate score and total financial literacy score. The resultant model showed acceptable levels of deviations in the beta coefficients of the four statistically significant variables (all changes were less than 20%).

Therefore the main effects model had amount of funds available, education level, professional advice, reason for leaving job, age, personal salary, self-assessed financial situation, CFC immediate subscale, BIS and total financial literacy index as predictor variables.

No statistically significant interactions were found between variables, therefore the preliminary final model contained the same predictor variables as the main effects model.

In assessing the model adequacy and fit, Table 6.25 sets out the information regarding the specific details of the predictors included in the model while Table 6.26 provides information regarding overall model fit. Table 6.27 and 6.28 provide classification and predictive information. The number of respondents included in this model was 217.

As can be seen from Table 6.25, age, salary, self-assessed financial situation, CFC immediate subscale, BIS and financial literacy index are not significant predictors (beta coefficients are not statistically significantly different from zero) they are assumed to have zero beta values in solving the logistic regression equation, however as they are part of the overall model, the results of the other variables are interpreted holding all of these variables constant.

The resultant logistic regression equation is as follows:

$$\ln(\pi/(1-\pi)) = -3.669 + 0.749X_1 + 1.172X_2 + 0.975X_3 + 0.710X_4 - 0.011X_5 - 0.172X_6 + 0.190X_7 + 0.071X_8 - 0.021X_9 + 0.063X_{10}$$

The probability of preservation can be determined as follows:

$$P(Y) = 1/(1 + e^{(-3.669 + 0.749X_1 + 1.172X_2 + 0.975X_3 + 0.710X_4 - 0.011X_5 - 0.172X_6 + 0.190X_7 + 0.071X_8 - 0.021X_9 + 0.063X_{10})})$$

Table 6.25: Main predictor and control variables in combined logistic regression model

Variable	Beta coefficient (SE)	Significance (Wald statistic)	Odds Ratio	95% confidence interval for odds ratio	
				Lower	Upper
Education level (X ₁)	β ₁ : 0.749 (0.262)	χ ² (1) = 8.176 p = 0.004	2.115	1.266	3.533
Professional advice (X ₂)	β ₂ : 1.172 (0.362)	χ ² (1) = 10.488 p = 0.001	3.227	1.588	6.557
Reason for leaving job (X ₃)	β ₃ : 0.975 (0.404)	χ ² (1) = 5.816 p = 0.016	2.650	1.200	5.850
Amount of funds available (X ₄)	β ₄ : 0.710 (0.278)	χ ² (1) = 6.538 p = 0.011	2.034	1.180	3.505
Estimated age at time of job move (X ₅)	β ₅ : -0.011 (0.028)	χ ² (1) = 0.164 p = 0.685	0.989	0.936	1.045
Self-assessed financial situation (X ₆)	β ₆ : -0.172 (0.247)	χ ² (1) = 0.488 p = 0.485	0.842	0.519	1.365
Personal salary (X ₇)	β ₇ : 0.190 (0.334)	χ ² (1) = 0.322 p = 0.570	1.209	0.628	2.328
CFC immediate subscale (X ₈)	β ₈ : 0.071 (0.310)	χ ² (1) = 0.052 p = 0.819	1.073	0.585	1.970
BIS score (X ₉)	β ₉ : -0.021 (0.022)	χ ² (1) = 0.849 p = 0.357	0.980	0.938	1.023
Total financial literacy index (X ₁₀)	β ₁₀ : 0.063 (0.203)	χ ² (1) = 0.096 p = 0.757	1.065	0.715	1.587
Constant	-3.669 (1.615)				

Source: SPSS output

However $\beta_5 - \beta_{10}$ are not statistically significant different from zero therefore for the purpose of solving the equation it is assumed that these coefficients are zero. Therefore, if someone holds a Grade 12 or lower educational qualification, did not follow advice, did not leave for a better job and had funds less than R100,000 then the probability that person preserves is:

$$P(Y) = 1/(1 + e^{-(-3.669 + 0.749(1) + 1.172(0) + 0.975(0) + 0.710(1))}) = 9.89\%$$

If someone holds a Grade 12 or lower educational qualification, did follow advice, did leave for a better job and had funds less than R100,000 then the probability that person preserves is 48.43%

If someone holds a doctorate, did not follow advice, did not leave for a better job and had funds more than R1,000,000 then the probability that person preserves is:

$$P(Y) = 1/(1 + e^{-(-3.669 + 0.749(4) + 1.172(0) + 0.975(0) + 0.710(4))}) = 89.72\%$$

If someone holds a doctorate, did follow advice, did leave for a better job and had funds more than R1,000,000 then the probability that person preserves is 98.68%.

6.6.4.2 Interpretation of odds ratios

Holding all other variables constant and controlling for CFC, BIS, financial literacy, age, salary and self-assessed financial situation:

- Each increase in level of education (reclassified levels as discussed in Chapter 5) increases odds of preserving by 111.5%
- Following professional financial advice increased odds of preserving by 222.7% compared to someone who did not follow professional advice
- If a person left for a better job the odds of preserving increased by 165.0% compared to someone who did not leave for a better job.
- For each increase in the level of amount of funds available (reclassified levels as discussed in Chapter 5) odds of preserving increased by 103.4%.

The likelihood ratio test statistic in Table 6.26 shows that the overall model is statistically significantly different from a model with only the constant term. The Hosmer and Lemeshow test shows non-significance indicating that the model fit is good. The McFadden R^2 measure is within the range of 0.2 to 0.4 which indicates a good level of fit, and the Nagelkerke R^2 is higher than this range. There are nine residual cases with values outside of two standard deviations. All cases were assessed and it was established that there were no data capturing

errors. The residuals above three were inspected and in both cases these individuals received advice from an acquaintance with a financial background which, in spite of low amounts available and one leaving as a result of retrenchment appeared to assist in the decision to preserve. In addition, the six cases which fell between 2.5 and three were inspected; in two of the cases the respondents had received assistance from an acquaintance with a financial background. The other four cases showed low CFC immediate scores or low BIS scores which could account for the decision to preserve in circumstances where amounts were low and no advice was followed.

Table 6.26: Assessment of overall combined model: approach two

Test	Value	Significance
Likelihood Ratio test statistic	82.531 (df = 10)	p < 0.001
Hosmer and Lemeshow test	6.920 (df = 8)	p = 0.545
McFadden's R ²	0.286	
Nagelkerke R ²	0.430	
Residuals	9 cases (4.1%)	1 between 2 and 2.5 6 greater than 2.5 less than 3. 2 greater than 3

Source: SPSS output

Table 6.27: Classification table of combined model: approach two

Measure	Value
Sensitivity	68.7%
Specificity	85.1%
False positives	31.3%
False negatives	14.9%
Area under the ROC curve	0.833
Cut value = .500	

Source: SPSS output

Table 6.28: Assessment of predictive success rate of combined model: approach two

	Percentage predicted	Improvement
Success rate	78.8%	
Base model rate	61.8%	27.6%
Proportional by chance model rate	52.8%	49.4%

Source: SPSS output

Table 6.27 shows that there are high levels of specificity in the model, while sensitivity is good, however there are still quite a number of false positives. The area under the ROC curve indicates that the model provides excellent discrimination between groups. As illustrated in Table 6.28, the predictive success rate of the model is 27.6% better than the base model and just over 49% better than the proportional by chance model, which is more than the 25% which is generally expected of a good model.

6.6.4.3 Hypothesis testing

Based on the likelihood ratio test statistic ($G^2(10) = 82.531, p < 0.001$), the null hypothesis is rejected as the model with variables associated with the preservation decision provides better predictions of preservation behaviour than a model without them.

6.6.5 Comparison of combined models

The four variable model has slightly lower improvement over base and proportional by chance models and slightly lower hit rate. It also showed slightly lower specificity and sensitivity and resultant higher false positives and false negatives. The Nagelkerke and McFadden R^2 were also slightly lower. However the likelihood ratio test statistic is higher with fewer degrees of freedom.

Both approaches to building the combined model result in the same four statistically significant predictors. The main difference is that the inclusion of control and effect modifiers in the second approach reduces the bias in the four predictors as their beta coefficients and odds ratios reflect the impact of the particular variable once all other variables are controlled for and held constant.

6.7 CONCLUSION

In this chapter logistic regression models were built to test a variety of hypotheses. The resultant models of bounded willpower, bounded rationality and rational factors all showed statistically significant differences in predicting preservation over models with only the constant term. In addition, a model of behavioural factors provided a better prediction of preservation than a model with only socioeconomic and demographic variables related to the rational model. The combined models of all relevant predictor variables were also statistically significantly different from models with only the constant term.

Chapter 7 provides an analysis and discussion of the findings from this chapter, in conjunction with the findings from Chapter 5, and links these to the conceptual framework developed in Chapter 3. This allows for an assessment to be made regarding support for the thesis statement and main hypothesis of this study, and the resultant implications for appropriate solutions.

CHAPTER 7 ANALYSIS OF FINDINGS - TOWARDS A SCIENTIFIC MODEL

7.1 INTRODUCTION

The previous two chapters have set out the findings for the empirical phase of this study. Chapter 5 provided findings related to each of the individual predictor variables which were included in the questionnaire as a result of their potential significance in light of the conceptual model developed in Chapter 3. Each of these variables was assessed in terms of their relationship to the preservation decision as a standalone variable. Chapter 6 contained an overview of the model building and assessment process for the combined variables and the resultant findings and testing of hypotheses related to the conceptual model and the overall study.

This chapter provides an analysis and discussion of the above findings and then links these findings back to the conceptual model. The chapter begins with an overview of the preservation decisions made by the respondents in this sample, thereafter the predictor variables for each part of the conceptual model, being bounded willpower, bounded rationality and the rational model are discussed. Next, a comparison of a model of behavioural and rational factors is carried out, followed by the construction of a model of the key predictors of preservation decisions. The implications for solutions are then discussed, and the chapter concludes with a discussion of the development of a scientific model of preservation decision making.

7.2 THE PRESERVATION DECISION

7.2.1 Overview

This section provides an overview of the preservation decisions made by the respondents in this study. Other information collected relating to the preservation decision focussed on the amount of funds available at the time of job move and what those who took a cash payout used their funds for. The findings from these questions are discussed in more detail below.

7.2.2 Preservation decision

Of the total sample of 418 respondents, approximately 66% had to make a decision regarding whether to preserve or take a cash payout of accumulated pension or provident funds when they last moved job. The other 34% were not faced with this decision, either because their current job was their first job (6%) or because they were not members of a pension or

provident fund at their previous employer (23%). This is in line with estimates that between 66% and 85% of employees in the formal sector have retirement benefits (South Africa, National Treasury, 2004:13). The remaining 5% were either taking early retirement, did not have access to funds or could not remember what their decision was.

Of the 256 respondents who made a preservation decision, 60% did not preserve their retirement funds and took the full amount in cash. This finding is in line with studies both in South Africa (South Africa, National Treasury, 2012; Old Mutual, 2012; Sanlam Employee Benefits, 2013) and internationally (Bassett *et al.*, 1998; Engelhardt, 2002) that find that the majority of people do not preserve funds when they move jobs. Of those who preserved funds, approximately two thirds transferred funds to a preservation fund, while one third moved their funds to their new employer's pension or provident fund.

7.2.3 Amount of funds

This study found that a key predictor of whether an individual preserved funds was the amount of funds available when the individual moved jobs, with higher amounts generally preserved. This finding is in line with a number of studies (Bassett *et al.*, 1998; Moore & Muller, 2002; Munnell *et al.*, 2009; Poterba *et al.*, 1998). In the current study, very low preservation levels were found for amounts below R100,000, and even for amounts between R100,000 and R500,000, the majority of respondents indicated they had not preserved their funds.

The amount of funds available to an employee when they moved jobs would be a function of the salary level of the individual, as well as how long the individual had worked at a particular company. There are a number of factors that could therefore explain why only large amounts are preserved. First it could be related to rational factors linked to salary levels and age as those with higher salaries would be expected to have higher amounts. In some instances those who are older would potentially have worked at an employer for longer and therefore have access to more funds when they move jobs. Therefore the trend to higher levels of preservation for large amounts of funds could be as a result of the predictors of the rational model where those who are older and who are less liquidity constrained (i.e. earn higher salaries) would be expected to preserve funds. However even after age and salary are controlled for this variable remained a statistically significant predictor of whether someone preserved funds or not.

Another possible rational explanation for low preservation of small amounts would be related to the tax breaks associated with amounts lower than R22,500 which can be accessed tax free. While there is evidence in this study that small amounts have low levels of preservation (preservation levels vary between 14% and 33% for amounts less than R20,000), these low preservation levels persist all the way up to amounts totalling R500,000. This appears to indicate that the tax free portion only explains low preservation for small amounts. However, taxes may also play a role when considering larger amounts. There is a sliding scale of tax rates applied to various withdrawal amounts, with the tax rate associated with payments between R22,500 and R600,000 currently set at 18%, while amounts between R600,000 and R900,000 incur tax at a rate of 27%, with a rate of 36% for amounts in excess of R900,000 (South African Revenue Service, 2013). Therefore, tax rates may well provide an explanation of the pattern of withdrawals seen in this sample, as individuals may be willing to pay the relatively low tax rate of 18% for amounts below R600,000, but less inclined to pay rates of almost double that when funds exceed R600,000.

Another potential explanation for low preservation of small amounts relates to the behavioural concept of mental accounts. As Shefrin and Thaler (1988:635) explain in their behavioural life cycle hypothesis, the way that people mentally account for windfalls and bonuses can have a major impact on whether amounts are spent or saved. If the funds that are suddenly accessible as a result of a job move are seen as a windfall then the influence of mental accounts may play a role in preservation decision making. In general it is proposed that when a person receives a bonus or a windfall, small amounts (usually determined with reference to percentage of the person's annual salary) are more likely to be consumed than large amounts. To illustrate the concept, Thaler (1990:198) provides the example of a study conducted by Landsberger (1966) where individuals who received small amounts (in this case defined as 7% of total annual salary) had a marginal propensity to consume (MPC) of two, which indicated that windfalls were actually spent twice, while large amounts (in this case defined at approximately 60% of total annual salary) were far less likely to be consumed, with MPCs of approximately 23%.

In retirement preservation decision making, the problem of using mental accounts to decide about preservation of small amounts is potentially exacerbated by increased job moves, and shorter tenure at companies that has become the norm over the past few decades. Individuals are therefore often faced with small amounts when making preservation decisions, however

the cumulative effect of not preserving small amounts could result in a situation where individuals have insufficient funds at retirement.

A final insight into the overall high propensity to consume amounts up to R500,000 might come from an assessment of what the funds are being used for. For amounts below R500,000, where low levels of preservation are observed, the most prevalent use of funds is to pay off debt or buy necessities. This would appear to indicate that funds might be used to facilitate consumption smoothing. The general discussion of use of funds which follows might provide further insight into this aspect.

Initial indications provide support for the view that the link between amount of funds and preservation levels may be related to rational factors associated with age, salary level, and consumption smoothing. However, tax rates, mental accounting and aspects of self-control linked to the decision to save or spend windfall amounts might also be important contributing factors.

7.2.4 Use of funds

For all those who did not preserve funds, the most commonly reported uses of funds related to the payment of short term debt, purchasing necessities and paying off long term debt. It would therefore appear that retirement funds are being used as a forced savings account which people access when they move jobs to assist with consumption smoothing as they pay off existing debts and buy necessities. There is very little evidence that amounts are being used to purchase luxuries. However as these responses were the subjective assessments of each individual as to what constituted necessities and luxuries, there may be higher spending on luxuries than revealed in this analysis. The high use of funds to pay off debt has been confirmed in industry studies which have found that 46% of individuals who took a cash payout used the funds to pay off short term debt, while 17% paid off long term debt in the form of mortgages, and 30% reporting they used funds for living expenses (Sanlam Employee Benefits, 2013:21).

