THE DECISION-MAKING BEHAVIOUR OF TRUSTEES OF SELF-MANAGED SUPERANNUATION FUNDS

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Declaration of Originality

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Roger Colbeck

31 March 2021

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Abstract

The focus of this thesis is decision making by trustees of Self-Managed Superannuation Funds (SMSF). SMSFs have grown exponentially since their inception in 1999. As of June 2019, they had over 1.1 million members and accounted for more than a quarter of Australia's $2.9 trillion superannuation sector. Given the significance of these funds, it is important to study how SMSF trustees make their investment decisions. To the extent that many SMSF trustees may not have a financial background, their investment decisions are likely to be sub-optimal. As such, this thesis investigates the decision-making behaviour of SMSF trustees. Behavioural attributes are examined using the Four Quadrant Model (FQM) developed by Lovric, Kaymak, and Spronk (2010), comprising of the cognitive, affective, controlled and automatic quadrants. The FQM is a combination of two closely related Dual Process Theories (DPT) and both the theories and the model have their basis in the cognitive and behavioural sciences.

This thesis uses both qualitative and quantitative methods. The qualitative study presents results from 18 semi-structured interviews with SMSF trustees and SMSF advisers, as well as a survey of 201 SMSF trustees. The results of the qualitative study provide support for the quantitative study, which uses the FQM model to explain investment decision making. The model can also be used to predict those trustees who seek investment advice as well as those who, ignore it and act in an independent manner. The FQM model was also associated with different styles of investment decision making by the SMSF trustees and investors classifying them as either active or passive investors.

Importantly, the mixed methods approach establishes that investment knowledge and expertise is not always the basis for investment decision making. In finding that FQM and behavioural attributes are driving factors of SMSF trustee investment decisions, this thesis

makes an original contribution to the literature on investment decision making in the

Australian superannuation context. A key finding of the research is that investment decision

making will often include emotions and feelings as overriding influences and that nonrational

behaviour can, and does determine investment decisions. The research findings may be

informative to Australian policy makers in developing financial education programs and in

future policy changes pertaining to SMSFs.

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Abbreviations

Abbreviation	Description
APRA	Australian Prudential Regulatory Authority
ASIC	Australian Securities and Investment Commission
ATO	Australian Taxation Office
DPT	Dual Process Theory
FQM	Four Quadrant Model
FSI	Financial System Inquiry
ROI	Return on Investment
SG	Superannuation Guarantee
SIS Act	Superannuation Industry Supervision Act
SISFA	Self-managed Independent Superannuation Funds Association
SMSFA	Self Managed Superannuation Funds Association
SMSF	Self-Managed Superannuation Funds
SPSS	Statistical Package for the Social Sciences

Chapter 1 Introduction

1.1. Background

Australia's retirement income system, has 'three pillars': a means-tested aged pension, mandatory occupational superannuation and voluntary long-term saving. The first and second pillars are supplemented by the third pillar of voluntary long-term savings which includes additional contributions to superannuation, investing in shares and home ownership. The decisions that are demanded of individuals and household groups, in order to provide predictable lifelong retirement incomes using these 'three pillars', is becoming increasingly complex and difficult to make (Agnew et al. 2013; Feldman & Beehr 2011). There are fears that Australians are not saving enough to contribute to their own comfortable retirement (Burnett et al. 2014). The question of how individuals make these decisions has attracted research interest over many years (Glöckner & Witteman 2010).

The Australian Securities and Investment Commission (ASIC)(2016), defines superannuation as the accumulation of assets during a person's working life and has identified it as the mechanism through which the required private savings will be accumulated in order to fund retirement. Although there are seven types of superannuation funds, investors universally use one of two paths for investment; either employer, industry-based and commercial funds, or self-managed superannuation funds (SMSFs).

The SMSF segment of the superannuation industry is a significant sector of the superannuation industry, which began in 1999 and is regulated by the Australian Taxation Office (ATO). It has grown from a niche product to become the second largest segment of the superannuation sector. There are 599,000 SMSFs with 1.1 million members, and assets of over $747 billion, representing 27 percent of the total superannuation sector (Australian Taxation Office 2019c). SMSFs are unique to Australia, with no other overseas retirement

income system providing the same level of choice and control for individuals (Self Managed Superannuation Funds Association 2020; Castillo 2013).

An SMSF is different to other superannuation funds whereby its trustees, who are usually also the beneficiaries and/or members, take direct control of their investments without the requirement a professional fund manager. An SMSF can have up to four members and is structured as a trust, with its rules and conditions stipulated in the trust deed. All trustees' must be actively involved in all aspects, including the establishment of the fund and the disposition of the resources under their control.

Trustees are directly responsible for all SMSF investment strategies, including the level of fund investment risk undertaken. Trustees manage SMSF funds by making investment decisions. Even if those investment decisions are guided by a financial adviser, the legal responsibility for those decisions rests with the trustees. It is also a legal requirement for each SMSF to have a documented fund investment strategy. This investment strategy should satisfy the sole purpose of providing retirement benefits to its members and be used to guide trustee decision-making. The retirement outcomes of SMSF trustees are a direct consequence of these investment decisions made by either the trustees, or in conjunction with their financial advisors.

SMSF trustees rely on advisers such as financial planners and professional accountants for financial advice on the proper management of their financial and lifestyle objectives. For example, they rely on financial planners for investment advice and on accountants for advice on issues such as tax strategies and establishment of the SMSF (McKeown, Kerry & Olynyk 2014).

Theoretical and empirical finance studies undertaken by Phillips, Cathcart and Teale (2007) have identified a number of micro-structure financial features in SMSF trustees

investment decisions including, a bias towards Australian equities. Since 2008, SMSF trustees have shifted from listed or managed trusts towards cash, term deposits and direct investments in property. The funds' asset allocations are also strongly concentrated in Australian domestic equities. This contrasts with Australian Prudential Regulation Authority (APRA) regulated superannuation funds which are more heavily invested in international equities.

Diversification is an important consideration for an SMSF trustee when formulating the fund's investment strategy. In a survey of over 1,000 superannuation members, 503 of the respondents were SMSF trustees who reported that they invest directly in Australian equities (Bird et al. 2018). SMSFs have just under 30% of their portfolios in Australian shares, however their international equities holdings are only 1.7% of total assets. The current exposure to growth assets is primarily in unlisted property and Australian equities, suggesting a lack of awareness and discipline regarding portfolio diversification.

In addition, SMSFs trustees can invest directly in residential and commercial property, with the ability to finance acquisitions through borrowings. As of 30 June 2019, SMSFs had 15% of net SMSF assets in property investments (Australian Taxation Office 2019b). With a potential lack of diversification, the ATO is concerned that SMSFs are too heavily invested in property, and that any downturn in the property market could negatively impact retirement balances (Mather 2019).

SMSF trustees have difficulty in obtaining proper comparative data to benchmark their funds investment performance, often using reports that use one or two indexes, rather than considering the total fund performance (Shugg 2018). These index reports may use model portfolios with asset allocations of larger employer, industry-based or commercial funds which are inappropriate for SMSFs. This may be significant for an SMSF trustee as

they cannot confirm whether their current approach is performing well or underperforming and adjust their portfolio accordingly.

There is debate on whether SMSF investors would be better served by enlisting the services of professional fund managers (Cooper 2018). This question arises from research that found SMSF trustees more closely resemble individual investors, rather than institutional investors (Baiocchi 2014). This may lead to some SMSFs not matching the returns of Australian government-initiated default funds, known as MySuper, which are regulated by APRA. This underperformance is linked to the diverse sizes of SMSF assets balances, and their focus on local shares and trusts, as opposed to the MySuper funds that often have a large international equities component (Australian Taxation Office 2018).

SMSFs also have less stringent reporting standards than professionally managed funds. The primary regulatory obligation for SMSF trustees is that their investments and financial reports must be compliant with the Superannuation Industry (Supervision) Act 1993 (SIS Act). The lighter regulation of SMSFs is based on the idea that trustees are self-directed, self-sufficient, make informed choices and demonstrate rational behaviour (Super System Review 2010). This leads to limited information on the investment strategies and approaches adopted by trustees.

Considering the importance of the Australian SMSF sector, little available research exists examining SMSF trustee investment decision-making, particularly their self-initiating and advice-seeking behaviours. A number of investor behavioural biases may exist within SMSF trustee investment decision-making. The Association of Superannuation Funds of Australia (2016) note that SMSF trustees may be vulnerable to common behavioural biases in making investment decisions, and do not benefit from the oversight of a third party, unlike trustees of government regulated or industry managed funds.

Traditional finance is based on the premise that individual investors[1] consider all relevant information to make rational financial decisions. The underlying assumption is that individual investors are risk averse and that they prefer higher returns to lower returns for the same level of risk. In reality, these assumptions are idealistic as individual investors are not perfect and are subject to behavioural biases. Behavioural finance is a field of study that analyses behaviour to explain why individual investors make nonrational investment decisions and the potential effect of these decisions on financial markets (Chaudhary 2013).

Behavioural finance studies merge concepts from psychology, sociology and financial economics (Baddeley 2010). The focus of behavioural theories is to understand the cognitive, social and emotional biases of individuals and how they actually behave when making decisions in real world situations (Ricciardi & Simon, 2000). It explains that real investors are influenced by their psychological biases. The view that decision-making is rational, shifted to a behavioural approach based on mental frames, heuristics and biases (Thaler 2005). Kahneman and Tversky (1979) showed that the decisions individuals make are influenced by the way they are framed, such as diverse settings, and situations.

Whilst decision-making theory describes the concepts and how they are related, cognitive models tend to produce testable predictions and relationships. The cognitive approach is primarily derived from cognitive psychology assigning observed behaviour to intrapersonal cognition (Sternberg 2003). A wide range of attributes were found to be intrapersonal processes including: perception, literacy, memory, thinking, emotion and motivation. Contemporary viewpoints on cognitive psychology have created a new general model of decision-making addressing cognition as a Dual Process Theory (DPT) (Kahneman, 2011).

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[1] For the purposes of this research the term individual investor and SMSF trustee are interchangeable.

The evolution of existing models of the decision-making process include expected utility theory, Bayesian, prospect theory and variations, and assume a single system of human thought (Mukherjee 2010). Several dual processing theories have been proposed including; two minds, dual types, dual coding, and the dual processing system (Evans & Stanovich 2013; Evans 2006; Kahneman 2003). Dual processing theories developed over the last few decades are a group of theories in social, personality, and cognitive psychology that describe how people think about information when they make judgments or solve problems (Evans 2008). The theory of human cognition is based on the view that the mind uses two parallel systems, and it is widely accepted as a dominant explanation of cognitive processes that typifies individual decision-making (Croskerry & Nimmo 2011; Evans 2008; Kahneman 2003; Sloman 1996).

Lovric, Kaymak and Spronk (2010) developed a descriptive cognitive model of an individual investor behaviour utilising a two-dimensional model of neural functioning as proposed by Camerer, Loewenstein and Prelec (2005), with the aim to analyse and describe behavioural phenomena. For the purpose of this quantitative study, and to maintain separation from the cognitive model of individual investor (Lovric, Kaymak & Spronk 2010) the thesis uses an abbreviated form of the Four Quadrant Model (FQM) (Camerer, Loewenstein & Prelec 2005) to describe their two-dimensional neural functioning framework[2].

The cognitive model of individual investor has two components: the FQM, and independent behavioural attributes. Central to the cognitive model of individual investor behaviour is the theory of dual processing systems using the FQM as shown in Lovric, Kaymak and Spronk (2010, Figure 1). The development of the FQM is based in behavioural economics and a new field of neuroeconomics first suggested by Camerer, Loewenstein and

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[2] Four Quadrant Model (FQM) is a term used to describe cognitive model of an individual investor behaviour developed by (Lovric, Kaymak & Spronk 2010)

Prelec (2004). The central part of the cognitive model of the investor behaviour is a two-dimensional framework with four quadrants consisting of Quadrant I (controlled-cognitive), Quadrant II (controlled-affective), Quadrant III (automatic-cognitive), and Quadrant IV (automatic-affective). A distinction between controlled and automatic processes was detailed by Camerer, Loewenstein and Prelec (2005) exploring psychology literature using various dual-processing theories.

Figure 1.1 Cognitive Model of an Individual Investor (Lovric, Kaymak & Spronk 2010, p 52)

GOALS
- Preferences (constructed, context dependant)
- Objectives (financial/non-financial)
- Constraints (financial/non-financial)

RISK ATTITUDE
- Risk Aversion
- Risk Neutrality
- Risk Seeking
- Risk Factors

TIME
- Investment Horizon
- Frequency of Update
- Planning
- Forecasting
- Discounting

MOTIVATION
- Self-interest
- Fairness
- Altruism
- Revenge
- Status Seeking
- Survival

STRATEGIES
- Security Analysis
- Fundamental Analysis
- Technical Analysis
- Security Selection
- Asset Allocation
- Portfolio Optimization
- Performance Evaluation
- Portfolio Revision

CONTROLLED

COGNITIVE

AFFECTIVE

I

II

FEELINGS - MOODS
- Fear / Greed
- Pleasure / Pain
- Optimism / Pessimism
- Regret

HEURISTICS
- Rules of Thumb
- Simplification
- Quick Judgments
- Patterns, Habits
- Tips

AUTOMATIC

III

IV

PERSONALITY
- Extraversion
- Agreeableness
- Conscientiousness
- Neuroticism
- Openness

DEMOGRAPHICS
- Gender
- Age
- Salary
- Wealth
- Education
- Culture

PERCEPTION
- Information Processing
- Feedback Mechanism

INTERACTION
- Communication
- Social Factors

ACTION
- Trading Orders

OTHER FACTORS
- Biorhythm
- Health
- Visceral Factors
- Exceptional Circumstances
- Noise

Behavioural decision making, which pursues explanations and reasons as to why individuals make the decisions they do, is utilised as a tool for assessing the retirement decisions of SMSF trustees (Baker & Ricciardi 2014). This thesis investigates SMSF trustee

investment decision-making framework within a cognitive model of an individual investor behaviour proposed by Lovric, Kaymak and Spronk (2010). The framework does not consider decision-making concerning specific asset allocation or portfolio construction undertaken by SMSF trustees.

The research will provide empirical evidence on the interplay between the model component parts of a four quadrant decision processing model developed by Camerer, Loewenstein & Prelec (2005) and independent behavioural attributes which may have significant effects on an individual investor behaviour and cognition. The attributes include demographics, timeframe, asset allocation, psychological attributes encompassing risk attitude and heuristic driven biases.

A theoretical framework for SMSF trustee investment decision making is proposed and a research question is posed. The research question asks:

Can Behavioural Finance, in this case the FQM, be used to understand the use of financial advice by trustees of SMSFs and the type of broader investment decision-making being used by them?

1.2. Theoretical Justification

This study adds to the increasing body of research on the SMSF sector, with a focus on SMSF trustee behavioural investment decision-making and the impacts of such decisions (May 2017). The premise that SMSF trustees make informed choices and show rational behaviour runs contrary to decision-making theories, which proposes that individuals demonstrate cognitive biases in their decision-making (Baiocchi 2014; Kahneman & Tversky 1979). Although many researchers test these cognitive biases, the area of SMSF has not attracted meaningful academic research (Bui, Delpachitra & Kristabela 2016).

The aims of this thesis are two-fold and these aims are linked. The first aim, to empirically test the FQM, examining the investment decision-making process behaviour of SMSF trustees. Empirical evidence is provided on the interplay within the FQM of these processes. From a review of literature, it appears that the interplay of the particular processes as a determinant of investor's decision-making has not been previously tested in the financial literature.

The second aim is to use the model to provide insights into which independent behavioural attributes influence SMSF trustee decision-making. As SMSFs are a relatively recent phenomenon, the research on these entities is nascent and evolving. The relevant decision-making contextual attributes found in industry reports and regulatory sources will be examined within the model (Australian Securities Exchange 2017; Australian Securities and Investment Commission 2013). These are categorised by individual trustees and contextual decision-making attributes such as; risk attitude, time, strategies, demographics, information sources, heuristics, personality, goals/motivation and personality/moods.

It is considered that authentication of the cognitive model of investment investor proposed by Lovric, Kaymak and Spronk (2010) can lead to a better understanding of investor decision-making. It will establish the influence of the interplay between the FQM and the independent behavioural attributes investigated. The model may also provide a platform for evidence that behavioural decision-making involves more than two systems, that is, controlled (rational) and automatic (nonrational/emotional). More significantly, it develops a foundation for new and improved behavioural research in cognitive models.

1.3. Practical Justification

A major reason for an individual choosing to have an SMSF is control over investment decisions including establishing and following the fund investment strategy, and allowing for

trustee risk tolerance (Australian Taxation Office 2018). SMSF trustees are required to use financial experience and skills to make sound investment decisions. They may be influenced by a range of attributes, operating beyond their conscious awareness, resulting in measurable heuristics and biases impacting their investment decisions. The interplay of decision-making processes and the independent behavioural attributes of SMSF trustees are not well documented in the literature, and any negative impacts may result in trustees facing retirement with an income well short of their expectations (Baiocchi 2014).

Whether or not SMSFs are able to fulfil the role of meeting member retirement needs depends on the investment decisions of trustees. Having a direct understanding of trustee decision-making behaviour will lead to a better understanding of their investment decision processes rather than merely providing a broad description of such behaviour. Hence, testing the cognitive model of individual investor decision-making will provide insight to policymakers, financial services industry and SMSF trustees about the ability of SMSFs to meet member retirement needs.

1.4. The Structure of the Thesis

The structure of the thesis is as follows:

Following the introduction chapter, Chapter 2 provides a brief overview of the Australian superannuation framework and focuses on the superannuation trust structure known as an SMSF. It reviews the legislative history, trustee background and investment decision making.

Chapter 3 reviews the existing literature to assess whether the research questions asked in this thesis are answered. The literature review is expected to provide a path to develop a methodology to answer these questions. The literature considers behavioural

decision theory, Dual Process Theory, the Four Quadrant dual processing system, and the contextual and psychological attributes of trustees within the SMSF investment environment.

Chapter 4 describes the method used in the present study. It also discusses the research design, measurements of the attributes, sampling and data collection procedures, and the analytical techniques used for data analysis. Justification for administering the interviews and survey questionnaire is also provided.

Chapter 5 details the analysis and reports the results of the study. The statistical techniques to be used are factor analysis followed by regression analysis. A cluster analysis of the variables of the study will be followed by a discriminant analysis. The results obtained from the survey and statistical analysis are then used to answer the research questions.

Chapter 6 is focused upon a discussion of the overall findings of the study and provides a conclusion to this thesis. It applies the theoretical framework to key findings, particularly in relation to the research questions posed in this study. Following a brief overview of the background, aims and significance of the study, it highlights the key contributions and the important implications for stakeholders. Relevant delimitations of the study and opportunities for future research are also discussed. Supporting documentation is provided in the appendices.