In light of the above, a key question would be whether the use of funds to pay off debt is optimal, or whether funds should be preserved to be used in retirement. On face value paying off debts, and therefore saving on interest costs, would in many cases be seen as optimal. However ascertaining whether individuals are trapped in a debt cycle, where paying off debts just frees up their credit lines to incur more debts, would be a fundamental factor in determining whether the use of funds is optimal in these cases.

Previous research has indicated that self-control is linked to levels of indebtedness and that those with a time orientation focused on the present (as measured by higher CFC immediate scores) are more likely to be over indebted (Joireman *et al.*, 2010) and those with higher levels of impulsivity (as measured by higher BIS scores) have higher levels of unsecured debt (Ottaviani & Vandone, 2011). While this goes beyond the scope of the present study, a preliminary assessment of self-control levels and use of funds was carried out to provide insight into whether the consumption smoothing observed in this study was optimal or not.

To assess potential links between self-control and use of funds, a comparison using the CFC immediate scores and BIS scores across use of funds was carried out. The scores were assessed against the average CFC immediate and BIS scores of all those who did not preserve funds. The mean CFC immediate score for all those who did not preserve was 2.50 and the mean BIS score was 56.89.

The CFC immediate scores were statistically significantly higher than average (indicating lower levels of self-control) for those who paid off short term debt with average CFC immediate scores of 2.67 ($U = 2103.5$, $z = -1.928$, p (one-tailed) = 0.0027). The BIS scores were statistically significantly higher (indicating higher levels of impulsivity) for those who paid off short term debt, where the average BIS score was 60.14 ($U = 1785$, $z = -2.701$, p (one-tailed) = 0.0035) and those who paid off medium debt where the average BIS score was 59.81 ($U = 1015$, $z = -1.704$, p (one-tailed) = 0.044).

Therefore, an assessment of the link between self-control and use of funds provides preliminary confirmation that those paying off short term debt have, on average, lower levels of self-control and higher levels of impulsivity. This provides an indication that they would be more susceptible to incur short term debt again in the future, and therefore that the use of retirement funds to pay off this debt might only be a temporary solution for these individuals.

When considering the additional information that respondents provided in the open ended question regarding the factors which played a role in their preservation decision, 21% of those who provided additional information specifically mentioned that the payment of debt was a key factor in their decision to take a cash payment. One respondent stated that: “I was drowning in debt and that is why I resigned to get my pension and settle my debt”. As highlighted in Chapter 3, this trend has been observed more generally in South Africa where individuals have resigned, and in some cases got divorced in order to access retirement funds (Personal Finance, 2010).

For more insight regarding the use of funds, other comments that were made in the open ended question indicated use of funds to overcome temporary liquidity constraints as a result of retrenchments, relocations and while studying. Further reasons for taking cash related to the amount being too small to consider reinvesting, and the tax free portion helping individuals decide to take a cash payment.

It would therefore appear that there is evidence that funds are being accessed to facilitate consumption smoothing both in terms of paying off debts and purchasing necessities, and to overcome temporary liquidity constraints while unemployed. However, while it might be rational to use funds for consumption smoothing, the high level of usage to pay off short term debts, and initial indications of low levels of self-control amongst those paying off short term debts could indicate that accessing funds may be a sub-optimal decision.

7.3 BOUNDED WILLPOWER

7.3.1 Overview

The following section reviews the measures of bounded willpower, being the CFC scale which is linked to time orientation, and the BIS measure of the level of impulsivity, in light of the preservation decisions made by individuals in this study. As per the bounded willpower predictions of the conceptual model, it would be expected that those with low levels of self-control would be more likely to take a cash payment rather than preserve funds when moving jobs. In this regard, those with a low level of future orientation, or those with a high concern with immediate consequences would be less likely to preserve funds, as would those with high levels of impulsivity.

Both measures of bounded willpower, the CFC scale and subscales, as well as the BIS scale, showed adequate levels of reliability in this study and could therefore be used to assess the time orientation and level of impulsivity of respondents. The following section assesses the two measures as standalone predictors of preservation. Thereafter an overview of the findings regarding a model of bounded willpower are discussed.

7.3.2 Assessment of predictors as standalone variables

It was found that the CFC immediate subscale and the CFC total scale act as significant predictors of preservation when considered as standalone variables. However the CFC future subscale is not a statistically significant predictor. Respondents who had high scores on the CFC immediate subscale (indicating a focus on the present), and those with low scores on the

CFC total scale (again indicating a focus on the present) were more likely to take a cash payout than to preserve funds. These results appear to indicate that the relationship between time perspective and self-control arises due to a high concern with the immediate consequences of behavior rather than low concern with the future consequences of behavior, as outlined in Chapter 4, this supports the susceptibility hypothesis of the link between time orientation and self-control (Joireman *et al.*, 2012:3). These findings are in line with those of previous studies which find high CFC immediate scores relate to behaviours which link to low level of self-control (Joireman *et al.*, 2008) such as compulsive buying and incurring credit card debt (Joireman *et al.*, 2010).

The BIS score was also found to be a statistically significant predictor of preservation. Those who had high levels of impulsivity in general reported lower levels of preservation than those with low levels of impulsivity. This finding supports the view that level of impulsiveness plays a key role in financial decision making (Ottaviani & Vandone, 2011) and that the BIS measure captures elements related to intertemporal choice and delay of gratification (Potts *et al.*, 2006; Spinella, 2004).

When considering relationships between predictor variables, the two main variables which were expected to be related to bounded willpower were age and education level. It was found that age, while displaying slight (but statistically significant) correlations with both CFC and BIS scores, did not have an interaction effect with either BIS or CFC. This appears to provide support for the view that the differences in BIS and CFC scores in this sample do not result from underdeveloped self-control as a result of developmental changes linked to age. This is supported by studies that show that the parts of the brain responsible for self-control and impulse control generally mature between late adolescence and early adulthood (Giedd, 2004; Sowell, 1999) and therefore those included in this sample would in general have fully matured and developed self-control and impulse control. Therefore the differences in levels of CFC and BIS scores in this sample appear to arise from persistent individual differences forming part of the respondent's unique character traits.

From the perspective of education, statistically significant relationships were found between education levels and time orientation, as well as between education and levels of impulsivity. These findings are supported both in terms of time orientation where the CFC scale has been shown to be statistically significantly related to education (Toepoel, 2010), and impulsivity, where studies have shown that levels of impulsivity, as measured by the BIS scale, are related to educational achievement (Miley & Spinella, 2003). The direction of the relationship is

unclear, as it cannot be determined whether those with higher levels of self-control are able to obtain higher educational qualifications, or whether higher levels of educational qualifications result in the development of higher levels of self-control.

In summary as standalone predictor variables the CFC total scale, the CFC immediate subscale and the BIS measure were statistically significant predictors of preservation. Statistically significant relationships were observed between these measures and both education and age. When age is controlled for, both the CFC and BIS measures remain statistically significant predictors of preservation. However, when education is controlled for only the BIS scale retains its statistical significance. This would appear to indicate that the moderate but significant relationship between education and CFC scores results in a situation where the combination of these variables results in the CFC score no longer adding sufficient information to predict preservation behaviour, over and above that provided by the education variable. This would appear to indicate that the impact of time orientation on preservation decisions is potentially as a result of the relationship between education and time orientation, rather than from time orientation in its own right. This issue is explored in further detail in section 7.4.2.2.

7.3.3 Model of bounded willpower

Following the purposeful selection technique discussed in Chapter 4, a model containing all bounded willpower variables shown to have statistical significance as standalone variables was constructed, and the significance of the variables as part of a multivariate model was assessed. The logistic regression model of bounded willpower factors is limited as a result of the fact that the construct being measured by CFC and BIS scores appears to be strongly related. The underlying constructs being measured in terms of time orientation and impulsivity have been shown to be related (Joireman *et al.*, 2003; Steinberg *et al.*, 2009) and the current study provides support for the existence of this relationship as demonstrated by high, statistically significant, correlations between the CFC immediate subscale score and the BIS total score.

The combination of the two measures as predictor variables results in a situation where the BIS predictor loses its individual statistical significance as, due to the relationship between the two variables, the BIS predictor does not add enough predictive value to the model to remain significant. However the CFC predictor variable retains its statistical significance. Due to the fact that the BIS variable is a theoretically relevant predictor variable and, as a

standalone input in the logistic regression model it displayed statistical significance, it is retained as a variable in the bounded willpower model to reduce any bias in other model variables.

When considering the ability of a model of bounded willpower factors to predict preservation behaviour, from the overall model perspective, the null hypothesis is rejected as the model with bounded willpower variables provides statistically significantly better predictions of preservation than a model without these variables. The model predicts that those with a time orientation that focuses on the immediate, and those with high levels of impulsivity are less likely to preserve funds than those who have less focus on the immediate and low levels of impulsivity.

This would appear to confirm the predictions of the behavioural model of bounded willpower that those with low levels of self-control, as measured by time perspective and impulsivity, would be more likely to take funds in cash when moving jobs. However, the overall model fit is poor, with these predictors only explaining a small amount of variance regarding the preservation decision. In addition, the improvement in the predictive success rate of the model is not much better than chance, and the model has a poor level of discrimination between groups.

All of the above issues appear to indicate that other predictor variables are required to explain the variance in the model more fully and provide better discrimination between groups. Therefore, while bounded willpower provides a better prediction of preservation than a model with only a constant term, it does not appear to present a full picture of all important factors playing a role in preservation decisions.

7.4 BOUNDED RATIONALITY

7.4.1 Overview

A number of predictor variables were assessed in terms of the bounded rationality construct of the conceptual model. First financial literacy scores, second self-assessed levels of financial knowledge, third educational qualifications and last whether advice was followed in the decision making process. The model of bounded rationality would predict that those with low levels of education or financial literacy and those who did not seek advice would be less likely to preserve retirement funds when moving jobs.

Each of these variables is first assessed as a standalone variable with the purpose of establishing to what extent the variable predicts preservation behaviour. Thereafter the variables are combined into a single model to establish the importance of bounded rationality as a predictor of preservation.

7.4.2 Assessment of predictors as standalone variables

7.4.2.1 Financial literacy

As outlined in Chapter 4, financial literacy was tested using an established financial literacy index to ascertain the level of both basic and sophisticated financial knowledge. A factor analysis confirmed the two component structure of the financial literacy index, and supporting this two factor structure, there were clear distinctions between the scores achieved on the basic financial literacy questions compared with the sophisticated questions. The average percentage correct for basic questions was statistically significantly higher compared to the sophisticated questions. In addition, substantially more respondents were able to correctly answer all of the basic financial literacy questions compared to those who answered all of the sophisticated financial literacy questions correctly.

The sophisticated financial literacy index as well as the total financial literacy index were both found to be significant predictors of preservation when considered as standalone variables. However the basic financial literacy index was not a statistically significant predictor. Those who preserved had statistically significantly higher scores on both the total and sophisticated financial literacy indices compared to those who did not preserve. These findings support other studies which have found that individuals who display higher levels of financial literacy, and in particular sophisticated financial literacy, are more likely to plan for, and be prepared for retirement (Lusardi & Mitchell, 2009; van Rooij *et al.*, 2012).

In line with a number of studies (Bateman *et al.*, 2011; Lusardi & Mitchell, 2009; van Rooij *et al.*, 2012; Van Rooij *et al.*, 2011) this study found a statistically significant relationship between self-assessed financial knowledge and financial literacy scores as well as between education level and financial literacy scores. In particular there were clear distinctions between the financial literacy scores of those who rated their financial knowledge as very good compared to those who assessed their knowledge as bad or very bad. However, as a standalone variable, an individual's self-assessed level of financial knowledge was not a statistically significant predictor of preservation. Total financial literacy scores were found to

increase steadily as educational qualification level increased. In addition, financial literacy scores showed low but statistically significant correlations with age.

In summary, high levels of financial literacy predicted higher levels of preservation. Relationships were observed between financial literacy and age, education, as well as self-assessed level of financial knowledge. When age and self-assessed level of financial knowledge were controlled for financial literacy retained its statistical significance as a predictor of preservation. However due to the interrelatedness between financial literacy and education, once education was controlled for financial literacy was no longer a significant predictor of preservation. This may suggest that the impact of financial literacy on preservation decisions is due to its relationship with education rather than in its own right. This issue is explored in further detail in section 7.4.2.2.

7.4.2.2 Education

From the perspective of educational qualification, the sample in general displayed high levels of academic qualifications with 55% of the respondents holding an honours level qualification or higher. As discussed in Chapter 4, the fact that the sample was recruited at an academic institution was probably responsible for the overall high levels of educational qualifications, as members of staff are generally encouraged to pursue further studies, and rebates on tuition fees may make this an affordable option for staff. However due to the diversity of the sample, the qualifications held were in a range of fields. Therefore, not all respondents with high levels of qualifications would necessarily have high levels of financial knowledge. This was supported by self-assessed level of financial knowledge where no statistically significant differences were observed between the various levels of academic qualifications and the level of self-assessed financial knowledge. However, as discussed in section 7.4.2.1, the mean scores for the various financial literacy indices increased significantly across educational levels.

The level of educational qualification of the respondent was a statistically significant predictor of preservation. Very high levels of preservation were observed among those holding a doctorate (77% preserved) versus those with Grade 12 or lower qualification where only 7% preserved funds. Respondents holding Honours and Masters qualifications had fairly low preservation levels with the majority not preserving funds and less than 30% of those with a diploma or undergraduate degree preserved funds.

When examining the impact of this factor on preservation, a key consideration would be that education is in general related to salary levels and age. This would imply that the high level of preservation observed among those with high educational qualifications may be as a result of the fact that these individuals would in general be older and earn higher salaries. Evidence of these relationships were found in this sample as education was found to be statistically significantly related to age and salary levels. In general average age increased for those who held postgraduate qualifications, and higher salaries were associated with higher educational qualifications. However, even after controlling for age and salary levels, education remained a highly significant predictor of preservation, indicating that education had an influence on preservation decisions beyond that of just providing a proxy for salary level and age.

In addition, as discussed in section 7.3.2 and 7.4.2.1, education level was related to self-control and financial literacy. However when all of these factors were controlled for, education remained a statistically significant predictor of preservation, once again demonstrating its importance as a predictor variable of preservation, in its own right, and not only due to the underlying relationship with self-control and financial literacy.

7.4.2.3 Advice

As discussed in Chapter 3, it has been suggested that using external cues and advice to make financial decisions is one way that individuals can attempt to overcome bounded rationality in situations of computational complexity. However many seek advice from acquaintances who do not necessarily have the requisite skill to assist them in decision making (Benartzi & Thaler, 2007:94). In this sample approximately two thirds followed some form of advice. However when considering what advice they received from various sources, it becomes apparent that higher preservation levels were found when professional advice was followed (i.e. from a financial advisor, the administrator of the fund or the HR department). Following advice of an acquaintance, even one with a financial background, did not lead to high levels of preservation. This seems to support the view that advice needs to be sought from the correct sources.

When assessing the impact of advice on preservation levels it was found that following advice from a professional was a statistically significant predictor of preservation. When no other factors are included or controlled for the odds of an individual who followed advice from a professional source preserving their funds was 492% higher than for someone who didn't follow the advice of a professional. However there are a number of other factors that

would be linked to this variable as it would be anticipated that those who had more funds available at the time of moving jobs would be more likely to seek advice from a professional than those with low balances. In addition, it would be expected that those earning higher salaries would be more likely to have access to a professional financial advisor.

In keeping with these anticipated relationships, it was found that those who followed professional advice were more likely to have higher amounts of funds available when moving jobs, and earn higher salaries. However even controlling for the effects of these variables, whether a person followed advice from a professional source remained an important and statistically significant predictor of preservation. Following professional advice was also linked to having higher education levels and a higher level of financial literacy. However, once again, when the impact of these variables was controlled for, following professional advice remained a statistically significant predictor of preservation indicating its importance over and above that of just a proxy for wealth or education levels. This finding is confirmed in a recent industry survey which found strong associations between advice and preservation (Old Mutual, 2012).