1.5.   Chapter Summary

This chapter introduces the primary purpose of this study, which is to investigate the effect of the FQM on the SMSF trustee investment decision-making together with the interplay of independent behavioural attributes on this process. Given the interdisciplinary range of economics, psychology, and neuroscience within the field of neuroeconomics, this study provides a significant contribution to research on a number of levels. This chapter outlines the research question and overall structure of this thesis. The next chapter provides

the context of the study, SMSFs in Australia, and discusses the advantages and challenges of this type of financial structure. As will be outlined, the challenges of managing SMSFs forms an important basis for the justification of the research, and the specific research objectives, developed in Chapter 3, following a review of the behavioural finance literature.

Chapter 2 Self-Managed Superannuation Funds

2.1.   Introduction

The previous chapter introduced the primary purpose of the study in this thesis, which is to investigate the effect of the Four Quadrant Model (FQM) on self-managed superannuation funds (SMSF) trustee investment decision-making together with the interplay with independent behavioural attributes. The purpose of this chapter is to provide the context for the study, however the model used derives from behavioural finance literature which can be widely applied. This chapter provides a history of superannuation and an overview of the use of SMSFs in Australia as an investment and retirement structure. As will be discussed, the use of SMSFs has become popular, but as a result of its popularity, it has become difficult for regulators to manage due to the sheer growth in numbers. There are also added responsibilities for trustees of SMSFs through increased regulatory requirements, even though they may not necessarily be financial experts. The chapter concludes with an outline of the advantages and challenges of SMSFs, which paves the way for a discussion of the behavioural financial literature in the following chapter.

The Australian Government Retirement Income Policy was developed with the objective of ensuring individuals in retirement achieve a higher standard of living than a person reliant on the Commonwealth Age Pension (Australian Government 2004). A related objective was to ensure retirement income policy could be fiscally sustainable in the future, given Australia's ageing population. Australian retirement income system had been based on a means-tested age pension since the early 1900s. It was not until the 1980s that superannuation savings schemes were made available, or compulsory for a large proportion of the population. With an ageing population, there is an increasing need for individuals to fund their own retirement. Consequently, the Australian government has structured superannuation

as a tax-effective vehicle to encourage Australians to save for their retirement. Complying superannuation funds are entitled to a concessional tax rate of 15% on taxable income.

Boosting national retirement savings has been a significant issue for Australian governments past and present. Even though industrial award-based superannuation was introduced in the late 1980s, and compulsory superannuation in the form of the superannuation guarantee (SG) has been available since 1992, most adult Australians have relatively low levels of retirement savings in the form of superannuation (Cowan 2018; Clare 2011).

2.2. Overview

Australia's retirement income system had $2.9 trillion in total superannuation assets as of 31 December 2019, falling within three groups: defined benefit; defined contribution schemes: consisting of employer, industry-based or commercial funds and individuals who actively manage their own fund called SMSFs. The SMSF sector is an integral part of Australia's superannuation system achieving extraordinary prominence, comprising over one quarter of the $2.9 trillion superannuation assets (Self Managed Superannuation Funds Association 2020).

2.2.1   Legislative and Regulatory Framework

Retirement income and superannuation have been significant regulatory themes for Australian governments (Australian Government 2014).The *Superannuation Legislation Amendment Act (No.3) 1999* (Cth) re-categorised small superannuation funds into two categories: self-managed superannuation funds (SMSF) and small Australian Prudential Regulatory Authority (APRA) Funds. SMSFs are known as *excluded funds* as they are excluded from having to comply with the full extent of reporting procedures. As SMSFs may include up to four members all of whom are trustees, all members are informed about the

actions of the fund. A proposed superannuation fund must meet the definition of an SMSF as outlined in the *Superannuation Industry Supervision Act 1993* (Cth) (SIS Act). In contrast to other superannuation funds, the regulatory body for SMSFs is the Australian Taxation Office (ATO). The ATO was chosen as the regulator in the belief that self-managed funds should not be subject to the same prudential regulations as larger funds.

Legislative recognition of small funds acknowledged that small superannuation funds were different from APRA regulated funds (Castillo 2013). These funds were mainly for family members, and it was acknowledged, that the sophisticated prudential legislation required by the employer, industry-based and commercial funds did not apply to them. The SIS Act allowed retiree members to stay in the fund until death, provided they started a pension in their SMSF no later than age 65. SMSFs were deemed to have an infinite life, ensuring the ability to pass retirement wealth and estate assets from generation to generation. With legislative validity, the number of SMSFs grew 54% between 2000 and 2006, with total assets rising from $75 billion to $219 billion (Australian Prudential Regulation Authority 2017).

There were a wide range of changes to superannuation laws in 2007 (Australian Government 2007). The changes simplified the calculation of superannuation components and streamlined many of the administration burdens on the government, ATO, trustees of superannuation funds, and members of superannuation funds. The main purpose of the changes was to remove benefits tax for Australians aged 60 years and over, given they had already paid tax on their superannuation contributions and earnings. A further noteworthy change was allowing SMSFs to gear for investing. Prior to this change, alternative investments, such as residential property, were not available to SMSF investors unless using accumulated funds. Following introduction of the *Tax Laws Amendment (Simplified*

Superannuation) Act 2007, there was a significant increase in the size of SMSFs from $170 billion in 2006 to $314 billion in 2007 (Australian Taxation Office 2017).

The long-term success of the SMSF sector was dependent on proving that the funds and their advisers were compliant with the rules. Two recent Australian Government inquiries since 2010 have reaffirmed the role of SMSFs in retirement income policy. The Super System Review (2010) reported that SMSF sectors were a 'largely successful and well-functioning part of Australia's retirement system'. The Financial System Inquiry (FSI) (Australian Government 2014) gave the SMSF sector a positive report with no moves to limit the criteria for setting up SMSFs, such as minimum balances, educational qualifications or any other restrictions.

Several submissions to the FSI highlighted the benefits of SMSFs to individuals and the superannuation system (Australian Government 2014). Some of the submissions referred to SMSFs providing members with greater flexibility and control, because members can tailor their investments to suit their individual needs. A submission to the inquiry stated that this is often the main motivation for people participating in SMSFs (Switzer Financial Group 2014). Other drivers of the growth in SMSFs include perceived or actual lower fees and better tax outcomes.

2.3   Trustee Background and Decision-Making

SMSF trustees have a wide range of backgrounds which vary in areas such as investment strategy and risk profile. As an example, SMSF trustees at different age groups, have different lifestyle needs, strategies for investment, and cashflow profiles within their SMSF.

2.3.1 Demographics

As of 30 June 2018, 85% of SMSF trustees were older than 45 and 37% were 65 years of age or older. The overall gender mix was 53% male and 47% female; (Australian Taxation Office 2019b). The ATO statistics also showed that SMSF trustees of all ages had a higher taxable income than non-SMSF members (Australian Taxation Office 2017). For the June Quarter 2019, new SMSFs established by individuals aged between 35 and 44 represented 31% of trustees. This represents a trend whereby SMSFs are being chosen as an accumulation vehicle rather than simply in preparation for retirement (Self Managed Superannuation Funds Association 2020).

The average age of SMSF members is higher than that of members of APRA funds, and had both higher average balances and higher average taxable incomes (Australian Taxation Office 2014). Two member/trustee SMSFs are the most common structure, comprising 70% of SMSFs, whilst single member/trustees comprised 23%, and SMSFs with three and four members each comprised 7% (Australian Taxation Office 2019c).

Typically, it has been individuals approaching retirement who establish SMSFs (Hoyle 2013). A large part of the demographic that make up trustees is Australia's baby boomer generation, which are individuals born between 1946 and 1964 (Australian Taxation Office 2019b; Monaghan, 2009, Quine & Carter, 2006). The rise in SMSFs has been attributed to the desire by baby boomers to take control of their retirement assets, rather than leave it to APRA regulated funds (Hoyle 2017; Kelly, Fartbotko & Harding 2004). The two factors of SMSF trustees being older than average, and have a larger than average pool of savings appear to be related. SMSF trustees accumulate larger superannuation investments with increasing age, and their interest in the effective management of those investments may also increase as their fund balances grow (Association of Superannuation Funds of Australia 2020).

The Global Financial Crisis had a significant financial impact on baby boomers, by both changing their retirement expectations and motivating actions to ensure their financial security in retirement (Kendig et al. 2013, O'Loughlin, Humpel & Kendig 2010). This event created fiscal pressure on baby boomers, requiring them to work longer and save more for their retirement (Humpel et al. 2010, Walter, Jackson & Felmingham 2008).

In the early years of SMSFs, from 1999, SMSFs were mainly used by small business owners and self-employed people. Russell Investments/SMSF Professionals Association of Australia (2014) note that on average, 45% of SMSF trustees have small to medium-sized enterprises and according to the Super System Review (Australian Government, 2010) nearly 39% of all SMSF members are self-employed or derive their income from a proprietorship or partnership. Individuals outside these categories such as company directors, employees, and retirees have also created SMSFs (Phillips, Cathcart & Teale 2007).

2.3.2 Establishment

There are many factors that trustees consider when establishing a SMSF and these include increased control, investment choice, and flexibility (Henderson 2016). Establishing a SMSF requires a significant amount of thought on the part of an individual, and although eligible does not automatically mean that it is appropriate (Steen 2016). There are many specific issues to consider, including size of initial asset balance, fund administration, investment strategies, and estate planning.

There appears to be no one simple explanation for the growth of SMSFs, and their popularity is evidenced by their growth. In recent years a trend towards lower fund balances and younger trustee ages at the time of establishment has developed. The annual rate of establishment has slowed, with just under 20,000 SMSFs being set up in the year to June 2019, down from 40,000 established in late 2010 (Australian Taxation Office 2019b).