7.4.3 Model of bounded rationality

Following the purposeful selection technique discussed in Chapter 4, a model containing all bounded rationality variables shown to have statistical significance as standalone variables was constructed, and the significance of the variables as part of a multivariate model was assessed. In the multivariate model of bounded rationality, financial literacy was no longer statistically significant; however education level and following professional advice remain statistically significant. It would appear that the construct being measured by the financial literacy scores is strongly related to education levels as demonstrated by the statistically significant relationship between the variables, and this relationship has been found in a number of studies as discussed in section 7.4.2.1. The combination of the two measures as predictor variables results in a situation where the financial literacy predictor loses its individual statistical significance. However it is kept in the model as it is theoretically relevant predictor variable and, as a standalone input in the logistic regression model, it displays statistical significance.

When considering the ability of a model of bounded rationality factors to predict preservation behaviour, from the overall model perspective, the null hypothesis is rejected as the model with bounded rationality variables provides statistically significantly better predictions of

preservation than a model without these variables. The model predicts that those with higher levels of education and, linked to this, high levels of financial literacy, and those who followed the advice of a professional, are more likely to preserve funds. This would appear to confirm the predictions of the behavioural model of bounded rationality that those with low levels of financial literacy and education, or those who did not follow credible advice would be more likely to take funds in cash when moving jobs.

The overall model fit is good, with these predictors explaining a relatively large amount of variance regarding the preservation decision. In addition, the improvement in the predictive success rate of the model is much better than chance, and the model provides an excellent level of discrimination in terms of determining who preserved or did not preserve funds. All of the above appear to indicate that the predictor variables associated with bounded rationality play an important role in explaining preservation decisions in this study.

7.5 RATIONAL MODEL

7.5.1 Overview

To determine whether rational factors drive preservation decisions, socioeconomic and demographic variables associated with consumption smoothing as per the LCH as well as those that identify liquidity constraints needed to be analysed. This would relate to age, financial security, reason for moving jobs, as well as relationship status as discussed in Chapter 3. The rational model would predict that those who are young or liquidity constrained would be less likely to preserve retirement funds when moving jobs.

In the sections that follow each of the abovementioned variables are evaluated as standalone predictors of preservation behaviour. The combined model of rational factors is then assessed to determine the ability of a model of rational factors to explain preservation behaviour.

7.5.2 Assessment of predictors as standalone variables

7.5.2.1 Age

In line with the findings of other studies (Hurd & Panis, 2006; Moore & Muller, 2002; Munnell *et al.*, 2009; Poterba *et al.*, 1998) there was a trend towards higher preservation levels as age increased, and age was a statistically significant predictor of preservation as a standalone variable. However in this data set, it would appear that the majority of those aged 45 and younger at the time of moving jobs did not preserve funds (on average preservation of funds was 40% or lower). The trend to higher preservation becomes more apparent after the

age of 45 when the majority begin to preserve funds, and levelled off for those above 50 years old, where approximately 60% preserved their funds.

When considering the appropriate age where individuals would commence saving for retirement in terms of the predictions of the LCH, as discussed in Chapter 3, 35 has been suggested as the optimal age provided savings contributions are stepped up as salary increases (Blake *et al.*, 2011). However, this sample shows low levels of preservation for at least 10 years beyond age 35 which appears to indicate that low levels of preservation are not limited to only younger participants in this sample as might be expected in terms of the LCH.

However as highlighted in section 7.2.4, when the use of funds is assessed it would appear that the majority of respondents were using funds to pay off debts or buy necessities. This appears to indicate some level of consumption smoothing occurring; however it appears to occur at ages beyond those traditionally associated with the LCH model.

When considering relationships between age and various other predictor variables it was found that age was statistically significantly related to salary levels, NAVs as well as education. When each of these variables was controlled for, age is no longer a statistically significant predictor of preservation. This appears to indicate that the impact of age on preservation is mainly driven by the link between those who are older in general having higher salaries, NAVs, and educational qualifications.

7.5.2.2 Salary and NAV

Again in line with numerous previous studies (Bassett *et al.*, 1998; Hurd & Panis, 2006; Moore & Muller, 2002; Poterba *et al.*, 1998), both salary levels and household NAV were statistically significant predictors of preservation and showed increasing levels of preservation as salary and NAV levels rose. In terms of the rational model, lower levels of preservation would be expected among those who are liquidity constrained. In line with this prediction, those earning low salaries were unlikely to preserve. However, the point at which the majority of respondents began to preserve funds was only for salary levels in excess of R20,000 take home salary per month, and NAVs above R1,000,000. A large increase in preservation occurred for those who earned in excess of R40,000 per month where almost 80% of respondents preserved funds.

In an attempt to assess what salary levels would be indicative of financial need, a recent report reveals that just less than half of consumers in South Africa who earn less than R15,000 a month are classified as financially secure. Of those earning less than R10,000 a

month, only 42% are financially secure, and for salaries less than R5,000 only 18% are seen as financially secure (Unisa, 2013). This would seem to suggest that the very low levels of preservation found in this study for those in the lowest income brackets, where only 20% of respondents preserved funds, might be related to liquidity constraints. However as salary levels increase, preservation levels remain relatively low, with only half of respondents earning between R20,000 and R40,000 preserving funds. According to the abovementioned report, almost two thirds of consumers in these higher income brackets are classified as financially secure. If that is the case they would probably not need to access retirement funds to meet current liquidity constraints, and low levels of preservation for amounts between R20,000 and R40,000 would appear to have some other cause.

It should be noted that these values are based on current salary levels and NAVs and not those at the time of job move, and since the majority of the sample (approximately 60%) indicated that since the job move their salary and financial situation had improved slightly or significantly, these figures would show inflated values for salary and NAV compared to the time of job move. This may account for the low levels of preservation observed at certain salary levels, for example between R20,000 and R30,000, as some of these individuals may have been earning below this bracket when they moved jobs. This may result in higher levels of financial vulnerability among these individuals at the time of job move. However when considering that low levels of preservation persist in the bracket between R30,000 to R40,000, even if these individuals had been earning substantially less at the time of job move, they would in general not have been financially vulnerable. Liquidity constraints would not therefore be expected to be a key driver of preservation at these higher salary levels.

In assessing what factors would be related to salary levels and NAVs, it was found that both were statistically significantly related to age. However, when age was controlled for they remained statistically significant predictors of preservation. As discussed in section 7.4.2.2, education was also statistically significantly related to salary levels. A statistically significant relationship between NAV and education levels was also observed. However when education levels were controlled for, salary and NAV were no longer statistically significant predictors of preservation. This would appear to indicate that the relationship between these variables results in diminished significance of salary and NAV as predictor variables. This could provide initial indications that the trend in preservation levels for various salary levels and levels of NAV is more related to the educational level of the respondent than to their financial situation.

7.5.2.3 Self-reported assessment of financial situation

This study found that self-assessed financial situation and self-assessed financial grouping were both statistically significant predictors of preservation. However high levels of preservation (in excess of 60%) were only observed for those who assessed their financial situation as “very good” and those who placed themselves in the most financially secure grouping.

When assessing self-reported levels of financial position, the observation that those who classify themselves as financially insecure do not preserve funds lends support to the view that these individuals are liquidity constrained and require the funds to meet day to day financial needs. However, once again, high levels of preservation only occur for those in the highest categories of self-assessed financial security. For those who indicate that their situation is satisfactory or good, low levels of preservation are still prevalent and once again these individuals would not necessarily be classified as financially vulnerable or needing funds to meet immediate liquidity constraints.

Self-assessed financial situation and grouping were statistically significantly related to salary levels and NAVs. There were however discrepancies where those earning relatively high salary levels and with high NAVs assessed their financial situation as bad or very bad, while some with relatively low salaries and NAVs assessed their situation as good or very good. There are a number of explanations for this phenomenon. First self-assessed criteria are subjective and would be assessed relative to a peer group or community, this could result in a situation where someone who is young and earning a low salary believes their situation is good compared to their peers who are also in the same low salary bracket. Support for this explanation is found in the absence of any significant relationship between self-reported measure of financial security and age. Second, number of dependants was not collected in this study, and would also impact on whether someone with a low or high salary considered themselves well off or not. This self-assessed financial situation predictor variable is therefore able to capture both subjective assessment of wellbeing, which would play a role in deciding to preserve funds or not, as well as a broader measure of the individual’s financial wellbeing in the context of overall household financial position, to supplement the information provided by salary and household NAV.

In summary, both self-assessed financial situation, and self-assessed financial grouping were significant predictors of preservation as standalone variables. Statistically significant

relationships were observed between these variables and salary levels, NAV and educational qualifications. When controlling for salary, NAV and education levels only self-assessed financial situation remained a statistically significant predictor of preservation.

7.5.2.4 Reason for job move

As discussed in Chapter 3, another factor which in previous studies has been linked to liquidity constraints was the reason for moving jobs. Studies have found that when a person leaves without another job to move to, then funds are used as a way to finance the unemployed time period (Amromin & Smith, 2003; Engelhardt, 2003; Hurd & Panis, 2006). The current study appears to support this finding as those who were retrenched, or quit without another job to move to, had very low levels of preservation (approximately 30%). In addition, it was found that others who were moving into a more liquidity constrained situation, such as leaving to start their own business or pursuing further academic studies also showed very low preservation levels.

When respondents were classified as moving to a better job versus all other reasons for leaving their previous employment, the higher level of preservation observed in terms of those with a better job to move to was not statistically significantly different. To echo this finding, moving for a better job was not a statistically significant predictor of preservation when considered as a standalone variable in the logistic regression equation (however the p-value was just outside the 95% confidence level).

On further investigation, it was found that once salary was included as a control variable in the logistic regression model, moving to a better job became a statistically significant predictor of preservation. This suggested an interrelationship between salary and moving to a better job. On closer inspection it appeared that the basis for this interrelationship was that at very low salary levels, whether someone moved to a better job or not had a significant impact on preservation. Those earning below R10,000 did not preserve at all if they were not moving to a better job, however this increased to 20% preservation when moving to a better job. In addition, the majority (over 90%) of those earning below R10,000 moved to a better job and this amplified the impact of the variable. This variable was therefore only a statistically significant predictor of preservation decisions in the presence of the variable related to salary.

7.5.2.5 Relationship status

Studies have found relationships between preservation of funds and relationship status. In general, it has been observed that those who are divorced, separated or widowed show lower

preservation levels, probably as a result of being more liquidity constrained than their married and single counterparts (Amromin & Smith, 2003; Hurd & Panis, 2006). In this study, the majority of the sample were married or in a long term relationship (72%). There were differences in the preservation levels depending on the relationship status of respondents, with only 30% of those who were divorced, separated or widowed preserving funds compared to the 40% preservation of those who were married or in a relationship, however, these differences were not statistically significant. Confirming this finding, relationship status was also not a statistically significant predictor of preservation as a standalone predictor variable. However this variable might be found to be a significant predictor in samples with a higher number of divorced, separated or widowed individuals.

7.5.3 Model of rational factors

Following the purposeful selection technique discussed in Chapter 4, a model containing all socioeconomic and demographic predictor variables associated with the rational model shown to have statistical significance as standalone variables was constructed. When variables associated with the rational model were included in a multivariate logistic regression model, self-assessed financial situation, personal salary, reason for leaving the previous job, as well as age, were statistically significant predictors of preservation.

The hypothesis that is tested is whether a rational model provides statistically significant predictions of preservation decisions. From the overall model perspective, the null hypothesis is rejected as the model with rational predictor variables is significantly different from one without these variables. The model predicts that those who are young, or have low salaries, or a poor financial situation, will display lower levels of preservation. In addition, those moving to a better job are more likely to preserve funds. This would appear to support the predictions of the rational model which predicts that low levels of preservation would be observed among those who are young and those who are liquidity constrained.

The overall model fit is fair, and the model provides an acceptable level of discrimination in terms of determining who preserved or did not preserve funds. This would appear to imply that while socioeconomic and demographic variables associated with the LCH and liquidity constraints provide important information regarding the preservation decisions of individuals, there could be other factors that are not captured by this model which would generate a better model fit.

7.6 SUMMARY OF FINDINGS

In general, according to the analysis of all variables in the above three models, and without controlling for the impact of other variables and interrelationships, a number of factors appear to provide insight into whether an individual preserves or not. Table 7.1 provides a summary of the factors that play a role in predicting preservation.

Table 7.1: Predictors of preservation

Model	Predictors of preserving	Predictors of not preserving
Behavioural Model: Bounded willpower	Low CFC immediate score	High CFC immediate score
	Low BIS score	High BIS score
Behavioural Model: Bounded rationality	High total financial literacy score	Low total financial literacy score
	High level of education	Low level of education
	Followed professional advice	Did not follow professional advice
Rational Model	Older	Younger
	Good self-assessed financial situation	Poor self-assessed financial situation
	High salary	Low salary
	Moved to a better job	Did not move to a better job

Source: Author's conception

This initial analysis provides support for both rational and behavioural elements in the retirement preservation decision making process. However due to the many interrelationships between variables, an assessment of models where factors are controlled for is required. This allows for conclusions to be drawn regarding the relative importance of the abovementioned factors in preservation decisions. The assessment of importance was first determined by comparing behavioural and rational factors as predictors of preservation. Thereafter, a combined model of all significant variables was constructed to determine which of the variables provide the best prediction of preservation.

7.7 MODEL COMPARISON: BEHAVIOURAL MODEL VERSUS RATIONAL MODEL

The above discussion confirms that measures of bounded willpower and bounded rationality, which constitute the behavioural factors in the conceptual model developed in Chapter 3, provide significant predictions of preservation, without controlling for other socioeconomic or demographic factors related to the rational model. The next step is therefore to evaluate whether these behavioural measures provide better predictions of preservation decisions than a model containing only socioeconomic and demographic variables associated with a rational model of preservation decisions. In other words, once all rational factors are controlled for, are behavioural factors still statistically significant predictors of preservation.

The rational model would predict that there would be low preservation levels among the young and those who were in financial need, or who were facing liquidity constraints. This study has found that there is evidence that preservation increases with age and very low levels of preservation are seen among those who are financially vulnerable. However other findings seem to indicate that there are more factors at play than just consumption smoothing and liquidity constraints. Low preservation levels were observed among those with low levels of financial literacy and education. In addition, those respondents who did not follow professional advice were less likely to preserve. Finally, those with high levels of immediate time orientation and high levels of impulsivity preserved less than those who showed more self-control.

A key question is whether a model of rational factors can explain all of the above observations. Due to the interrelatedness of factors, age and salary could potentially have an influence on education, financial literacy and measures of self-control, therefore it is important to control for socioeconomic and demographic factors to determine if behavioural factors remain significant predictors of preservation.

The hypothesis that is therefore tested is whether a model of behavioural predictors explains preservation decisions better than a model with only rational factors. In this regard, the null hypothesis is rejected, indicating that once all significant rational factors have been controlled for, behavioural predictors are still statistically significant predictors of preservation. Therefore, a model with both rational and behavioural factors provides better predictions of preservation than a model with only rational factors. This provides support for the thesis statement being tested in this study that behavioural factors play an important role in

preservation decisions, and contribute significantly to our understanding of preservation decision making.

7.8 COMBINED MODEL

Having confirmed the importance of behavioural factors in preservation decisions, the focus shifts to determining which of the predictor variables, whether behavioural or rational, are the best predictors of whether an individual preserved their funds when moving jobs. This provides further insight into the relative importance of behavioural factors, and, more importantly, allows conclusions to be drawn regarding which solutions, as set out in the conceptual model, would be best suited to assist individuals in making optimal decisions.

In order to determine which factors best predict preservation a combined model was developed with factors from all three preliminary models. In addition to the factors from the preliminary models, a last factor, which was the amount of funds available when the respondent moved jobs, was added. This factor has been found to be important in determining whether people preserve in previous studies, and was also found to be a significant predictor of preservation in this study. This variable had not been included in either the rational or behavioural models as elements from both models have the potential to impact on this variable as discussed in section 7.2.3.

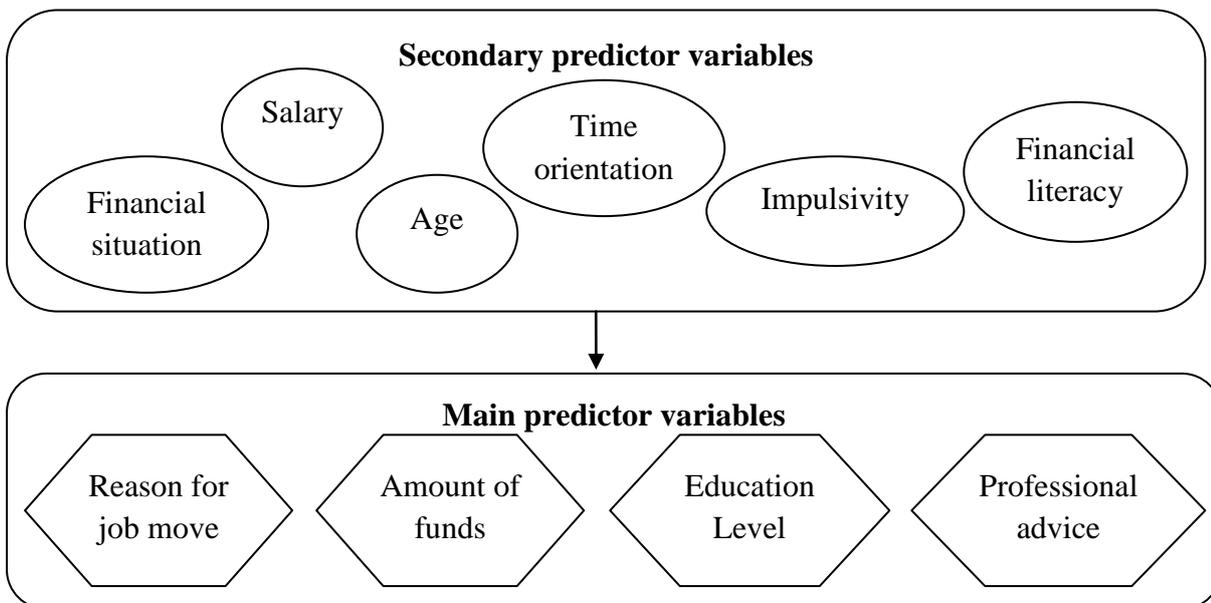
In building the combined model two approaches were used, first purposeful selection without adding back any effect moderators, and second, purposeful selection including effect moderators. In the first approach only those variables found to be statistically significant in the multivariate analysis were included in the final model. This creates the most parsimonious model with only four predictors of preservation being: level of education, reason for job move, professional advice and the amount of funds available when the individual moved jobs. The use of backward stepwise regression confirmed the significance and inclusion of the abovementioned predictor variables.

The model provided a statistically significantly better prediction of preservation than a model with no predictors. The overall model fit was very good with high levels of sensitivity and specificity providing excellent levels of discrimination between those who preserved and did not preserve. However, a key drawback to this model was that it did not account for all the interrelationships and correlations between the variables which were identified as statistically significant predictors on a standalone basis. This therefore resulted in a situation where the

effects of the four predictors provided biased estimates of the probability of preservation due to the absence of control variables.

Therefore, in line with Hosmer and Lemeshow's (2000:94) approach, variables were added back to the model to act as effect moderators. The variables added back to the model were all those which were contained in the final models of bounded willpower, bounded rationality and rational factors. The resultant model showed a slight decline in the likelihood ratio statistic, however all other indicators of model fit showed slight improvement. More importantly the model with controls provided more accurate information regarding the actual impact of the main predictor variables on the probability that an individual preserved. Figure 7.1 provides an overview of the predictor variables that play a role in the preservation decision.

Figure 7.1: Predictors of preservation



Source: Author's conception

Both the main and secondary predictor variables are all statistically significant predictors of preservation on a standalone basis, however when included in a multivariate model only the main predictor variables retain their significance. The secondary variables, while no longer significant predictors, play an important role as effect moderators to reduce bias in the interpretation of the main predictor variables.

In summary, holding all other factors constant, and controlling for all significant variables from both behavioural and rational models, the factors that predicted low levels of

preservation in this study were: not moving to a better job; low amount of retirement funds available at the time of job move; low education level; and not following professional advice.

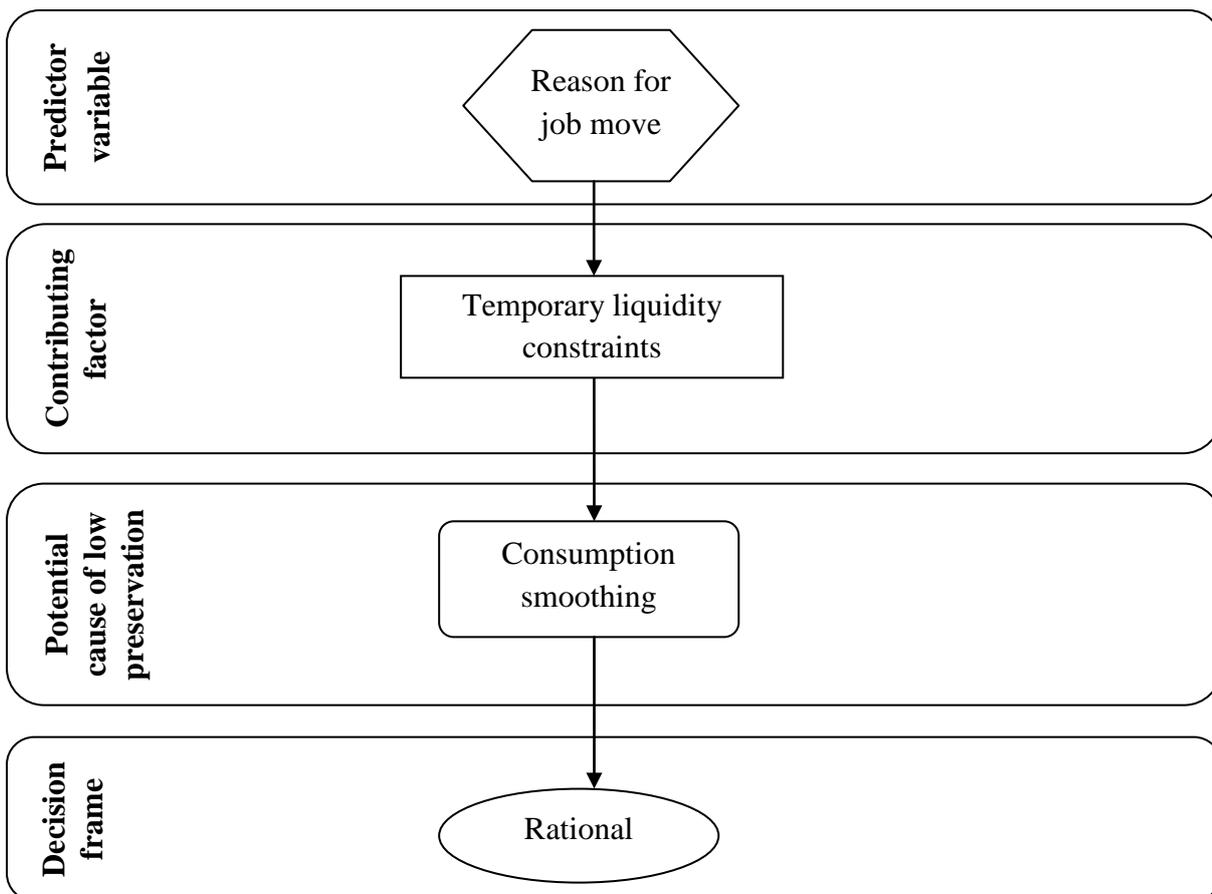
The next part of the analysis focuses on where the four main predictor variables fit into the conceptual framework developed in Chapter 3, in order to move forward in determining what solutions are best suited to ensure optimal preservation decisions. What follows in section 7.9 is a brief summary regarding each main predictor variable in the context of the overall conceptual model. Section 7.10 explores solutions relevant to these predictor variables.

7.9 KEY PREDICTORS IN THE CONTEXT OF THE CONCEPTUAL MODEL

7.9.1 Reason for job move

As discussed in section 7.5.2.4, the reason for leaving a job influenced whether an individual preserved funds. Figure 7.2 places this variable within the context of the conceptual model.

Figure 7.2: Reason for job move as a factor in the conceptual model



Source: Author's conception

In general respondents who did not have a better job to move to were less likely to preserve funds. This effect appeared to result from temporary liquidity constraints and linked to

consumption smoothing over the liquidity constrained time period which forms part of the rational model of preservation decision factors. Additional information provided by respondents supported the concept of consumption smoothing as a result of temporary liquidity constraints as funds were reportedly used to help support individuals after retrenchments, relocations and while studying.

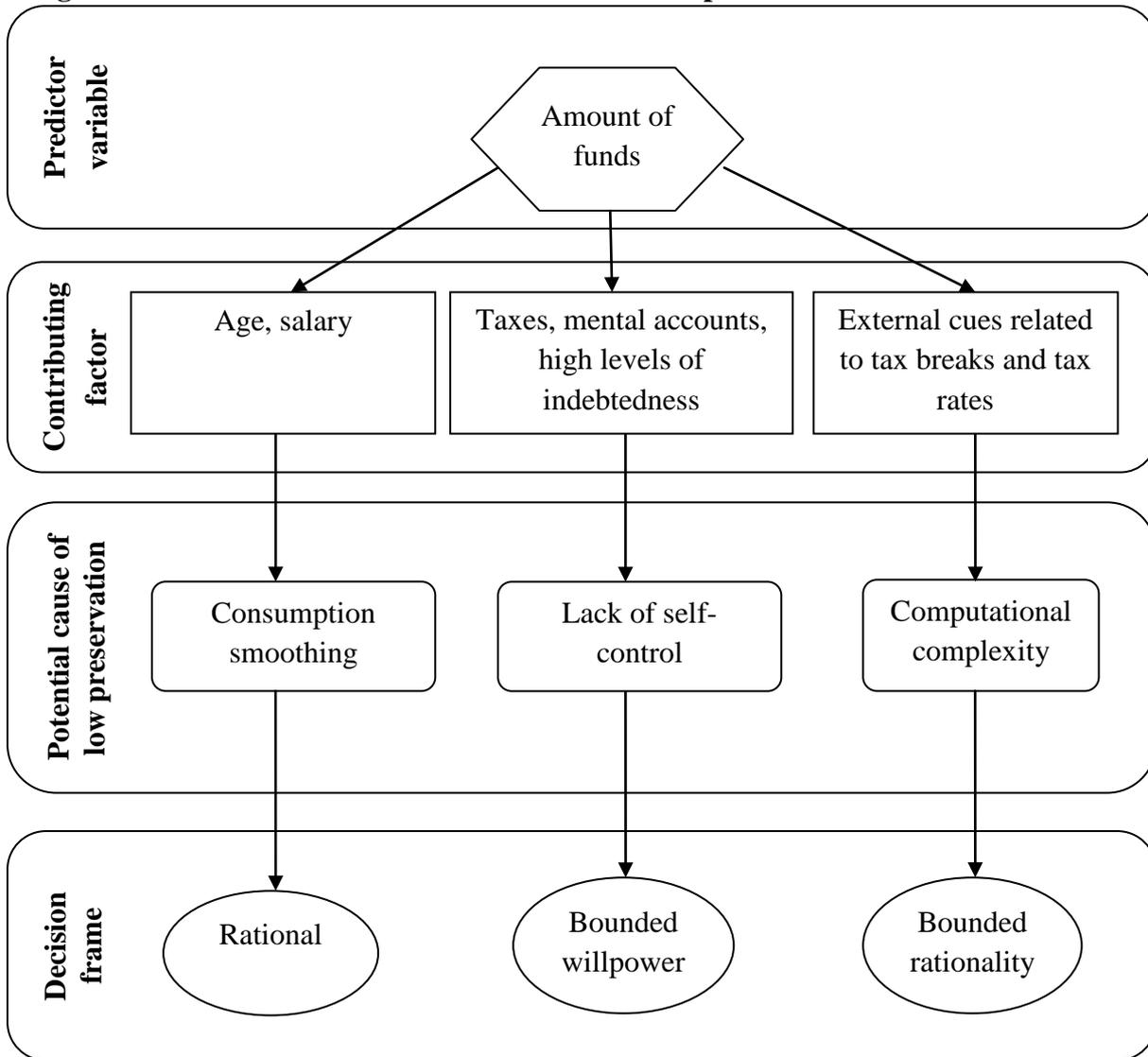
As a standalone variable it does not have a significant impact on preservation decisions, however, once included in a model with control variables, it predicts increased odds of preserving in the region of 165% for someone moving to a better job. The key influence of this factor appears to be for those earning low salaries; however the impact of moving to a better job also results in higher levels of preservation across higher salary brackets, although the effect is less pronounced than for those earning low salaries.

7.9.2 Amount of funds

As highlighted in section 7.2.3, the amount of retirement funds available at the time of job move is a key predictor of preservation. When considered as a standalone variable, the odds of preserving increase by 154% for each increase in the level of amount of funds available. However, both salary and age are related to higher amounts of funds, and another factor that could have an impact would be that those with large amounts may be more likely to seek professional advice regarding the preservation decision, and as the model has shown those using professional advice are more likely to preserve. However, controlling for all significant behavioural and rational factors, the amount of funds remains a significant predictor with the odds of preserving increasing by 103% for each increase in level of funds available.

When considering where this variable fits in to the conceptual model, a key issue is determining what factors link preservation decisions to the amount of funds available at retirement. As highlighted in section 7.2.3 there could be a number of potential factors including age, salary, tax free portions for amounts below R22,500, low tax rates for amounts up to R600,000, mental accounting where the marginal propensity to consume windfalls and bonuses might play a role, and the use of funds to help pay off debt and buy necessities as part of consumption smoothing. Figure 7.3 provides an overview of the abovementioned factors and how they ultimately impact on defining this variable in the context of the conceptual model.

Figure 7.3: Amount of funds as a factor in the conceptual model



Source: Author's conception

If the main drivers of low preservation for lower amounts relate to those who are young and liquidity constrained, and those who are accessing funds to facilitate optimal consumption smoothing over their life cycle, then this predictor variable relates to the rational factors within the conceptual model. However, if tax incentives, mental accounting and individuals accessing funds to pay off debts resulting from self-control issues, are the reason for the link between amount of funds and preservation levels, then all indications are that this predictor variable relates to bounded willpower factors within the conceptual model.

Suboptimal consumption smoothing decisions might also be made by individuals who are unable to assess whether accessing funds is the optimal solution. These individuals may be guided by external cues such as the tax free portion available, and relatively low tax rates for

accessing funds up to R600,000. Therefore factors related to bounded rationality could explain the link between low levels of preservation and amount of funds.