However, a recent Vanguard/Investment Trends SMSF Report found an ongoing appetite by Australians to set up an SMSF, citing greater control and better returns as the main motivators (Bowerman 2019).

Research by the Australian Securities Investment Commission (ASIC) (2019b) found that SMSFs are not a suitable investment option for people who want a simple superannuation solution. This is especially the case if they have a low level of financial literacy or limited time to manage their own financial affairs. On average, SMSF trustees spend more than 100 hours a year managing their SMSF.

2.3.3   SMSF Fund Investment Strategy

SMSF trustees must follow the sole purpose test, which dictates the requirement to manage the fund for the single purpose of providing its members with retirement benefits. Trustees are responsible for making the investment decisions for the fund and are therefore responsible for ensuring the fund has an investment strategy in place. An obligation placed upon the trustees of SMSFs is to develop and implement a fund investment strategy for the assets of the fund. The investment strategy begins with the investment objectives and then sets out the parameters for the investments, usually including an asset allocation (May 2017). The investment strategy should be based on the goals, needs and preferences of all the SMSF members and consider their age, retirement needs and risk attitude. Jones (2019) writes that establishing and maintaining an appropriate investment strategy is the most challenging regulatory requirement for SMSF trustees.

The scale, scope and complexity of the strategy will differ with changes according to many variables, including:

- The amount of money in the fund,

- The goals of the members, and

- The stage at which the members are in their working lives.

The ATO assesses whether trustees have adopted and then implemented the documented strategy by examining the funds records. It has no power to question the actual investments of an individual fund or trustee and lacks detailed access to the investment transaction decisions of SMSF trustees. The ATO cannot prohibit SMSFs from investing in a single asset. The only restrictions that exist, are those under the *SIS Act* that require SMSFs to formulate, regularly review, and give effect to an appropriate strategy.

In 2019, the ATO sent a letter to select SMSF trustees over concerns about the lack of diversity in their investment strategies, particularly those with 90% or more of its funds in one asset, or a single asset class (Australian Taxation Office 2019a; Gottliebsen 2019). Through SMSF fund auditors the ATO is attempting to find a mismatch between the asset classes of the adopted investment strategy and the actual investment classes of the investment portfolio. The ATO letter stated that the investment strategy had to meet the retirement objectives and cash-flow requirements of the fund. The letter also made mention of an administrative penalty of $4,200 if the investment strategy of an SMSF fails to meet these diversification requirements.

Diversification is not necessarily a risk protection measure, as consideration should be given to the correlation between the asset classes (Delcoure 2010). In recessionary times diversification may not be the optimal portfolio strategy. Instead an investor may choose to be 'underweight' in those assets that are likely to be negatively affected such as equities and property, and 'overweight' in those asset classes that are protective, such as cash and bonds.

SMSF trustees have a choice in determining their investment strategy and portfolio assets and the strategies should be reviewed at least annually having regard to members' risk profiles and circumstances. If trustees actively choose to take risks within their SMSF asset portfolio, that is principally their choice (Bowerman 2014).

2.3.4 Financial Literacy

SMSF trustees should have a sufficient level of financial literacy to allow them to make investment decisions that are consistent with their funds investment strategy (Australian Taxation Office 2018). However, the ATO does not assess a trustee's ability to run a SMSF in order to provide an income in retirement, nor does it impose accreditation or education requirements.

According to Emmons (2005), financial literacy is the ability to manage a multitude of tasks related to money. Research has revealed that financial literacy levels in most countries are low (Lusardi & Mitchell 2014, 2011). With increasingly complicated financial products in the global marketplace, the urgent need to improve financial literacy has increased (Hastings, Madrian & Skimmyhorn 2013). It has been suggested by Bhandari, Deaves and Hassanein (2008) that interventions such as decision aids and simple decision rules may increase an unsophisticated investor decision-making skill.

Research has established a link between financial planning for wealth accumulation and retirement planning (van Rooij, Lusardi & Alessie 2012; Hung, Parker & Yoong 2009). Further, the increased interest in financial literacy is attributed to the growing necessity to save for retirement and the complexity of financial products and services. According to Lusardi and Mitchell (2011), the lack of financial knowledge is a key element in poor retirement planning.

2.3.5 Behavioural Attributes

The behaviour of the 1.1 million-plus SMSF trustees is of interest to regulators, the financial services industry and financial advisers (Baiocchi 2014). Three behavioural attributes of control, gender and group behaviour bias have been identified as influencing SMSF trustee investment decision-making. A survey of SMSFs revealed that trustees believe that control over their investments is the key motivator for establishing an SMSF (Russell Investments/SMSF Professionals Association of Australia 2014). The Financial Services Council (2014) found that 59% of trustees set up SMSFs to achieve control over investments. Survey results from Russell Investments/SMSF Professionals Association of Australia (2014) confirm that some SMSF trustees display a self-indulgent tendency towards managing their investments and that 41% of SMSF trustees could be considered controllers, preferring to make their own decisions on the SMSF investments.

Self-employed persons, identified as a key demographic of SMSF trustees, are more individually orientated than the general population (Beugelsdijk and Noorderhaven, 2005). This is consistent with locus of control, a theory suggesting that an individual believes they have greater power over events through their own ability, effort or skills (Beugelsdijk & Noorderhaven 2005; Rotter 1966). Beugelsdijk and Noorderhaven (2005) found that the key characteristics of the self-employed were individual responsibility and effort, particularly the ethic of working hard. Gartner (1985) identified locus of control as a key attribute in research on entrepreneurial traits and Hwang, Kim and Jeng (2000) proposed that an improvement in responsible behaviour relies on an individual's internal locus of control. Hira (2009) found that an individual who maximised their retirement contributions demonstrated a strong internal locus of control.

The second behavioural bias concerns the almost 70% of SMSF who have two members, most of which it may be reasonable to assume, represent married couples or those

in long term relationships. A study by Commonwealth Bank of Australia and the Self Managed Superannuation Funds Association (2016) found that although females account for 47% of SMSF trustees, they are less confident than males in managing their SMSF (83% to 62%), and are also less assured in their knowledge across the asset classes. This is supported by Graham et al. (2002) finding that females tend to have greater risk aversion when compared to males in investing decisions.

Bird et al. (2018) found that individuals who are overconfident in their financial literacy are likely to be SMSF trustees. Research has indicated that males tend to be more susceptible to overconfident behaviour (Mishra & Metilda 2015; Barber & Odean 2001). A report in 2017 by SuperConcepts and the University of Adelaide's International Centre for Financial Services found that male trustees have an unsupported confidence in their intuitive reasoning, judgments, and cognitive abilities. The degree of overconfidence is more noticeable when it comes to investment related tasks (Fisher & Yao 2017). This leads to the trend that male SMSF trustees demonstrate a greater tendency to invest in riskier assets.

The third behavioural attribute is the number of trustees within the SMSF. Research into individual group members' behaviour found that they often function under significant cognitive demands. Consequently, behavioural biases can often affect group decision-making in the context of asset allocation decisions and influence the group's overall performance (Osmani 2016; Bazerman 2009). This leads to the need for greater understanding of SMSF trustee investment decision-making, which will be further explored in Chapter 3.

2.4. The Advantages and Challenges of Self-Managed Super Funds

The magnitude of the SMSF sector (1.1 million funds) makes it difficult for the primary regulator, the ATO, to obtain a comprehensive understanding of how trustees undertake their investment decision-making. Whilst there are advantages for a trustee to run

their own super fund, several challenges exist for regulators and SMSF trustees. These challenges include diversification issues, inexperience and the utilisation of financial advice.

There are several advantages for SMSF trustees entering the sector apart from control. These other advantages are investment choice, flexibility, cost, taxation advantages, and estate planning.

Trustees have more investment choices than industry and retail super funds. They have access to direct shares, high-yielding cash accounts, term deposits, fixed interest, direct property, unlisted assets, international markets, derivatives, and collectables. Another key advantage for small business owners is the ability to have a business property owned by their SMSF and then leased back to the business.

SMSFs allow multiple members to run a mixture of accumulation and pension accounts. This provides the flexibility to control their investment decisions when making investment and sale decisions. For example, SMSF trustees are entitled to use lower income and taxable capital gains for investments that have moved to a retirement phase providing tax-exempt or partially exempt income to the fund.

The cost advantages of an SMSF compared to other superannuation funds will vary according to the characteristics and circumstances of the fund. Generally, an SMSF with a low balance may be relatively cost inefficient when compared with larger funds. The more an SMSF grows, the more cost-effective it becomes, but the total cost of running an SMSF will depend on the related investments and any costs associated with engaging financial advisers. Australian Securities and Investment Commission (2019a) states that on average, SMSFs with balances below $500,000 have lower returns after expenses and tax than funds regulated by APRA.

As for all superannuation funds, SMSFs can be a tax-effective investment vehicle. SMSFs are entitled to have their members contributions and fund earnings taxed at the concessional superannuation rate of 15% and capital gains taxed at 10%. In addition, benefits received after the age of 60 are tax-free including during pension phase. SMSF trustees are able to use tax strategies around capital gains, taxable income or franking credits.

SMSFs have estate planning advantages over APRA regulated funds, with the most important being perpetual succession and the indefinite binding death benefit nomination. Intergenerational transfer of SMSF fund assets can happen where other members of the family also belong to the fund. An SMSF also offers more benefits than other APRA regulated funds, namely control and flexibility over a member's estate plan, ensuring that funds from the SMSF go to the right individual, in a timely manner and the most tax effective way.