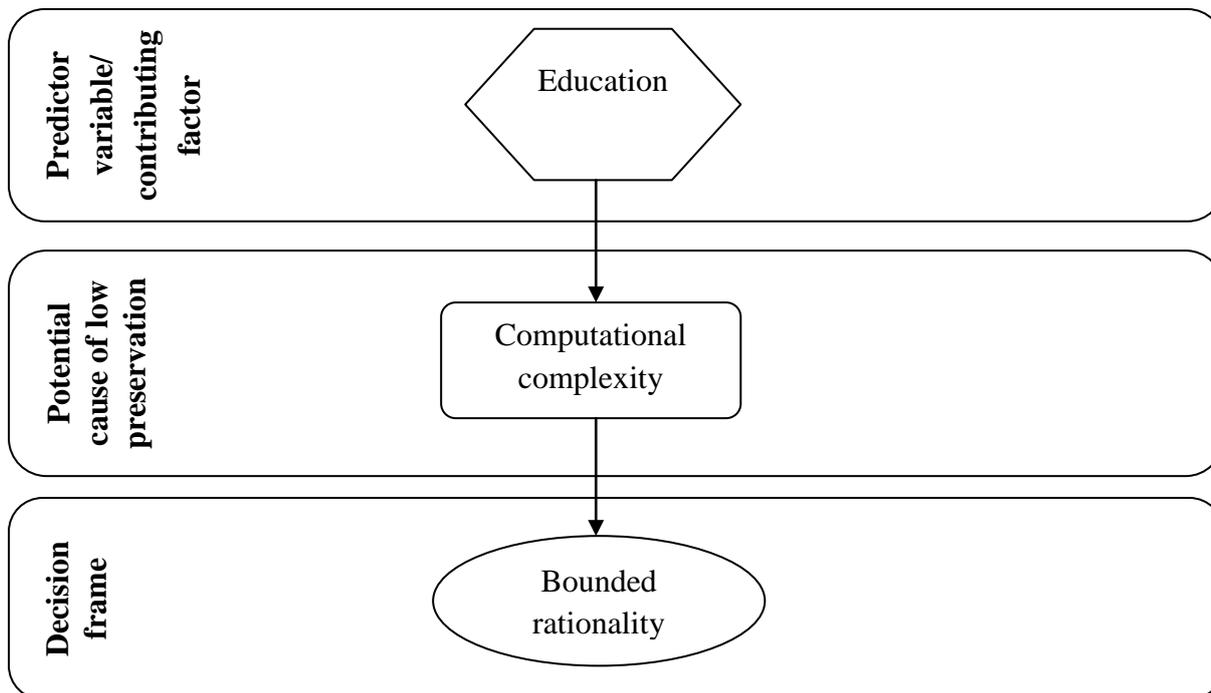
7.9.3 Education

Education has been discussed in the context of bounded rationality in section 7.4.2.2. As a standalone predictor of preservation, an increase in the level of educational qualification increased the odds of preserving by 216%. However, while primarily part of the bounded rationality part of the conceptual model, education has links and relationships to a number of variables in both the bounded willpower and rational section of the model.

In general, higher levels of education were found to be related to more financially secure individuals, older respondents, respondents with lower levels of immediate time orientation and lower levels of impulsivity, and respondents with higher levels of financial literacy. In addition, those with higher education levels were more likely to seek advice from a professional advisor. Despite all of these relationships, once all these variables were controlled for, education remained a statistically significant predictor of whether an individual preserved or not, with the odds of preserving increasing by 112% for each increase in level of educational qualification. This appears to indicate that education level is a significant predictor of preservation in its own right, beyond just being a proxy for those who are older, have higher salaries or higher levels of self-control. This would appear to imply that those who are more educated are better able to handle the computational complexity associated with preservation decisions. Figure 7.4 sets out the context for the inclusion of education in the conceptual model as an indicator of computational complexity related to bounded rationality.

A final point to note relates to the fact that the education levels of this sample were high relative to what may be observed in the more general population of active retirement fund members. As education level appears to play a significant role in preservation decision making, the average levels of preservation in this particular sample would probably overstate general levels of preservation in South Africa. As discussed in Chapter 3, this is supported by studies that find preservation levels below what was observed in this study (Murphy, 2002; South Africa, National Treasury, 2007). However a recent industry survey found similar average levels of preservation as those observed in this study (Sanlam Employee Benefits, 2013).

Figure 7.4: Education as a factor in the conceptual model



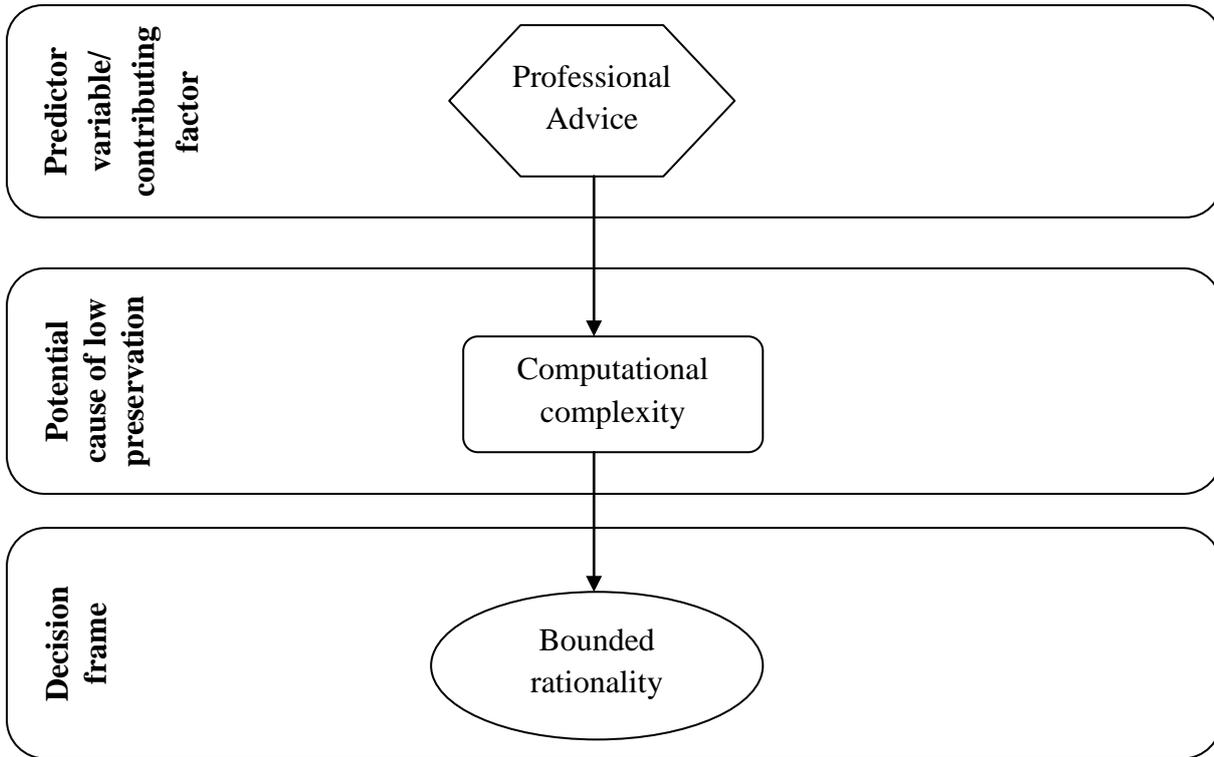
Source: Author's conception

7.9.4 Advice

Advice has been discussed in detail in section 7.4.2.3 in the context of bounded rationality. As a standalone predictor variable the odds of someone who followed professional advice preserving funds was 492% higher than someone who did not follow this advice. As would be expected, wealthier respondents and those who had access to higher amounts of funds at the time of job move were more likely to follow advice, however this variable remained a statistically significant predictor of preservation even after these factors were controlled for, showing increased odds of preserving of 223% relative to someone who did not follow advice.

Figure 7.5 illustrates how this variable fits into the conceptual model. As with education, the role that advice plays appears to relate to the inherent computational complexity of the preservation decision making process. As discussed previously, consulting the correct external sources is a way to overcome bounded rationality in situations of computational complexity.

Figure 7.5: Advice as a factor in the conceptual model



Source: Author's conception

7.9.5 Summary of predictors in the context of the conceptual model

Two of the main predictor variables are related to behavioural factors in the form of bounded rationality being education level and whether someone followed professional advice. There is also evidence of rational factors in the form of liquidity constraints as those who did not move to a better job were less likely to preserve funds. The last predictor, amount of funds, is difficult to allocate to a specific part of the conceptual model as it could potentially signal rational behaviour or it could be related to behavioural factors.

The overall importance of behavioural factors, in the form of bounded rationality linked to education levels and advice, in explaining preservation decision making once again provides support for the thesis statement being investigated in this study. This study has found that behavioural factors play an integral role in understanding low levels of preservation, and could therefore provide important insights into what solutions are appropriate to drive optimal levels of preservation.

7.10 PROPOSED SOLUTIONS

7.10.1 Overview

As discussed in section 7.8, while many factors play a role in determining whether individuals preserved or not, the four main predictor variables have a significant impact after controlling for these factors. Therefore even if an individual has self-control problems, or is young, or has a low salary, these main predictor variables still have a significant impact on the decision to preserve funds and therefore need to be the focus of solutions to improve preservation levels.

As highlighted in Chapter 3, an important distinction needs to be made regarding the ultimate aim of solutions in the context of preservation decisions. If the goal is to drive the highest possible levels of preservation then a solution of mandatory preservation achieves this. However if the goal is to drive optimal levels of preservation then solutions should focus on the underlying causes of low preservation levels in an attempt to understand what causes people to access cash when they move jobs. As previously discussed, the focus of solutions in this study is on the latter objective. This section investigates what insights are provided in terms of the main predictors in this study as they relate to the identification of appropriate solutions.

7.10.2 Reason for job move

It appears from this study that those who do not have a better job to move to will generally cash out preservation funds to help meet current liquidity needs, using the funds to temporarily smooth consumption. When considering the implications for solutions, this predictor variable provides insight into who would be most likely to take a cash payout. However rather than providing information regarding where interventions should be targeted or pointing to a particular intervention, it potentially illustrates a need for concessions to be made for individuals to access funds when facing temporary liquidity shortages. The need for such concession is generally recognised by policy makers, and, as an example, hardship withdrawals exist in the USA to assist individuals (Bassett *et al.*, 1998:279). In a South African context, the current retirement reform proposals also take account of this, and makes concessions for individuals to access funds (South Africa, National Treasury, 2013).

7.10.3 Amount of funds

A first insight provided by this variable is in terms of who is most at risk of taking a cash payout, and therefore where interventions might need to be directed. In general individuals with small amounts of funds are unlikely to preserve these funds, and the current tax free portion, and sliding scale of taxes could actually encourage this behaviour.

When analysing the amount of funds available and the use of cashed out funds, consumption smoothing behaviour is evident as many respondents reported using funds to pay off debts and purchase necessities. It is difficult to identify solutions based on this predictor variable without further information regarding the rationality of the decision made to cash out funds to facilitate consumption smoothing. An approach that accepts that this decision making is optimal would lean towards a libertarian view that no interventions would be required. However, at the same time, initial indications seem to point to potential issues related to self-control and mental accounts. This would imply that adopting a libertarian approach would result in insufficient funds at retirement and would suggest a need for intervention, either in the form of mandatory preservation, or using behavioural tools to assist in debiasing decision making. Finally, given the complexity of understanding whether a decision to take a cash payout is optimal to fund current consumption needs and the payment of debt, this might provide support for the idea that decision assistance at the time of moving jobs to facilitate optimal decision making is a key way to encourage individuals to make optimal preservation decisions.

7.10.4 Education

While higher education levels predicted higher preservation levels in this study, it would be virtually impossible to target improved academic qualification as a way to increase preservation levels. However, targeted financial education in the form of workplace education may have a role to play in increasing preservation. In addition, given the findings in this study, it would appear that to be most effective, interventions should be targeted at those with lower educational qualifications.

When considering educational interventions, studies have shown that deductive and inductive reasoning can be improved through specific training (Klick & Mitchell, 2006; Mitchell, 2002) and workshops to teach decision making skills have been found to decrease the reported use of maladaptive decision making tools (Mann *et al.*, 1989). However, in the context of

retirement savings decisions, the efficacy of educational and training efforts is still open to debate (Agarwal, Amromin, Ben-David, Chomsisengphet & Evanoff, 2011:2; Bell, Denney, Quinn, Shields & Weisman, 2010:26).

Lusardi and Mitchell (2007c:43) also highlight a number of obstacles to using financial education as a means to improve financial decision making. First, only a small fraction of workers attend training, second, it is difficult to “cure” financial illiteracy with a one-off intervention. Third people have trouble following through on what they say they are going to do, and lastly, a one-size fits all approach does not work. These obstacles lead Lusardi and Mitchell to conclude that consumers need to be given the tools to change their behaviour and require personalised feedback to assist in the learning process. This potentially points to providing decision support and decision guidance as appropriate interventions to assist individuals in making optimal decisions.

Therefore the significance of education as a predictor variable provides insight regarding where solutions that target higher preservation levels should be directed and confirms the presence of computational complexity as a key factor in retirement preservation decision making. While this variable does not necessarily highlight a specific intervention that would drive higher levels of preservation, it does point to the need for decision support and guidance.

7.10.5 Advice

When considering the role that professional advice played in predicting preservation in this study, and its implication for solutions, there are two main focus areas. First, the variable provides a clear idea of a practical intervention to facilitate optimal preservation decision making, which is the provision of professional advice to individuals at the time of moving jobs. The large role this variable played in predicting preservation behaviour in the current study may make it a prime area to concentrate efforts to assist in driving high levels of preservation through optimal decision making.

Second, this variable provides insight into who would benefit from this advice, and how this advice could best be delivered. As advice would generally be more beneficial to those who had low educational qualifications or low levels of financial literacy, the worrying finding from this study is that it appeared that in general, those who would benefit the most from advice were the ones who did not seek advice from a professional source. It is therefore these individuals who should probably be targeted in terms of interventions to increase preservation

levels. However an interesting phenomenon was observed in that those respondents with the lowest financial literacy scores did seek advice from a professional source in the form of the HR department. This has important implications regarding the opportunity to intervene and assist in preservation decision making.

Given the uniqueness of each individual's financial situation, tailor made advice would be the optimal solution as an assessment could be made of the individual's unique financial circumstances to determine whether the retirement funds should be preserved or not at the time of a job move. However, the costs involved in provision of tailor made advice could make this prohibitively expensive for those with lower incomes. While HR departments and the administrators of pension funds are other places where individuals can obtain advice at no cost, the ability of these areas to provide advice is hampered by the complexity of the decision making environment and the uniqueness of each individual situation.

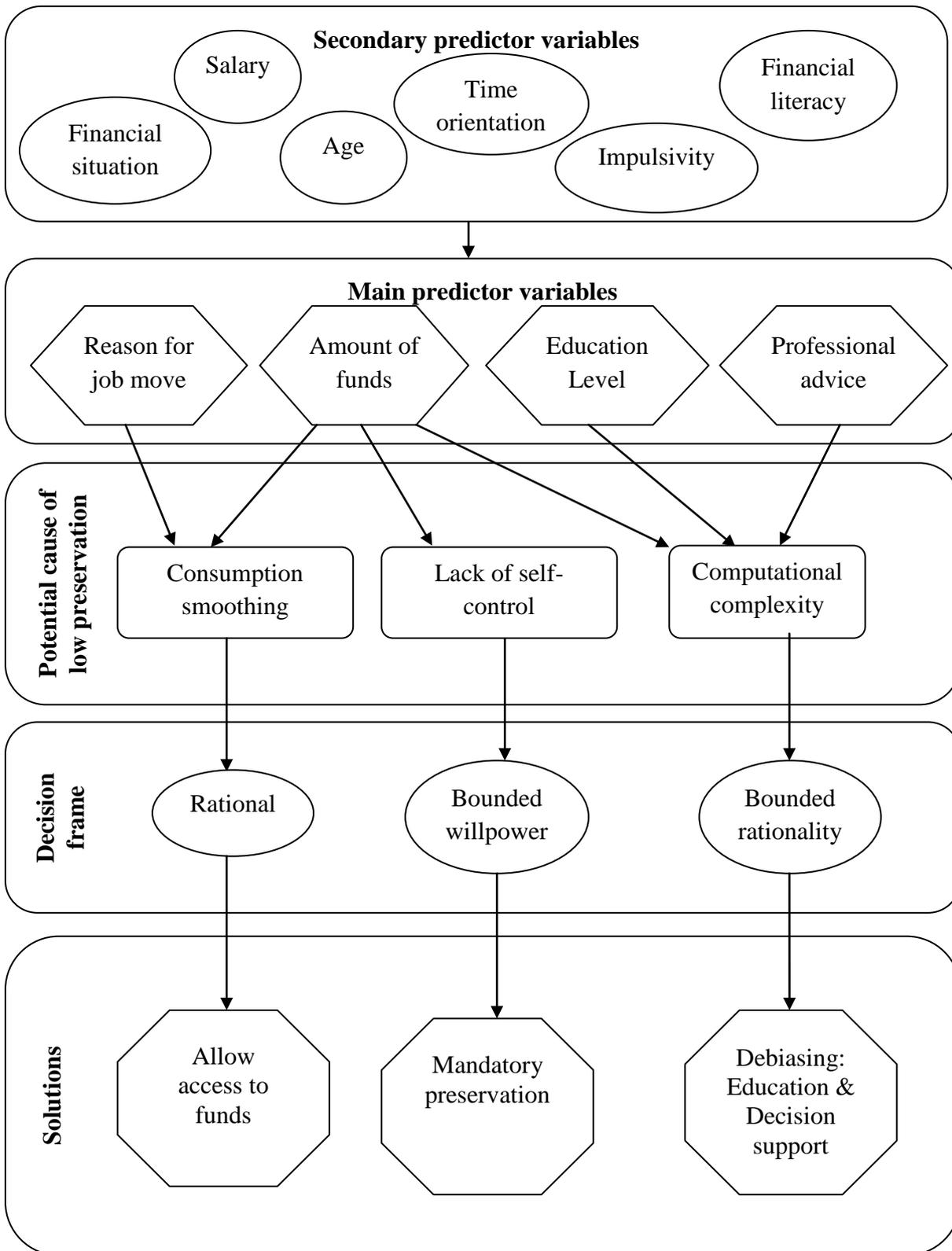
Suggestions for alternative interventions could include the use of decision tools and related technological intervention such as computer based decision aids (Hershey *et al.*, 1998:468) and, as discussed in Chapter 3, the use of decision support systems (DSS) to assist in financial decision making is something that has received increased attention in the past two decades (Arnott, 2006; Chen & Lee, 2003; Keren, 1990; Larrick, 2004). The intrinsic design of DSS helps overcome bounded rationality in that it provides a mechanism for carrying out complex computations (Parikh, Fazlollahi & Verma, 2001; Silver, 1991).