There are challenges for trustees in managing an SMSF when they choose to take control of their retirement investments. These include diversification challenges, a lack of experience and the utilisation of financial advice. The *SIS Act* does not broadly impose restrictions on the asset allocation of SMSFs (apart from those involving in-house and related party assets) but there are behaviours that may be of regulatory concern. The research on SMSF-trustees investment decisions and portfolio construction to date has been concerned mainly with risk and return variables; principally on whether risk premiums on investment returns are adequate for their needs (see for example, Valentine 2011; Phillips, Baczynski & Teale 2009; Phillips, Cathcart & Teale 2007).

The diversification challenges for SMSFs are well documented, and concern portfolios being overweight in cash and Australian listed securities and underweight in fixed income and international equities (Dale 2019). The allocation to three main asset categories represented

approximately 68% of all SMSF assets: 29% in direct Australian shares, 21% in cash and term deposits, and 20% in direct Australian property. The remaining 30% of the $747 billion in total SMSF assets were held in trusts (17%), other managed investments (5%), with the remainder spread across 12 other categories (8%). This lack of diversification is concerning, as asset allocation is an important determinant of portfolio performance (Brinson, Hood & Beebower 1986).

It was concluded by Tang et al. (2010) that individuals make inefficient portfolio investment choices in retirement plans. Empirical studies provide substantial evidence of individual investors making portfolio choices which are difficult to reconcile with behavioural finance theories (Jacobs, Müller & Weber 2014; Barber & Odean 2013). Less than optimal decision-making by individual investors include preferring domestic investments over foreign investments, too few assets classes in a portfolio and employing heuristics and biases including overconfidence (Goetzmann & Kumar, 2008; Kilka & Weber 2000; Barber & Odean 2000).

A common argument advanced against individuals starting a self-managed super fund is that potential SMSF trustees could lose their retirement savings through inexperience and bad investment decisions (Valentine 2011; Phillips 2011).Where individuals have limited investment decision-making experience or prefer to delegate decision-making to financial advisers, they should consider if an SMSF is right for them. even if they pay a professional to assist.

The scope or use of financial advice by SMSFs trustees is relevant given the primary focus of the study relates to the investment decisions of SMSFs. Although trustees are likely to base their investment decisions on information gleaned from a number of different sources including family and friends, newsletters, internet or other forms of media, financial advisers

are still recognised as the primary source (Thorp et al. 2020). However, the trustees are always at liberty to accept or reject advice given the responsibility for investment decisions rest solely with the trustees.

The quality of financial advice provided to SMSF trustees is believed to be crucial to the performance of the sector. Due to significant and complex changes to superannuation in 2017, access to specialised financial advice is essential (Self Managed Superannuation Funds Association 2020). Further, ensuring SMSF trustees are receiving quality advice is a prime challenge for regulators and the financial services industry. To support this challenge of improving professional standards a new education and ethical standards for financial advisors has been created by the new Financial Adviser Standards and Ethics Authority.

An ASIC review of SMSF files showed that the SMSF advice-giving process needed significant improvement in some areas (Australian Securities and Investment Commission 2018). ASIC found that financial advisers had not conducted sufficient research nor given sufficient consideration of the client's existing financial products when making recommendations to the clients.

It is recognised by the SMSF Association (2020) that problems exist within the regulatory advice model which prevents SMSF trustees obtaining the basic SMSF advice they require. One impediment is a complicated and inefficient regulatory framework which licenses financial advisers (CPA 2019). SMSF trustees may wish only simple advice, but are either required to seek prescribed costly financial advice from an authorised adviser or act without advice. This may mean that there are important unmet SMSF advice needs for trustees.

2.5. Conclusion

SMSFs are a uniquely Australian retirement vehicle and there is some understanding of the identity, nature and motivations of SMSF trustees. However, despite a number of surveys and government statistical information, a comprehensive picture of the SMSF trustee is yet to emerge. The academic literature on the sector is minimal, due to the recency of the SMSF phenomenon, and the lack of access to regulatory and industry surveys (Castillo 2013). SMSFs are an established part of the Australian financial, retirement and business environment. This chapter explained the background and requirements of SMSFs and considered behavioural attributes and challenges for trustee investment decision-making. The next chapter discusses the insights from behavioural finance and how it can provide a theoretical basis to understand the challenges SMSF trustees face in their investment decisions.

Chapter 3 Literature Review

3.1. Introduction

The previous chapter outlined some of the advantages and challenges of self-managed superannuation funds (SMSF). Of concern was the importance of the trustee following financial advice and making bad decision outcomes by not considering risk. There is thus a need to understand the decision making of trustees in SMSF.

This chapter outlines an approach to understand the financial decision-making of trustees in SMSFs as individual investors. The basis of this understanding comes from the evolution of knowledge about financial behaviour in the academic literature. This starts with a discussion of neo-classical utility theory, the impact of psychology with the development of behavioural finance, leading to the dual processing theory of financial behaviour. Dual processing, as will be seen, is not without its limitations. To this end the Four Quadrant Model (FQM), developed from insights gathered in neuroeconomics is proposed to provide a more holistic explanation of investor behaviour. In this thesis, all components of the FQM with respect the investment decision making behaviour of SMSF trustees are developed and evaluated. The chapter then examines the potential ramifications of the FQM for important aspects of investor behaviour including; advice, risk and active versus passive decision making.

Using the FQM model, this thesis investigates whether SMSF trustees may be assigned to one of the four quadrants and the interplay of SMSF trustees behavioural attributes when making investment decisions. The FQM is a combination of two closely related Dual Process Theories (DPT) and both the theories and the model have their foundations within the cognitive and behavioural sciences. The independent behavioural attributes have their origin within behavioural finance and are examined using the FQM. The

theoretical basis for this research examines the interplay between FQM and the independent behavioural attributes that influence that decision-making.

The study commences with a review of decision-making theory as a multi-disciplinary area of research involving the disciplines of management, statistics, mathematics, psychology, and economics. Following will be an evaluation of the kind of decision-making that occurs in practice, using behavioural decision theory. Decision-making is further explored with a review of DPT postulating that decision-making can be described as a function of both an affective system and/or a cognitive processing system.

The remainder of this chapter is set out as follows. First, an examination of the FQM is conducted. Second, independent behavioural attributes and the use of financial advice are reviewed. Finally, the chapter concludes with a statement of the research objectives, hypotheses and summary.

3.2. Neo-Classical Economic Decision-Making

A key premise for SMSF trustees is that they should fully participate in the decision-making processes of their SMSF. The ATO offers a range of free, public guidance materials to support trustees and their financial advisers in making key decisions (Fleming 2018).

Decision-making theory is a concept examining how rational individuals should behave when encountering risk and uncertainty (e.g. McFall 2015; Yates, Veinott & Patalano 2003). The study of decision-making has emerged as an interdisciplinary field in recent years and it has shifted from psychological approaches, to concepts, theories, and methods from other disciplines such as economics, and sociology (Buchanan & O'Connell 2006; Akerlof & Yellen 1987).

Modern decision theory originated in middle of the 20th century, founded on the seminal work of von Neumann and Morgenstern (1947). Their study generalised the qualitative concept of utility theory by testing it using a mathematical structure. Decision-makers were viewed as an 'economic man' with decisions described as gambles motivated to maximise payoffs (Edwards 1954). The core theme of utility theory is that an individual will not choose the highest expected value, but the highest expected utility. Utility is a measure of the degree of satisfaction of the outcomes from choices selected by the decision maker (Baron 2000).

Von Neumann and Morgenstern (1947) developed four axioms of expected utility theory that describe a rational decision maker: completeness, transitivity, independence, and continuity. When these axioms were present, they proved that a utility functions exists. Savage (1954) extended the expected utility theory by substituting subjective probabilities for objective probabilities. Subjective expected utility theory is concerned with how to choose rationally when one is uncertain about the outcome that will result from their acts (Schoemaker 1982). Decisions within this framework represent risk as a combination of the expected size of a gain or loss, combined with a probability distribution of the predicted outcomes (Bazerman 2006).

Expected utility and subjective expected utility, originating in economics and mathematics, informed psychological enquiry and motivated its research models (Raynard, Crozier & Svenson 1997). Bell, Raiffa and Tversky (1988) segregated decision-making into three schools of thought. These three schools of thought were the normative, descriptive, and prescriptive approaches, and each represents a means of viewing and investigating decision-making (Peterson 2009; Bell, Raiffa & Tversky 1988). Normative theory is concerned with the nature of rationality, the judgment of decision makers, with the most desirable outcomes determined by their utility (Huczynski & Buchanan, 2001; Goldstein & Hogarth 1997;

Howard 1983). Descriptive theory is concerned with how individuals proceed through steps in a decision-making process and why they make those decisions (Von Winterfeldt & Edwards 1986; Kahneman & Tversky 1979). The prescriptive decision theory focuses on how decision-making in practice might be improved (Keeney 1982). The prescriptive view, covered in detail by Corner, Buchanan and Henig (2001), offers insight into how decisions are made in practice and may be useful with regards to this thesis which seeks to understand individual investment decisions.

The decision process occurs over a time period, and is characterised by the level of stress or complexity involved (Maqsood, Finegan, & Walker 2004). It involves a series of processes, including; information search, judgement and evaluation, that may categorise into a number of phases or stages (Raynard, Crozier & Svenson 1997). Modern decision-making process models derive from the Dewey (1910) five stages of decision-making: problem recognition, information search, alternative evaluation, choice, and outcomes. Simon (1960), from his work on psychology and cognitive load in decision-making, refined these stages for his research in the field of management decision-making, looking at intelligence, design and choice. The processes proposed by Dewey and Simon have been criticised as being sequential and unrealistic in practice (Witte 1972). Further, it was considered that a more realistic model would recognise the various stages of the decision process often occur in a non-sequential order, depending on the type of decision involved (Mintzberg, Raisinghani & Théorêt 1976). Building on earlier research, decision-making evolved from a single staged process, to where it included several strategies, with the choice influenced by context and individual preferences (Payne, Bettman & Johnson 1993). These theories around decision-making reinforced the idea that individuals are flexible in their processes and vary their behaviour according to the effort and complexity of the task (Johnson & Meyer 1984).

Much of early phase of psychological research was concerned with issues of measuring utility and subjective probability. Despite its mathematical style, utility theory attracted critics. Mathematical models applied to decision-making are only an approximation and not necessarily applicable to a real-world situation (Sortino 2009). This modelling may produce faulty predictions about individual real-life decisions where each decision depends on feedback from an ever changing environment (Kahneman, Slovic & Tversky 1982). Findings were difficult to reconcile with the behavioural model of rational behaviour. For this reason, the field of behavioural finance emerged to provide a more complete understanding of investment decisions.

3.2.1 Behavioural Finance

Behavioural finance is an emerging field of study, combining behavioural and cognitive psychological theory to analyse human behaviour and help explain why investors make nonrational investment decisions (Chaudhary 2013). It seeks to explain observed investor behaviour and whether their decision making is influenced by emotion, biases, social factors or cognitive errors. This approach is in contrast to traditional finance, which is based on hypotheses about how investors and markets should behave (Shefrin 2002, Fama 1970). According to behavioural finance theory, the choices of individuals can vary, and risky choices can often be in conflict with rational individual behaviours.

Simon (1993) outlined differences between nonrational and irrational where decision-making behaviours describe conditions where investors systematically act contrary to their own best interests. Nonrational decision-making is considered intuitive and judgmental signifying a type of process, not a type of outcome (Gigerenzer 2015). Tversky and Kahneman (1986) used the term 'irrational investors' in their studies as they observed that individuals of different socio-demographic backgrounds made irrational decisions, responding to emotions

when investing in the stock market. An approach to reduce the inconsistencies between behaviour and expected utility theory was developed in the early 1950s by leading economists Samuelson and Savage (Starmer 2000).

New theories such as bounded rationality gave an improved explanation of some of these discoveries (Wheeler 2020). The theory of bounded rationality proposes that the rationality of a decision must be understood within the context of the environment in which it evolved (Simon 1982). Under this approach, it is considered that individuals are able to behave rationally within the limits of the simpler model. Simon (1957) argued that individuals can effectively adapt to their environment by recognising actions that are satisfactory for their goals. There are restrictions to human information processing and therefore decisions are not always optimal due to a lack of knowledge or information (Kahneman 2003; Simon 1982).

Following Kahneman and Tversky's early work in the 1970s, psychologists in this field began to assess their cognitive models of decision-making when there was risk and uncertainty, using economic models of rational behaviour (McFarland 2016; Hirshleifer 2015; Barber & Odean 2013). Consequently, a behavioural finance approach developed as a response, focusing on an individuals' psychological attributes which may contribute to effective decision-making (Ritter 2003; Kahneman & Tversky 1974).

Two studies by Kahneman and Tversky (1979, 1974), provided significant impetus to the study of behavioural finance (Hayes 2010). Kahneman and Tversky in their 1974 study outlined how heuristics, or mental shortcuts, were used by individuals to actually make decisions. With their 1979 study, they developed prospect theory, which used cognitive psychology to explain anomalies in economic rational decision-making. Prospect theory deals with the idea that individuals do not always behave rationally. The main hypothesis of

prospect theory is that loss aversion, that is, suffering a financial loss is twice as painful as the pleasure derived from a financial gain.

Prospect theory outlined two phases in the choice process: the early phase of framing, and the successive phase of evaluation. Prospect theory is descriptive, and it finds deficiencies in the expected utility approach. The descriptive theories give information on individuals biased behaviour. This information can be used as a prescriptive support in economic situations and more generally, in everyday real-life decision-making, providing an predictor of actual behaviour. As a result, behavioural finance is becoming an integral part of investor decision-making processes, as it seeks to minimise or eliminate the psychological biases in investment decisions of individuals.

The future of behavioural finance is expanding into the research areas of behavioural corporate finance and investor psychology, enabling the development of richer models of investment decision-making behaviour (Itzhak Venezia 2019). Behavioural finance research has also incorporated findings from the fields of cultural differences and neuroeconomics (Baker Filbeck & Ricciardi 2017; Meta 2015). While traditional finance suggests that investing has a lot to do with mathematics, behavioural finance has emphasised individuals and the mistakes they may make during their investment decision-making. There are important implications of behavioural finance in understanding SMSF trustee investor behaviours.

Early work by Phillips (2007) using a small SMSF sample size identified that biases influencing investment choices of SMSF trustees were evident. SuperConcepts (2017) found that behavioural traits have an important influence on the way SMSF trustees allocate their investment assets. Baiocchi, (2014) found that SMSF trustees exhibit behavioural biases and heuristics of loss aversion, representativeness, and cognitive dissonance. Thorp et al. (2020)

show that not having an appropriate measure of SMSF performance is likely to cause a significant number of trustees to overestimate their own qualities and abilities. Limited research exists on the impact of behavioural finance on SMSF trustee investment decision-making and therefore this study evaluates the wider research. An explanation of the types of heuristics and biases in investment behaviour is discussed in greater detail next.

3.2.2   Behavioural Heuristics and Biases in Investment Behaviour

Behavioural finance demonstrates that in relation to risk and uncertainty, investor behaviour deviates from the ideal picture of the rational investor. Typically, investors suffer from an array of behavioural biases. According to Pompian (2011), there is a broad collection of behavioural biases related to investor decision-making. Recent studies have focussed on heuristics and biases uncovered by behavioural finance research. Individuals need to make judgments and decisions quickly, using limited cognitive resources and as a result, they often use shortcuts (Kahneman, Slovic & Tversky 1982). The term heuristics encompasses inbuilt and automatic processes together with learned or consciously selected criteria. In their seminal work, Kahneman and Tversky (1974) reported on three heuristics: representativeness, availability, and anchoring. Their paper led to a surge of research on heuristics leading to the discovery of other systematic biases, including insensitivity to prior outcomes, sample size, regression to the mean, anchoring, and others. While these biases do not have unity with formal rational reasoning, they are useful when making fast-paced intuitive judgments and actions (Gigerenzer & Todd 1999). They are categorised as heuristics and/or biases, organised for this study along quadrant paradigms (see Table 3.2). Tversky and Kahnemann (1981) outline the influence of framing on the outcome of investment decisions. Framing refers to the observation that individual investment decisions are generally affected by the way in which the choices are framed. Empirical studies have shown that the psychological mechanisms of

framing depend on different social and cognitive variables. Examples proposed by Levin, Scheider and Gaeth (1998) are: risky choice framing, attribute framing and goal framing.

Individuals are inclined towards several types of behavioural biases, leading them to make cognitive errors. They may make sub-optimal choices when faced with complex and uncertain decisions because of the employment of heuristics or shortcuts. Cognitive bias is the mistake of processing information in one's own beliefs, judgements, and preferences, despite contrary information (Fiedler, Klaus & Sydow 2015; Kahneman & Tversky 1974). Common cognitive biases are confirmation, anchoring, halo effect, and overconfidence (Pompian 2011). Emotional biases exhibited by individual pre-dispositions can affect how someone makes a decision (Weber & Johnson 2009). Examples of emotional bias include control, loss aversion, and endowment.

Although the relevant literature suggests that there are many factors affecting individual behaviour, the research in this thesis explores the most important psychological biases affecting investment behaviour: overconfidence, confirmation, recency, and loss aversion. Although many researchers test these behavioural biases, the area of SMSFs has not attracted meaningful academic research (Bui, Delpachitra & Kristabela 2016). Kahneman, Slovic and Tversky (1982) stated that overconfidence is overrating one's own knowledge or capabilities. Confirmation bias is seeking or processing information that confirms already held existing views or beliefs (Pohl 2017). Recency is weighing the most recent information gathered more heavily when making a decision, and herding is copying the actions of a larger group.

In making decisions, individuals constantly make judgements or draw conclusions (Schirrmeister, Göhring & Warnke 2020). Some of these judgments seem intuitive, fast, and reflexive, for example which road to choose. Others appear to be more reasoned, deliberate

and consciously derived, like deciding on a career. While individuals are capable of being rational, they tend to avoid the effort demanded by strict logic and instead use heuristics to substitute a complex question with one that is simpler to answer. The distinction between intuition and reasoning in an individual is known as Dual-Process Theory (DPT). Kahneman (2011) used two processes, System 1 (intuition) and System 2 (reasoning), to explain how the two processes interact with each other when making judgements. This is described in more detail next.

3.2.3 Dual Process Theory

There are a number of models of decision-making including: expected-utility theory, Bayesian, prospect theory and variations which assume a single system of human thought (Mukherjee 2010). The foundations of the two-systems approach is associated with psychologist, William James (1890) who believed there were two different kinds of thinking: associative and the analytical deliberate mode. This theory of human cognition is based on the view that the mind uses two parallel systems and it is widely accepted as a dominant explanation of cognitive processes that typify individual decision-making (Croskerry & Nimmo 2011; Evans 2008; Kahneman 2003; Sloman 1996).