If DSS are created to help individuals determine what the optimal preservation decision is for their unique circumstances, then, it may be possible to provide decision guidance to individuals as part of job leaving procedures that are already in place within companies. Such interventions could take place during exit interviews or while finalising administrative tasks already carried out in terms of procedures to pay out or transfer funds.

7.11 TOWARDS A SCIENTIFIC MODEL

The move towards the development of a scientific model of factors influencing preservation decisions has commenced with the findings from this study. Figure 7.6 provides an overview of the findings of this study in relation to the initial conceptual model.

Figure 7.6: Developing a scientific model



Source: Author's conception

When considering that many individuals use funds to pay off debt or buy necessities it would in general be assumed that this points to consumption smoothing. However until more is known about the rationality of such behaviour it is difficult to assess which solution is most appropriate. If the consumption smoothing behaviour observed in this study is rational and leads to optimal life cycle spending and saving then no intervention is required. This would appear to be the case with regard to short term liquidity shortages when individuals do not have a better job opportunity, or where amounts are accessed to pay off debts and buy necessities in line with the predictions of the LCH, where this would be prevalent among younger individuals in the consumption phase of their life cycle.

However if the consumption smoothing is not as a result of rational behaviour then intervention may be required. Preliminary indications in this study are that those with lower levels of self-control reported that they used funds to pay off short term debts, however due to the propensity for those with low levels of self-control to be over indebted, the payment might only provide a temporary solution. In addition, the role played by self-control in the context of mental accounting and the consequent low levels of preservation for small amounts is another potential sign that irrational factors are influencing preservation decisions. As mentioned previously the impact of mental accounting may be exacerbated as individuals move jobs more often and have shorter tenure at companies leading to small amounts available at the time of moving jobs. The impact of multiple withdrawals of small amounts has the potential to reduce eventual retirement funding significantly.

In addition, when assessing other indicators of the life-cycle hypothesis, it appears that the majority of individuals only begin to preserve funds from age 45 and older. While indicators of financial need confirm that those with the lowest salaries, NAVs and self-assessed financial situation are least likely to preserve, low levels of preservation persist at higher salary and NAV levels. This evidence, coupled with studies which indicate that many are retiring without sufficient funds (South Africa, National Treasury, 2007) could provide support for some form of intervention.

While some concessions might need to be made for those who are liquidity constrained, either permanently, or as a result of temporary circumstances such as retrenchment, there may be a need to introduce mandatory preservation to ensure that individuals have sufficient funds available at retirement. However the knock on effect of mandatory preservation on overall levels of indebtedness is unknown. In addition mandatory preservation could result in a situation where individuals are unable to pay off debts and therefore incur high interest

charges while at the same time being forced to accumulate funds for retirement which could be put to better use relieving debt obligations. As discussed in Chapter 3, mandatory preservation only assists when individuals display self-control problems. If individuals are accessing funds to facilitate consumption smoothing as they are not able to determine whether it would be optimal to spend or save funds, then mandatory preservation will not assist individuals, and the focus should shift to assisting individuals to make optimal choices.

Therefore mandatory preservation might do more harm than good, and could also result in a knock on effect of lower overall retirement savings as employees who are worried they will not have access to funds reduce their retirement contributions. While problems of self-control may lead to over indebtedness and suboptimal consumption smoothing, until more is known about the links between use of preservation funds, debt levels and self-control, it may be better to focus attention on solving the problem of low preservation levels by considering the other main predictors of low preservation linked to bounded rationality.

The role that education levels and following professional advice play in predicting preservation in this study highlight the importance of considering solutions related to bounded rationality, due to the computational complexity of the preservation decision making environment. A case could be made that providing relevant education and training, and perhaps more importantly, providing professional advice when individuals move jobs, may be the most effective solution to the problem of low preservation levels.

Initial indications are that solutions should be targeted towards debiasing in the form of either education or decision support. Of these two approaches, the provision of decision support, either in the form of a professional advisor, or through the use of DSS would appear to be the most effective solution to assist individuals to make optimal choices regarding their retirement funds when moving jobs.

As discussed in Chapter 3, solutions should assist those who require help, without adversely impacting on those who do not require assistance. Decision guidance and decision support appear to meet that mandate. An important caveat would relate to the costs involved in setting up the requisite support systems as, depending on who bears these costs, there may be a potentially negative impact on those who do not require assistance. While there will be costs involved in designing appropriate decision support, the ongoing costs of providing assistance need not be prohibitive if technological interventions are made available as part of the existing job exit procedures.

In a retirement landscape dominated by defined contribution schemes, the individual is increasingly responsible for ensuring they have sufficient funds at retirement. As highlighted in Chapter 3, there appears to be a disconnect between the libertarian view that individuals should assume this responsibility, and the idea that individuals should be forced to preserve funds as paternalistic solutions are imposed to ensure individuals make the “correct” decision. A far better approach may be to provide individuals with the tools to allow them to make optimal decisions. As Larrick (2004:318) suggests “Debates about rationality have focussed on purely cognitive strategies, obscuring the possibility that the ultimate standard of rationality might be the decision to use superior tools.” These sentiments are echoed by Edwards and von Winterfeldt (2000:616): “The whole issue of how good human intuitive performance is may be more or less irrelevant to the broader question of human intellectual competence, because if the problem is important and the tools are available people will use them and thus get right answers.” Therefore the ultimate measure of rationality in preservation decisions might be in the advice that is sought and the tools that are used to make optimal decisions in a computationally complex environment.

7.12 CONCLUSION

The empirical phase of this study confirmed that both rational and behavioural factors play a role in the preservation decision process. In general, as per the rational model, those who were young and liquidity constrained were less likely to preserve their funds. However, behavioural factors linked to both the bounded willpower and bounded rationality models assisted significantly in predicting those who would preserve funds. In support of the thesis being tested in this study, it was found that a model with behavioural factors was better able to explain preservation decisions than one with only socioeconomic and demographic factors associated with a rational model.

When considering the main predictors of preservation, both consumption smoothing and computational complexity appear to play a role. However, while there is evidence of consumption smoothing behaviour, general low preservation levels would appear to point to sub-optimal decision making. This study has identified the crucial role that decision support and levels of education play in determining whether an individual preserves funds. Therefore the introduction of debiasing in the form of decision support appears to offer the best opportunity to intervene in the decision making process to assist individuals in making optimal preservation choices.

CHAPTER 8 CONCLUSION

8.1 INTRODUCTION

This chapter first provides a summary of the findings from the multidisciplinary literature review which formed phase one of the study, the empirical findings of phase two and the development of a scientific model of preservation which was the focus of phase three of this study. The chapter then details the main conclusions of the study in light of the research objectives and thesis outlined in Chapter 1. The chapter concludes with a summary of the contributions of this study and suggestions for further research.

8.2 SUMMARY OF FINDINGS

8.2.1 Phase One: conceptualisation

The overview of savings theories in Chapter 2 provided insight into the importance of psychological and behavioural factors in early theories of intertemporal choice. These factors were later excluded as a move towards more scientific explanations of economic theories took precedence. However, behavioural concepts related to savings decisions returned to prominence in the latter part of the 20th century. In part this appears to have been driven by the need to understand potential shortcomings in the individual's decision making abilities as the global move to defined contribution retirement schemes placed the responsibility for retiring with sufficient funds in the hands of the individual.

The conceptual model developed in Chapter 3 highlighted three main models of factors which explain preservation decisions, a rational model, a behavioural model based on limitations as a result of bounded rationality and a behavioural model based on limitations as a result of bounded willpower. Each model provides different predictions of the factors that potentially account for low levels of preservation, and in light of this, what solutions are required to ensure optimal preservation decisions.

In terms of the rational model low levels of preservation would be driven by the predictions of the LCH, linked to consumption smoothing, and as a result of financial need. Therefore low levels of preservation would be expected among those who are young or liquidity constrained. In this instance, no intervention is required as individuals should be allowed to access funds to facilitate consumption smoothing or overcome situations in which they are liquidity constrained.

The behavioural model linked to bounded rationality would predict that those who are unable to overcome the computational complexity of the retirement preservation decision would be less likely to preserve funds. Therefore low levels of preservation would be seen among those who had low levels of education, low levels of financial literacy or those who did not seek advice regarding their decision. In this instance, interventions are required to assist individuals in making optimal choices using debiasing techniques to provide decision support either focused on educational or technological interventions.

The behavioural model linked to bounded willpower would predict that those with low levels of self-control would be less likely to preserve funds. Therefore if an individual had a time orientation that focused on the present, or high levels of impulsivity, it would be expected that the individual would not preserve their funds. The solutions in this case would either be driven by policy tools in the form of taxes or mandatory preservation, or alternatively behavioural tools focussed on debiasing strategies.

8.2.2 Phase Two: empirical testing

In line with other studies, it was found that the majority of respondents did not preserve their retirement funds when moving jobs. The most commonly reported uses of funds were related to paying off short term and long term debt, as well as purchasing necessities. These uses appeared, when taken at face value, to reflect consumption smoothing behaviour, however on further investigation it was found that numerous behavioural factors were also potentially at play.

Initial testing of all three models of preservation as developed in Chapter 3 provides preliminary support for each model as factors related to rational, bounded rational and bounded willpower models all provide statistically significant predictions of preservation decisions.

In terms of the rational model, those who are young and liquidity constrained showed lower levels of preservation. In terms of the bounded rationality model, those with lower levels of education and those who did not follow professional advice were less likely to preserve. Lastly in terms of bounded willpower, those with low levels of self-control also had lower levels of preservation. This appeared to provide initial support for the idea that rational factors were not the only variables at play and that behavioural factors provided additional insights into preservation decisions. However, due to the interrelatedness of a number of the

variables in the above models, before determining whether behavioural factors played an important role in preservation decisions, rational factors had to be controlled for.

Once all socioeconomic and demographic variables associated with the rational model were controlled for, it was found that a model containing behavioural factors provided a statistically significant improvement in prediction of preservation decisions over one with only rational factors. This finding provides support for the thesis under investigation in this study as behavioural factors played an important role in predicting preservation behaviour.

The last step of the empirical testing was to develop a combined model of all factors, both rational and behavioural, to determine the most important predictors of preservation. In this regard four main predictors emerged as key variables in determining whether an individual preserved funds or not. Two of the main predictors of preservation were whether an individual followed professional advice and the level of education of an individual. Both of these variables are part of the bounded rationality model and appear to emphasise the role played by the inherent computational complexity of the preservation decision making environment. This provided further support for the thesis statement regarding the importance of behavioural factors in preservation decisions.

The third key predictor related to whether an individual was moving to a better job. Moving to a better job involved elements of consumption smoothing linked to the rational model of preservation. The impact was most pronounced for those earning low salaries where this appeared to be a key factor in deciding whether to preserve funds or not.

The last key predictor variable, which was the amount of funds available at the time of job move, did not fit clearly into one part of the conceptual model and could be associated with either rational or behavioural factors. Rational factors would be associated with age and salary, while behavioural factors were potentially related to bounded willpower issues as a result of mental accounts, tax breaks and high levels of indebtedness. In addition, bounded rationality could also play a role as a result of the external cues created by tax incentives

8.2.3 Phase Three: developing a model

When considering what the above empirical results imply in terms of solutions to assist with optimal preservation decisions, there appears to be a need for intervention due to the prevalence of behavioural factors which play a role in these decisions. While there is evidence of rational behaviour and consumption smoothing as individuals access funds to pay

off debts and buy necessities, there are indications that this consumption smoothing might not be optimal due to the potential influence of behavioural factors.

The role played by education and professional advice in predicting preservation appear to support interventions related to bounded rationality as it seems that computational complexity had the biggest influence on the preservation decisions of individuals in this study. Findings from this study provide support for solutions that target debiasing through education or decision support to ultimately assist individuals in making optimal preservation decisions.

8.2.4 Limitations

Due to the nature of this study, the above findings in terms of the empirical phase of the study and resultant scientific model are not necessarily representative of the general South African working population who have access to retirement funding. However it provides indications of the key factors that drive low levels of preservation and the importance of behavioural factors in preservation decisions. Further testing in other samples would be required before these results can be generalised.

One aspect which requires further exploration relates to the level of education of the respondents in this study. As has been found in other studies, level of education was linked to self-control, with higher levels of self-control associated with higher levels of education. In this study, education played an important role as a predictor variable of preservation, even after controlling for levels of self-control. However, given that this particular sample displayed generally high levels of education, the impact of self-control on preservation decisions may be more pronounced in samples with lower overall education levels. Further testing of the model in other samples is therefore required to more fully explore the impact of education and the links to self-control in preservation decision making.

8.3 CONCLUSIONS

The thesis statement tested in this study was that behavioural factors play an important role in explaining preservation decisions when individuals move jobs. This study has found support for this thesis in two key areas. First, the overall model of behavioural factors better predicts preservation decisions than a model of only socioeconomic and demographic variables linked to the rational model. Second, when considering which factors were the most important predictors of preservation, it was found that education and advice, which are both linked to the behavioural model of bounded rationality, played a key role in predicting which individuals preserved funds once all other variables were controlled for.

Therefore, when assessing the level of rationality of retirement preservation decision making, while there is evidence that rational factors are at play, behavioural factors are required to provide a complete understanding of what predicts preservation. In particular behavioural factors related to the inherent computational complexity of preservation decision making emerge as important variables, as those who are in a better position to overcome such complexity, as result of higher education or because they followed advice, seem to be in a better position to make optimal decisions.

Turning to the implications of the above findings in terms of solutions, the important role played by behavioural factors implies that intervention is required to assist individuals in preservation decision making. In light of the role that education levels and following professional advice played in predicting preservation in this study, solutions related to bounded rationality, due to the computational complexity of the preservation decision making environment should be focused on. Therefore, providing relevant education and training, and perhaps more importantly, providing professional advice when individuals move jobs, may be the most effective solution to ensure individuals make optimal preservation decisions. In this regard the provision of decision support, either in the form of a professional advisor, or through the use of technology such as DSS, could provide effective interventions.

As discussed in Chapter 3, if the ultimate aim of solutions related to low levels of preservation is to drive the highest possible levels of preservation then the only solution required is to implement mandatory preservation. However if the aim is to drive optimal preservation decisions then solutions would be identified in relation to the underlying causes of low levels of preservation. In this study, where the latter approach is adopted, the prevalence of predictor variables linked to computational complexity would appear to suggest that decision support and guidance are more suited to solving the problem of low preservation levels than mandatory preservation. In addition, in accordance with the view that solutions should assist those who require it, without adversely impacting those who do not, decision guidance and support is a far less prescriptive approach than mandatory preservation. Providing decision making support does little harm to those acting rationally, while at the same time assisting those who require help.

The impact of these particular factors in the broader population would however need to be confirmed prior to drawing definitive conclusions regarding solutions required to assist in optimal preservation decision making. However, support for the importance of advice in preservation decisions has been confirmed in a recent industry study (Old Mutual, 2012)

which appears to indicate that this solution may have applicability to the wider South African population.

In light of the conceptual model developed in phase one of this study, and the empirical testing of the model in phase two, this study has allowed the development of a scientific model of factors that predict whether individuals preserve their retirement funds when they move jobs. The identification of behavioural factors, and in particular those linked to bounded rationality, provides insights regarding interventions required to address the problem of low levels of preservation. The conceptual model developed in this study, and the questionnaire designed to assess factors that play a role in preservations, provide a foundation for the scientific model and form the basis for further investigations to confirm the relevance of these factors in other samples and populations.

8.4 SUMMARY OF CONTRIBUTIONS

This study makes a unique contribution to the field of retirement finance and decision making. It extends the boundaries of the traditional finance discipline to include insights regarding the psychological and behavioural elements which have the ability to impact on the decision making process of individuals as they prepare for retirement and therefore contributes to the growing body of work in the field of behavioural finance. The results of this study have widespread implications and are therefore informative for policy makers, members of retirement funds, sponsors of retirement funds, retirement fund providers and financial advisors.

From an international perspective, very few studies of preservation decisions have included behavioural factors. Therefore the development and use of a customised questionnaire to test behavioural factors in a preservation decision model adds to the exploratory work being done in this particular area. The development of the conceptual model, and the design of a questionnaire to test such a model, facilitates the move towards the construction of a comprehensive scientific model and provides opportunities for exploring preservation decisions in other samples both in South Africa, and internationally.

In addition, this study has provided further insights into the use of existing measures of time orientation and impulsivity in financial decision making environments. In particular it has confirmed the importance of the CFC immediate score as a measure of self-control, and in so doing provided support for the susceptibility hypothesis in determining the link between time orientation and self-control.

From a South African perspective, while a number of industry and government studies have been carried out, this study appears to be the first academic study to test the key drivers of low levels of preservation in a South African context. Therefore, in terms of the implications for the retirement reform process currently underway in South Africa, this study provides some insights regarding the proposed solution of mandatory preservation. As outlined in Chapter 3, mandatory preservation is a good intervention if individuals have self-control problems. However in this study, indications are that, while self-control is a predictor of preservation, it is not as significant as other factors, for example those linked to bounded rationality. Taxes, penalties and mandatory preservation all focus on problems of self-control but this study has found that self-control is a secondary predictor and not a primary driver of low levels of preservation. If this is true in the broader population then implementing mandatory preservation as a solution is misdirected and it would be better to focus on guidance and decision support.

8.5 SUGGESTIONS FOR FURTHER RESEARCH

The first area for further research would be to expand this study to a more representative sample to see if the same results are found. This will provide better insight into the correct solutions required to improve preservation decisions.

In addition, this study has highlighted the need to investigate levels of indebtedness and how this relates to the preservation decisions made by individuals. Such a study would provide further information to assess the potential impact of mandatory preservation on existing debt levels and to obtain a better understanding of the consumption smoothing behaviour observed in this study.

This study has also identified the need for decision support software to assist individuals in making optimal preservation decisions. Developing such software and then establishing the effectiveness of DSS in retirement preservation decision making is another key area for further research.

Lastly, given that increased job mobility has the potential to magnify the problem of low preservation of small amounts, further investigation of this phenomenon is required. In particular, in light of the potential role that the use of mental accounts might play, a study which investigates mental accounting in retirement preservation decisions could provide useful information and insights for appropriate interventions.

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APPENDIX A: RESEARCH INSTRUMENT

Survey of Retirement Decision Making

There are many decisions that we all have to make about our retirement savings. This study investigates some of the decisions we make when we move jobs and have to determine what to do with any retirement savings we have accumulated at our previous employer. Specifically it considers some of the factors that might play a role in our decision making. Please answer all questions as honestly as possible as the information you provide will be very helpful in assisting us with understanding these factors.

Before continuing with this questionnaire, please place a cross in the box alongside to indicate that you have read and understand the information provided in the above letter and you give your consent to participate in the study on a voluntary basis.	Consent <input type="checkbox"/>
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	For office use only				
<i>Respondent Number</i>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 20px;">V0</td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> <td style="width: 20px;"></td> </tr> </table>	V0			
V0					

PART A	For office use only												
1. What is your current age? _____ years	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 20px;">V1</td> <td style="width: 20px;"></td> </tr> </table>	V1											
V1													
<i>Please answer the following questions by providing a cross in the appropriate box:</i>													
2. How would you rate your level of financial knowledge?													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Very good</td> <td style="width: 20%; text-align: center;">1</td> </tr> <tr> <td>Good</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Satisfactory</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Bad</td> <td style="text-align: center;">4</td> </tr> <tr> <td>Very bad</td> <td style="text-align: center;">5</td> </tr> </table>	Very good	1	Good	2	Satisfactory	3	Bad	4	Very bad	5	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 20px;">V2</td> <td style="width: 20px;"></td> </tr> </table>	V2	
Very good	1												
Good	2												
Satisfactory	3												
Bad	4												
Very bad	5												
V2													
3. How would you assess the financial situation of your immediate household?													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">Very good</td> <td style="width: 20%; text-align: center;">1</td> </tr> <tr> <td>Good</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Satisfactory</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Bad</td> <td style="text-align: center;">4</td> </tr> <tr> <td>Very bad</td> <td style="text-align: center;">5</td> </tr> </table>	Very good	1	Good	2	Satisfactory	3	Bad	4	Very bad	5	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 20px;">V3</td> <td style="width: 20px;"></td> </tr> </table>	V3	
Very good	1												
Good	2												
Satisfactory	3												
Bad	4												
Very bad	5												
V3													

4. Which group of people do you think you belong to?

We hardly make ends meet. We do not even have enough money for food.	1
We have enough money to buy food but buying clothes causes financial difficulties	2
We have enough money to buy food and clothes but the purchase of durable goods (a TV-set, a refrigerator) is problematic.	3
We have no trouble buying durable goods, but the purchase of an expensive thing like a car is hard for us.	4
We can afford expensive things such as buying a car	5
We can afford to buy very expensive things	6

5. What is your highest level of educational qualification?

No school	1
Some primary school	2
Primary school completed	3
Some high school	4
Grade 12 / Matric	5
Diploma	6
Undergraduate	7
Honours	8
Masters	9
Doctorate / PhD	10

V4	
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V5	
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PART B	For office use only																						
<i>Please answer the following questions by providing a cross in the appropriate box</i>																							
1. When did you last change employer? <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Less than 1 year ago</td><td style="text-align: center;">1</td></tr> <tr><td>1 – 2 years ago</td><td style="text-align: center;">2</td></tr> <tr><td>2 – 3 years ago</td><td style="text-align: center;">3</td></tr> <tr><td>3 –4 years ago</td><td style="text-align: center;">4</td></tr> <tr><td>4 – 5 years ago</td><td style="text-align: center;">5</td></tr> <tr><td>More than 5 years ago</td><td style="text-align: center;">6</td></tr> <tr><td>Not applicable, this is my first job</td><td style="text-align: center;">7</td></tr> </table>	Less than 1 year ago	1	1 – 2 years ago	2	2 – 3 years ago	3	3 –4 years ago	4	4 – 5 years ago	5	More than 5 years ago	6	Not applicable, this is my first job	7	<table border="1" style="width: 100%;"> <tr> <td style="width: 80px;">V6</td> <td style="width: 40px;"></td> </tr> </table>	V6							
Less than 1 year ago	1																						
1 – 2 years ago	2																						
2 – 3 years ago	3																						
3 –4 years ago	4																						
4 – 5 years ago	5																						
More than 5 years ago	6																						
Not applicable, this is my first job	7																						
V6																							
2. Approximately what amount of money was available in your pension/provident fund at your employer when you left? <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Less than R5,000</td><td style="text-align: center;">1</td></tr> <tr><td>R5,001 – R10,000</td><td style="text-align: center;">2</td></tr> <tr><td>R10,001 – R20,000</td><td style="text-align: center;">3</td></tr> <tr><td>R20,001 – R50,000</td><td style="text-align: center;">4</td></tr> <tr><td>R50,001 – R100,000</td><td style="text-align: center;">5</td></tr> <tr><td>R100,001 – R500,000</td><td style="text-align: center;">6</td></tr> <tr><td>R500,001 – R1,000,000</td><td style="text-align: center;">7</td></tr> <tr><td>More than R1,000,000</td><td style="text-align: center;">8</td></tr> <tr><td>Do not know</td><td style="text-align: center;">9</td></tr> <tr><td>Not applicable did not have pension or provident fund</td><td style="text-align: center;">10</td></tr> </table>	Less than R5,000	1	R5,001 – R10,000	2	R10,001 – R20,000	3	R20,001 – R50,000	4	R50,001 – R100,000	5	R100,001 – R500,000	6	R500,001 – R1,000,000	7	More than R1,000,000	8	Do not know	9	Not applicable did not have pension or provident fund	10	<table border="1" style="width: 100%;"> <tr> <td style="width: 80px;">V7</td> <td style="width: 40px;"></td> </tr> </table>	V7	
Less than R5,000	1																						
R5,001 – R10,000	2																						
R10,001 – R20,000	3																						
R20,001 – R50,000	4																						
R50,001 – R100,000	5																						
R100,001 – R500,000	6																						
R500,001 – R1,000,000	7																						
More than R1,000,000	8																						
Do not know	9																						
Not applicable did not have pension or provident fund	10																						
V7																							
3. When you moved jobs, what did you do with retirement funds which you had accumulated at your employer? <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Took full amount in cash</td><td style="text-align: center;">1</td></tr> <tr><td>Moved full amount to new employer's pension/provident fund</td><td style="text-align: center;">2</td></tr> <tr><td>Moved full amount to a preservation fund</td><td style="text-align: center;">3</td></tr> <tr><td>Took some money in cash and moved the rest to new employer or into preservation fund Please specify % taken in cash _____%</td><td style="text-align: center;">4</td></tr> <tr><td>Could not take funds / Did not have access to funds</td><td style="text-align: center;">5</td></tr> <tr><td>No pension / provident fund at previous employer</td><td style="text-align: center;">6</td></tr> </table>	Took full amount in cash	1	Moved full amount to new employer's pension/provident fund	2	Moved full amount to a preservation fund	3	Took some money in cash and moved the rest to new employer or into preservation fund Please specify % taken in cash _____%	4	Could not take funds / Did not have access to funds	5	No pension / provident fund at previous employer	6	<table border="1" style="width: 100%;"> <tr> <td style="width: 80px;">V8</td> <td style="width: 40px;"></td> </tr> </table>	V8									
Took full amount in cash	1																						
Moved full amount to new employer's pension/provident fund	2																						
Moved full amount to a preservation fund	3																						
Took some money in cash and moved the rest to new employer or into preservation fund Please specify % taken in cash _____%	4																						
Could not take funds / Did not have access to funds	5																						
No pension / provident fund at previous employer	6																						
V8																							
<i>List continues on next page</i>																							

Appendices

Left funds at previous employer's pension/ provident fund	7
Can't remember	8
Other	9
Please specify _____	

4. Did you follow the advice of any of the following people when you made your decision regarding what to do with your accumulated funds?

Professional financial advisor	1
Family member, friend or colleague (with no financial background)	2
Family member, friend or colleague (with financial background)	3
HR department of company	4
Administrator of pension / provident fund	5
Other	6
Please specify _____	

5. If you took funds in cash (full amount or partial amount), what did you do with the cash? (mark all that are applicable)

Paid off long term debt (e.g. homeloan)	1
Paid off medium term debt (e.g. car loan)	2
Paid off short term debt (e.g. credit cards, store cards etc)	3
Purchased necessities	4
Purchased luxuries	5
Invested in interest bearing account (e.g. money market, fixed deposit)	6
Invested in financial instruments (e.g. shares, unit trust, retail bonds)	7
Purchased a home	8
Started a business	9
Paid education expenses	10
Can't remember	11
Other	12
Please specify _____	

V9	
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V10	
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V11	
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V12	
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V13	
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V14	
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V16	
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V25	
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V26	
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V27	
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6. Compared to when you left your previous employer do you consider your current financial situation to be:

Much better	1
Slightly better	2
About the same	3
Slightly worse	4
Much worse	5

V28	
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7. If you compare your current salary to the salary you were earning at your previous employer is your current salary:

Much higher	1
Slightly higher	2
About the same	3
Slightly lower	4
Much lower	5

V29	
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8. Please indicate the reason for leaving your previous employer

Retrenched	1
Quit (without another job to move to)	2
Better job opportunity	3
Poor health / disability	4
Early retirement	5
Other	6
Please specify _____	

V30	
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9. Is there anything further you would like to add about the decision you made regarding your accumulated retirement savings when you moved jobs? (For example factors that played a role in your decision)

V31	
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<p>PART C</p> <p><i>This section contained the 14 questions from the CFC 14-item scale (Joireman et al., 2012)</i></p>	<p>For office use only</p> <p>V32 – V45</p>																				
<p>PART D</p> <p><i>This section contained the 30 questions from the BIS-11 30-item scale (Patton et al., 1995)</i></p>	<p>For office use only</p> <p>V46 – V75</p>																				
<p>PART E (Adapted from Lusardi & Mitchell (2009))</p> <p><i>Please answer the following questions by selecting the correct answer and placing a cross in the appropriate box (select only one answer for each question)</i></p> <p>Please <u>do not</u> use a calculator.</p> <p><i>If you do not know the answer to a particular question please do not guess and rather select the “Do not know” option.</i></p> <p>1. Suppose you had R100 in a savings account and the interest rate was 2 percent per year. After 5 years, how much do you think you would have in the account if you left the money to grow?</p> <table border="1" data-bbox="178 1274 1139 1496"> <tr> <td>More than R102</td> <td>1</td> </tr> <tr> <td>Exactly R102</td> <td>2</td> </tr> <tr> <td>Less than R102</td> <td>3</td> </tr> <tr> <td>Do not know</td> <td>4</td> </tr> </table> <p>2. Suppose you had R100 in a savings account and the interest rate is 20 percent per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?</p> <table border="1" data-bbox="178 1711 1139 1933"> <tr> <td>More than R200</td> <td>1</td> </tr> <tr> <td>Exactly R200</td> <td>2</td> </tr> <tr> <td>Less than R200</td> <td>3</td> </tr> <tr> <td>Do not know</td> <td>4</td> </tr> </table>	More than R102	1	Exactly R102	2	Less than R102	3	Do not know	4	More than R200	1	Exactly R200	2	Less than R200	3	Do not know	4	<p>For office use only</p> <table border="1" data-bbox="1235 1435 1396 1491"> <tr> <td>V76</td> <td></td> </tr> </table> <table border="1" data-bbox="1235 1868 1396 1924"> <tr> <td>V77</td> <td></td> </tr> </table>	V76		V77	
More than R102	1																				
Exactly R102	2																				
Less than R102	3																				
Do not know	4																				
More than R200	1																				
Exactly R200	2																				
Less than R200	3																				
Do not know	4																				
V76																					
V77																					

3. Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After 1 year, how much would you be able to buy with the money in this account?

More than today	1
Exactly the same	2
Less than today	3
Do not know	4

V78	
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4. Assume a friend inherits R10,000 today and his sibling (brother or sister) inherits R10,000 3 years from now. Who is richer because of the inheritance?

My friend	1
His sibling	2
They are equally rich	3
Do not know	4

V79	
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5. Suppose that in the year 2013, your income has doubled and prices of all goods have doubled too. At the end of 2013, how much will you be able to buy with your income?