Dual Process Theories (DPTs) contend that human cognitive architecture contains not one but two types of reasoning processes. One process, which is associative, has evolved over a prolonged period of time and is automatic, whilst the second process is controlled, analytical, rule-based and explicit (Sherman, Gawronski & Trope 2014; Chaiken & Trope 1999). An array of DPTs have been proposed, and they include: two minds, dual types, dual coding, and the dual processing systems (Evans & Stanovich 2013; Evans 2006; Kahneman 2003). DPTs developed over the last few decades, and are a group of theories in social, personality, and cognitive psychology that describe how people think about information when

they make judgments or solve problems (Evans 2008). Unless otherwise specified, the term dual process is used in the thesis to refer to dual process theories.

As outlined above, DPTs have their origins in the assumption that mental processes can be divided into two general types: those that operate automatically, and those in a controlled manner (Shiffrin & Schneider 1977; Posner & Snyder 1975). Initial work by Evans (1984) proposed two types of dual processes, namely heuristic processes and analytic processes. A distinction was drawn between heuristic processes, selecting relevant items of information, and analytic processes which use the selected items to generate inferences. DPTs of information processing developed within different disciplines with properties characterised by their underlying framework. For instance, a prominent heuristic-analytic theory developed by Evans (2006) and Stanovich and West (2000) is based on reasoning. Using the theory of two distinct types of reasoning, they distinguished between different accounts of individuals departures from normative standards. These theories have been influential in exploring and examining the processes involved in the characteristics of reasoning behaviour including decision-making and problem-solving.

When DPTs first emerged, they were related to a particular domain of inquiry within social psychology, such as persuasion and associative reasoning. For example, Petty and Cacioppo (1986) proposed that there are two different routes to persuasion in decision-making. The first route is central and occurs when an individual is thinking carefully considering the information they are given. The second exterior route occurs when a person is not thinking carefully about information given and uses shortcuts to make judgments. The essential question of these models relates to conditions under which various aspects of persuasive information influences the effectiveness of persuasive appeal. The message processing needs to be taken into consideration when assessing persuasion, as conditions can either enable or inhibit the generation of a particular kind of thought when evaluating the

argument (Petty, Wheeler & Bizer 1999). Sloman (1996) explained dual processing differently, proposing that how an individual connects is directly proportional to the similarity of past experiences, rather than an evaluation of the underlying rule-based structure. Other examples include prejudice and stereotyping (e.g. Devine 1989) and attitude behaviour relations (e.g. Fazio 1990).

The focus of DPTs shifted towards integrative models, divided into general DPTs describing mental processing through two domain-independent operating principles irrespective of its content (Carruthers 2009; Sloman 1996). The multiple dualisms proposed by domain-specific theories explain input and output in relation to particular content areas. For instance, associative versus rule-based processes (e.g. Sloman,1996), reflective and reflexive processing (Lieberman et al. 2002) and System 1 compared to System 2 processing (Kahneman, 2003; Stanovich & West, 2000).

Although the tenets of DPT have undergone many changes, the theoretical fundamentals amount to a dichotomous view of the two types of processes Type 1—automatic, fast, intuitive, affective, nonconscious, effortless, and Type 2—controlled, slow, reflective, deliberate, cognitive, effortful. The two processing types recognised in literature are referred to as Type 1 and Type 2 (Evans & Stanovich 2013). To address confusion over system function qualities and lack of consistency in theories, Evans & Stanovich (2013) reverted to the older terminology of Type 1 and Type 2 processing. They were concerned that whilst retaining distinct systems, other terminologies did not allow for recognition of multiple cognitive or neural systems that underlie the two systems. For clarity purposes, Kahneman (2011) popularised these two systems using the terms fast thinking and slow thinking on how both systems function within the mind. For the purposes of this research and in order to maintain consistency, the terms Type 1(fast thinking) and Type 2 (slow thinking) will be used for dual processes.

These types are described as working together to enable an individual to think both fast and slow when making a decision. Depiction of the correlations between two theorised process characteristics use lists of properties (Gawronski, Sherman & Trope 2014; Kahneman 2003; Smith & DeCoster 2000) (see Table 3 1). Automatic cognition, called Type 1 by cognitive psychologists, are unconscious processes that occur in response to environmental or emotive cues, relying on learned or existing heuristics. Controlled cognition, called Type 2, is a conscious process of evaluating choices based around a combination of utility, risk and social influences.

Table 3.1 Clusters of Properties Associated with Dual Process Theory

Type 1 (Automatic)	Type 2 (Controlled)
Affective	Cognitive
Fast	Slow
Associative	Rule based
Experiential	Rational
Reflexive	Reflective
Non-conscious	Conscious
Heuristic	Analytical
Parallel	Serial

Originally, automatic and controlled processes were theorised as working either completely or not at all, suggesting that a given process may be characterised either by the properties of automatic processing or the properties of controlled processing. As an example, further properties for automaticity of intentionality, efficiency, controllability, and awareness were believed to be perfectly correlated (Moors & De Houwer 2006). Subsequently, Bargh (1992) found that no process met the operating properties within the two types. This debate

suggests that the dual process model may be limited in scope, and not able to explain decision making in a wider context, including that of investors. Some of these limitations are explored in the next section of this chapter.

3.2.4 Problems with the Dual Process Theories

Dual processes theories are sometimes criticised as being merely a conceptual framework applied to data to predict events or behaviours without the empirical confirmation or interpretative constraints of forecast predictions (Keren & Schul 2009). Gawronki and Bodenhausen (2009) refer to the concepts of operating principles, that is, the mechanisms translating perception to action and the operating conditions in which these mechanisms operate. There are concerns over a clear distinction between the two and the lack of empirical testing of the operating conditions of the properties within the generic parameters of automatic and controlled. The term 'automatic' includes the following properties: affective, fast, heuristic, associative, experiential, reflexive, non-conscious, whilst the term 'controlled' includes the following properties: cognitive, slow, analytical, reflective, rational, conscious (Gawronski, Sherman & Trope 2014; Gawronski & Creighton 2013; Gigerenzer 2010) (see Table 3.1). Other challenges to the theory revolve around trying to crystallise Type 1 and Type 2 as distinct systems (Sharma, Markon & Clark 2014). The processes associated with each type are diverse, and each type may share properties. In the real world, an individual cognitive process is unlikely to solely fall into either type but oscillate between the two systems.

Criticisms of DPT include that Type 1 and Type 2 processes are not of a higher cognition and that other models maybe more appropriate (Sherman, Gawronski & Trope 2014; Frank, Cohen, & Sanfey 2009). An example is the Unimodel proposed by Kruglanski and Gigerenzer (2011) that does not distinguish between different processing types. The

Unimodel offers a single process theory of individual decision-making. The basic tenet of the theory is that reasoning is based on a number of rules governed by such characteristics as memory, association and processing ease (Kruglanski & Gigerenzer 2011). Rule choice for the decision-making process is linked to the underlying stimulus driving the decision. Osman (2004) found that the evidence presented for several dual system theories is also consistent with a single process model.

According to Grayot (2020) there are growing challenges to DPT and its use as a framework for decision modelling. These challenges revolve around processes that are not clearly articulated or tested, and are not as descriptively accurate as is often depicted. However, in the fields of behavioural economics and neuroeconomics DPT is widely used as the theoretical framework for their modelling needs (Maharani 2014).

Evans (2008) suggests that fluctuations between the two types come in two varieties, default interventionism and parallel-competitive. First, default interventionism, which assumes the activation of automatic processes initially and the activation of controlled processes if necessary to intervene, correct, or support reasoning (Glockner & Betsch 2008c; Kahneman & Frederick 2002). Default-interventionism is the most common dual process position held by theorists, whereby the interaction is framed as Type 1 being subservient to Type 2 (Mugg 2015). The second variety is parallel-competitive models, assumes the two processes activate at the same time and are in direct competition with one another (Sloman 1996).

Theorists have also argued that Type 1 and Type 2 have a suite of properties, including specific domains: automatic and cognitive (Stanovich 2011; Evans & Frankish 2009). (see Table 3.1). Evans and Stanovich (2013) stated that the vagueness of definition, lack of coherence and consistency in the proposed cluster of properties for DPT is significant

and demonstrated this by removing all of the properties from the standard suite of dual process systems. Further they contend that the understanding of the relationship between Type 1 and Type 2 is still developing and remains a matter of dispute.

Modern models are influenced by theoretical contributions coming from other areas of psychology, particularly social cognition which concentrated on subjective utilities as opposed to objective utilities. These two types of utilities or properties, such as cognitive and affective, may influence the overall decision process (Lewicka 1997). Zajonc (1980) examined the contrast between affective versus cognitive processing for decision-making, considering them key independent concepts of information processing. For example, the following may have properties that overlap: affective–cognitive, and similarly, emotional–cognitive, associative–propositional, affective – descriptive and unconscious–conscious dualities. (Gawronski & Bodenhausen, 2009; Jacoby 1991). Furthermore, determining that a mental process is affective or cognitive or a combination of other properties, does not explain how the process translates perception into action, nor does it explain whether affective and cognitive processing involve the same or separate mental structures and operations.

Labelling the processes as either automatic or controlled may create the misunderstanding that these labels are sufficient to describe the inherent nature of the process (Gawronski & Bodenhausen, 2009). For example, does a given perception lead to a particular action when cognitive resources are reduced? Bargh (1992) notes that processes studied in psychology contain a mixture of selected properties that are both automatic and controlled. Hence, most processes studied within psychology involve mixtures of selected properties, making them automatic in one process and nonautomatic in another (Bargh 1992). Thus, by assuming systematic overlap between two conceptually distinct systems, dual process theories may exclude two out of four possible combinations. Based on this assumption, any specified

process may be characterised as automatic or controlled by assessing its position on one of the four operating dimensions of awareness, efficiency, intentionality, and controllability (Sprunt 2015; Gawronski, Sherman & Trope 2014).