More than today	1
The same	2
Less than today	3
Do not know	4

V80	
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6. Which of the following statements describes the main function of the stock market?

The stock market helps to predict share earnings	1
The stock market results in an increase in the price of shares	2
The stock market brings people who want to buy shares together with those who want to sell shares	3
None of the above	4
Do not know	5

V81	
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7. Which one of the following statements is correct?

Once one invests in a unit trust, one cannot withdraw the money in the first year	1
Unit trusts can invest in several assets, for example invest in both shares and bonds	2
Unit trusts pay a guaranteed rate of return which depends on their past performance	3
None of the above	4
Do not know	5

V82	
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8. If the interest rate falls, what should happen to bond prices?

Rise	1
Fall	2
Stay the same	3
None of the above	4
Do not know	5

V83	
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9. True or false? Buying a company share usually provides a safer return than a unit trust.

True	1
False	2
Do not know	3

V84	
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10. True or false? Shares are normally riskier than bonds.

True	1
False	2
Do not know	3

V85	
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11. Considering a long time period (for example 10 or 20 years), which asset normally gives the highest return?

Savings accounts	1
Bonds	2
Shares	3
Do not know	4

V86	
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12. Normally, which asset displays the highest fluctuations over time?

Savings accounts	1
Bonds	2
Shares	3
Do not know	4

 V87

13. When an investor spreads his/her money among different assets, does the risk of losing money:

Increase	1
Decrease	2
Stay the same	3
Do not know	4

 V88
PART F

Please answer the following questions by providing a cross in the appropriate box.

**For office
use only**

1. What is your employment status at the University of Pretoria

Permanent Fulltime Employee	1
Permanent Part-time Employee	2
Temporary Fulltime Employee	3
Other	4
Please specify _____	

 V89

2. What is your gender?

Male	1
Female	2

 V90

3. What is your current relationship status?

Married / in a long term relationship	1
Single	2
Divorced / Separated	3
Widowed	4

 V91

4. What is your population group?

Black	1
Coloured	2
Indian	3
White	4
Other	5

V92	
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 5. What is your current personal **monthly** take home salary (cash amount received into your bank account after employer deductions)

Less than R5,000	1
R5,001 – R10,000	2
R10,001 – R20,000	3
R20,001 – R30,000	4
R30,001 – R40,000	5
R40,001 – R50,000	6
More than R50,000	7
Do not know	8

V93	
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 6. What is your current household **monthly** take home salary (cash amount received into household bank accounts after employer deductions)

Less than R5,000	1
R5,001 – R10,000	2
R10,001 – R20,000	3
R20,001 – R30,000	4
R30,001 – R40,000	5
R40,001 – R50,000	6
More than R50,000	7
Do not know	8

V94	
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Appendices

7. What is your estimated current household net asset value (Rand value of all that you own e.g. house, cars, etc minus rand value of all your debts e.g. homeloan, car loan, credit card debt)

Negative (my debts exceed my assets)	1
Less than R10,000	2
R10,001 – R50,000	3
R50,001 – R100,000	4
R100,001 – R500,000	5
R500,001 – R1,000,000	6
More than R1,000,000	7
Do not know	8

V95

Thank you for completing this questionnaire, your assistance is most appreciated

APPENDIX B: CODING OF VARIABLES

Note: V1 – V95 correspond to numbers in the questionnaire (see Appendix A)

V1: Age (and V6 time since job move)

In its original form V1 age is an interval variable.

Adjustments made to V1:

1. Adjustment to get age at time of job move:

Subtract number of years since job move from current age

$$V1_{adj} = V1 - V6 \text{ (interval variable)}$$

2. Categorisation of age brackets (for both current age and adjusted age)

Age brackets were created using 5 year increments.

Age Bracket	Coding Category
Ages 20 – 24	1
Ages 25 – 29	2
Ages 30 – 34	3
Ages 35 – 39	4
Ages 40 – 44	5
Ages 45 – 49	6
Ages 50-54	7
Ages 55 – 59	8
Ages 60 – 64	9
Ages 65+	10

V2: Level of financial knowledge

V2 is an ordinal variable coded in line with categories 1 – 5 as per questionnaire.

V3: Self-assessed financial situation

V3 is an ordinal variable coded in line with categories 1 – 5 as per questionnaire.

V5: Highest level of educational qualification:

V5 is an ordinal variable coded in line with categories 1 – 10 as per questionnaire.

V7: Amount available when you moved jobs:

V7 is an ordinal variable coded in line with categories 1 – 10 as per questionnaire

Adjustments made to V7:

1. Removed all who answered “Don’t know” and “Not applicable” and remaining categories retained original coding from 1 – 8.

V9: Preservation decision

Originally coded as nominal variable using all categories as per questionnaire i.e. 1 – 9.

The only additional category created for “other” related to those who had taken early retirement.

Non-preservation of funds related to category 1, while preservation of funds related to categories 2, 3 and 7. Those respondents who were part of categories 5, 6, 8 and 9 could not be included in any further analysis as no preservation decision was made, or could be remembered, or the decision related to early retirement and not preservation as part of an ordinary job move (which was the focus of this study). In addition those who partially preserved (category 4) could not be classified as either 100% preserved or 100% cash payout and were therefore excluded from this study.

Therefore the final classification of the variable was as follows:

Outcome variable	Categories included	Final code allocated
Did not preserve	1	0
Preserved	2, 3 & 7	1

V10 – V15: Advice regarding preservation decision

V10 – V15 is a nominal variable coded in line with categories 1 – 6 as per questionnaire.

Adjustments made to V10 – V15:

1. Advice 1 (include “other” categories added by respondents)

The first adjustment added the “other” categories mentioned by respondents which were coded as 7 and 8. If advice was sought from multiple sources this was coded as 6.

1 – 5 as is

6 = multiple sources

7 = own advice

8 = no advice

2. Advice 2: Financial background/expert versus all others including no advice

The second adjustment was to create two categories, one for all those who sought advice from someone with a financial background or knowledgeable about the preservation decision, and the second category for those who sought advice from all others, or used their own advice or took no advice.

1 = Financial advisor (1), Acquaintance with financial background (3), HR (4), Administrator (5) and Multiple Sources (6)

2 = All other (2, 7 & 8)

V16 – V27: Use of funds

Nominal variable, added “other” uses identified by respondents to V27

Renovated House = 13

Divorce needs = 14

Relocation costs = 15

Bought a new car = 16

V28: Change in financial situation

V28 is an ordinal variable coded in line with categories 1 – 5 as per questionnaire.

V29: Change in salary

V29 is an ordinal variable coded in line with categories 1 – 5 as per questionnaire.

V30: Reason for moving jobs

V30 is a nominal variable coded in line with categories 1 – 6 as per questionnaire.

Category 6 had a number of other reasons for moving jobs which were initially coded as follows:

Reason for moving jobs (including other reasons provided 7 – 22)	Initial coding
Retrenched	1
Quit (without another job to move to)	2
Better job opportunity	3
Poor health / disability	4
Early retirement	5
To start own business	7
Relocated	8
Change in family circumstances / Personal reasons	9
Unhappy at previous company	10
Dismissed / Fired	11
Contract expired	12
Job nearer home	13
Career change to academia	14
Pursue further studies	15
Head hunted	16
Freelance / to be self-employed	17
Gap year / Travel	18
Immigrated	19
Voluntary retrenchment	20
Relocated as a result of spouse	21
Got married	22

Adjustments made to V30:

1. V30 reclassify:

Re-categorised all “other” reasons provided by respondents as follows:

Reason for moving jobs	Codes included	Final coding
1 = Retrenched (incl 20)	1 & 20	1
2 = Quit without another job to move to (incl)	2 & 8, 11, 18, 19 & 21	2
3 = Early retirement	3	3
4 = Start own business (7 and 17)	4, 7 & 17	4
5 = contract expired (12)	12	5
6 = Personal circumstance (9 and 22)	9 & 22	6
7 = Academic/Studies (14 & 15)	14 & 15	7
8 = Better job (incl 6, 10, 13, and 16)	3, 6, 10, 13 & 16	8

2. V30: Better

The above categories were then reduced to two categories to assess whether the individual moved to a better job or not

8 = 1 (better)

1, 2, 3, 4, 5, 6, 7 = 2 (not better)

V31: Additional comments made in open ended question

Coding	Theme of additional information
1.	Wrong HR advice / lack of advice regarding options
2.	Changed what they did with funds at later date
3.	Renovated house
4.	Accumulate funds for children / future needs

5.	No retirement fund at previous job
6.	Previous provident fund (but then self employed)
7.	Couldn't decide where to reinvest money (unhappy with Pension Fund returns)
8.	Healthy pension fund at previous employer so left funds there
9.	Age / health / time to retirement / political climate in SA
10.	Pay off debt
11.	Retrenched / quit and used funds for monthly expenses until new job found / funds ran out
12.	Has / Had own Retirement Annuity
13.	Tax implications led to decision to preserve
14.	Early retirement (withdraw portion and monthly payments)
15.	Cash needed to support parents
16.	Preserved as concern about sufficient funds at retirement
17.	Took job with pension fund as would be forced to save for retirement
18.	Tax free portion helped make decision (withdraw some preserve rest)
19.	Young age and wanted funds to grow over long term
20.	Couldn't / didn't find job prior to relocation
21.	Wanted to take responsibility for own finances (PF risky as a result of irresponsible govt)
22.	Didn't need the cash so preserved
23.	Resigned to access pension to pay debt
24.	Moved countries
25.	Business failed, used retirement funds to make ends meet
26.	Was pregnant and had lots of expenses
27.	Divorce settlement allowed access to pension funds which were used
28.	Unhappy with previous pension fund
29.	Has existing own pension provision

30.	Also preserved in a prior job move
31.	Moving to another city / house
32.	Needed cash to help support family while studying
33.	Still young – haven't thought about retirement (early 20s) / can still accumulate funds (39 year old)
34.	Made a mistake (used funds to start own business)
35.	Difficult to find trustworthy institutions to look after money – research needed
36.	Wanted to start own business
37.	Needed cash following divorce
38.	Didn't have another job (visa issue) so cash paid into bank account
39.	Amount too small to consider reinvesting
40.	Needed cash

V32 – V45: CFC Scales

CFC Future = V32, 33, 37, 38, 39, 44, 45

CFC Immediate Scale = V34, 35, 36, 40, 41, 42, 43

CFC Total = CFC Future and reverse score CFC Immediate

CFC Average Scales:

Take each scale score and divide by number of items to get average scale score (between 1 and 5).

V46 – V75: BIS Score

BIS Total Score:

Normal coding: V47 – V51; V56; V59; V61-V64; V66 – V73.

Reverse coding V46, V52 - V55, V57, V58, V60, V65, V74 and V75

BIS Low medium and high categories

Code 1 = BIS score < 52

Code 2 = 51 < BIS score < 72

Code 3 = BIS Score > 71

BIS Median Split

Use median of valid population to split.

Those below median = 1 (low impulsivity) those equal to or above median = 2 (high impulsivity)

V76 – V88: Financial Literacy Scores

V76 – V80 = basic financial literacy

Basic	V76	V77	V78	V79	V80
Correct answer	1	1	3	1	2

Basic score = number correct / 5

V81 – V88 = sophisticated financial literacy

Sophisticated	V81	V82	V83	V84	V85	V86	V87	V88
Correct answer	3	2	1	2	1	3	3	2

Sophisticated score = number correct / 8

Total score = number correct / 13

Standardised scores Financial Literacy:

Standardised scores: Calculated as $\{(score - average) / standard\ deviation\}$

V90: Gender

V90 nominal variable categorised as per original questionnaire (categories 1 and 2)

V91: Marital status

V90 nominal variable categorised as per original questionnaire (categories 1 - 4)

V93: Personal take home salary

V93 is an ordinal variable coded in line with categories 1 – 8 as per questionnaire

Adjustments made to V93:

1. Removed all who answered “Don’t know” and remaining categories retained original coding from 1 – 7.

V94: Household salary

V94 is an ordinal variable coded in line with categories 1 – 8 as per questionnaire

Adjustments made to V94:

1. Removed all who answered “Don’t know” and remaining categories retained original coding from 1 – 7.

V95: Household NAV

V95 is an ordinal variable coded in line with categories 1 – 8 as per questionnaire

Adjustments made to V95:

1. Removed all who answered “Don’t know” and remaining categories retained original coding from 1 – 7.

APPENDIX C: CODING ADAPTATIONS

V1: Age

After a review of cell frequencies, brackets for those younger than 30 were combined as were brackets for those older than 55.

New coding

Age Bracket	Coding Category
Ages less than 30	1
Ages 30 – 34	2
Ages 35 – 39	3
Ages 40 – 44	4
Ages 45 – 49	5
Ages 50-54	6
Ages 55 and above	7

V2: Level of financial knowledge

After a review of cell frequencies, the two lowest categories were combined into category 4.

New coding

Self-assessed level of financial knowledge	Coding Category
Very good	1
Good	2
Satisfactory	3
Bad & Very Bad	4

V3: Self-assessed financial situation

After a review of cell frequencies, the two lowest categories “bad” and “very bad” were combined into category 4.

New coding

Self-assessed financial situation	Coding Category
Very good	1
Good	2
Satisfactory	3
Bad & Very Bad	4

V4: Self-assessed financial group:

After a review of cell frequencies, the two lowest categories groups (1 and 2) were combined into group 1.

New coding:

Group	Coding Category
We hardly make ends meet. We do not even have enough money for food. & We have enough money for food but buying clothes causes financial difficulties	1
We have enough money to buy food and clothes but the purchase of durable goods (a TV-set, a refrigerator) is problematic.	2
We have no trouble buying durable goods, but the purchase of an expensive thing like a car is hard for us.	3
We can afford expensive things such as buying a car	4
We can afford to buy very expensive things	5

After review of linearity categories 3 and 4 were combined.

New coding:

Group	Coding Category
We hardly make ends meet. We do not even have enough money for food & We have enough money for food but buying clothes causes financial difficulties	1
We have enough money to buy food and clothes but the purchase of durable goods (a TV-set, a refrigerator) is problematic.	2
We have no trouble buying durable goods, but the purchase of an expensive thing like a car is hard for us & We can afford expensive things such as buying a car	3
We can afford to buy very expensive things	4

V5: Highest level of educational qualification:

After a review of cell frequencies Grade 12 and lower were combined into one group.

New coding:

Educational Level	Coding Category
Grade 12 and lower	1
Diploma	2
Undergraduate degree	3
Honours	4
Masters	5
PhD / Doctorate	6

After a review of linearity, those holding a diploma or undergraduate degree were combined into one category and those with an Honours or Masters were combined into one category.

New coding:

Educational Level	Coding Category
Grade 12 and lower	1
Diploma and undergraduate degree	2
Honours and Masters	3
PhD / Doctorate	4

V7: Amount available when you moved jobs:

After a review of linearity all those who answered less than R100,000 were combined into one category

New coding

Amount available	Coding Category
Less than R100,000	1
R100,001 – R500,000	2
R500,001 – R1,000,000	3
R1,000,001 +	4

V91: Marital status

After a review of cell frequencies respondents who were widowed were combined with those who were divorced or separated.

New coding

Relationship status	Coding Category
Married / in a long term relationship	1
Single	2
Divorced / Separated / Widowed	3

V93: Personal take home salary

After a review of cell frequencies the lower two categories were combined as were the highest two categories.

New coding

Salary bracket	Coding Category
Less than R10,000	1
R10,001 – R20,000	2
R20,000 – R30,000	3
R30,001 – R40,000	4
R40,000 +	5

After a review of linearity those earning between R20,000 and R40,000 were combined into one category.

New coding

Salary bracket	Coding Category
Less than R10,000	1
R10,001 – R20,000	2
R20,000 – R40,000	3
R40,000 +	4

V95: Household NAV

After a review of linearity, all respondents with a NAV less than R100,000 were combined into one category.

New coding

NAV bracket	Coding Category
Less than R100,000	1
R100,001 – R500,000	2
R500,001 – R1,000,000	3
R1,000,000 +	4