There are many dual processes theories proposed; as for example, standard dual process distinction (e.g. Deutsch & Strack 2006), and others recommending either a Unimodel process (e.g. Kruglanski et al. 2006) or multi process alternatives (e.g. Sherman 2006a). Gawronski and Creighton (2013) stated that not all the operating conditions of these processes are able to be, or have been tested empirically. Buturovic and Tasic (2015) suggest that the problem is that what a theorist would define as observations in a laboratory test are then taken up as evidence in a real-world setting or environment.

Crusius, van Horen and Mussweiler (2012) stressed the importance of a process focused view when investigating economic behaviour in various contexts. They outlined that a similar process may be responsible for different phenomena and contextual influences may have dramatic effects on how individuals process information. In economic behaviour, there are few studies which integrate DPT into research. Two studies that achieved this are Kempf, Merkle and Niessen-Ruenzi (2013) who showed a connection between affective attitudes and stock market expectations, and Godek and Murray (2008) who examine the role of processing modes on paying for advice. They find that willingness to pay for advice depends not only on the information available to a decision maker, but whether they are engaged in rational or experiential processing. There appears to be minimal research linking DPT with investment decisions.

3.2.5 From Dual Process to Multiple Process Models

A common assumption of the two system DPT models is that one of the two processes operates only to the extent that the other one fails (Payne 2008). Conrey et al. (2005) argued

that these assumptions make the two system DPT models less suitable to capture circumstances in which automatic and controlled processes operate simultaneously. To address this issue, Conrey et al. (2005) proposed a quadruple process model which includes parameters for four distinct processes instead of two. The purpose of the quadruple process model (quad model) was to estimate the simultaneous contributions of automatic and controlled processes. It is contended by Conrey et al. (2005) that no decision process is pure and that many responses are influenced simultaneously by automatic and controlled processes. It is proposed that decision-making may be influenced by an automatic activation of an association or bias such as stereotyping (Macrae, Milne & Bodenhausen 1994). This leads to being able to determine a correct response and overcome any automatically activated association or response bias.

A similar quad model with association activation was proposed by Sherman (2006a) to determine how individuals regulate their automatic associations and behavioural instincts. The quad model enhances many DPT models by regulating psychological processing through understanding activation versus overcoming activation (Sherman et al. 2008: Sherman 2006b). Gawronski and Creighton (2013) described the quad model as a multiple process model rather than a DPT model whilst retaining the emphasis on automatic and controlled processes.

The central focus of the next section is that both fast and slow brain systems may undertake decision-making using a four or quadrant (cognitive, affective, controlled and automatic quadrants) combinations. These combinations are drawn from models of actual systems within the brain employing the field of neuroeconomics.

3.3. Independent Variables: Four Quadrant Model

The model of neuroeconomics uses knowledge about brain mechanisms to inform economic theory and was coined as opening the 'black box' by economists (Camerer, Loewenstein and Prelec 2004). It is an area of study which seeks to better understand the behaviour of the decision maker. Neuroeconomics incorporates economics, psychology, and neuroscience into one discipline, building on the theory of human behaviour (Glimcher & Rustichini 2004). It proposes that economic behaviour is the result of interactions between two different processing systems. Camerer, Loewenstein and Prelec (2005) describe neuroeconomics as a component of behavioural finance which studies financial behaviour through understanding brain activity. The goal of neuroeconomics is to gain knowledge in how individuals make economic decisions through studying how their brain works.

Early research commencing with Camerer, Loewenstein and Prelec (2004), focused on reverse inference, linking activity in different brain regions to competing behavioural models. However, this research did not achieve wide acceptance (Konovalov & Krajbich 2019). Neuroeconomics is developing more complex models to study decision-making processes (Grayot 2020; Stoyanov 2017; Camerer 2013). Neuroeconomics, with the use of technology, is well placed to assess the convergence of economics and psychology and determine their role in the decision-making process.

3.3.1 Four Quadrant Model Properties

Lovric, Kaymak and Spronk (2010, Figure 3.1) proposed a cognitive model of an individual investor decision-making consisting of three component parts. First, a three-stage decision-making process of perception, interaction and action. Second, the FQM proposed by Camerer, Loewenstein and Prelec (2005) as the foundation model. Finally, the influence of individual behavioural attributes.

A visual representation of the cognitive model of an individual investor decision-making is presented herewith to see how the components are related and fit within the field of interest (Miles & Huberman (1994).   To provide a clear visual representation of the cognitive model of individual investor used for this study an equivalent figure is developed showing the components of the Lovric, Kaymak and Spronk (2010) model used.

Figure 3.1 Cognitive Model of an Individual Investor components used for study (Lovric, Kaymak & Spronk 2010)
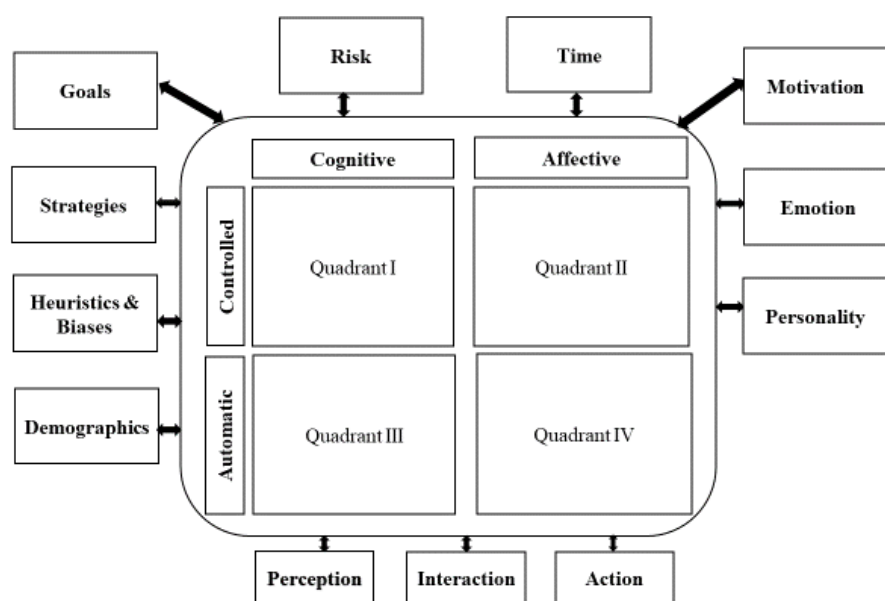
The cognitive model of an individual investor has a three-stage decision-making process of perception, interaction, and action. This accounts for information processing, the interaction of independent attributes and the presumed relationships amongst them. Perception in the model is defined as the analysis of sensory information from sources in the investment environment. Interaction deals with influences from peers and social factors. Action is the result of decisions by an investor through making changes to their portfolios.

The FQM was selected as the core of the cognitive model of an individual investor decision. The FQM is derived from brain organisation and functioning based on

neuroeconomics. Camerer, Loewenstein and Prelec (2005), in their review of neuroeconomics, concluded from the study of neuroscience that brain processes can be subdivided into controlled and automatic processes and further, between cognitive and affective (see Table 3.2).

As discussed in Section 3.2.3, DPTs generally distinguish affective, fast, heuristic, associative, experiential, reflexive, non-conscious Type 1 automatic processes from cognitive, slow, analytical, reflective, rational, conscious Type 2 controlled processes (Stanovich & West 2000; Evans 1989; Kahneman, Slovic & Tversky 1982). Based on this distinction, there is a view that the properties listed can easily be overlapped in such two-process accounts (Evans & Frankish 2009). Further, there are more than two cognitive processes with possible multiple sub-systems underlying individuals performance on dual processing tasks.

Table 3.2 Two Dimensions of Neural Functioning (Camerer, Loewenstein & Prelec 2005)

	Cognitive	**Affective**
Controlled	Quadrant	Quadrant
serial		
effortful	I	II
evoked deliberately		
good introspective access		
Automatic	Quadrant	Quadrant
parallel		
effortless	III	IV
reflexive		
no introspective access		

The combination of the two dual processes (i.e. controlled-automatic and cognitive-affective) is accomplished via a four quadrant matrix representation. This approach by Camerer, Loewenstein and Prelec (2005) suggests that the automatic–controlled and cognitive-affective distinction is insufficient, as it only describes the operating conditions of a specified process without detailing what the process is doing. If the processes draw on the

same underlying cognitive–affective systems properties, then it is assumed that these distinct properties will allow for complex interplay between the processes within the model. The processes will either work together or they will compete with one dominating the other. Camerer, Loewenstein and Prelec (2005) suggest that decision-making behaviour operates from a continuous interplay between neural systems supporting the activity within each of the FQM. In addition, Quadrant I (controlled-cognitive) should not dominate but collaborate and interact with the remaining quadrants.

The dual processes develop within a two dimensional framework with four quadrants as outlined by Camerer, Loewenstein and Prelec (2005). The decision behaviour making quadrants are controlled-cognitive (Quadrant I), controlled-affective (Quadrant II), automatic-cognitive (Quadrant III), and automatic-affective (Quadrant IV).

3.3.2   Four Quadrant Model Processes

The FQM is presented with Quadrant I (controlled-cognitive) sharing similar suite of properties as Type 2 (controlled) and Quadrant IV (automatic-affective) with similar suite of properties as Type 1 (automatic) (see Table 3.1). Further, the FQM presents a holistic view, providing a combination of Type 1 and Type 2 properties in Quadrant II (cognitive-affective) and Quadrant III (automatic-cognitive) (see Table 3.3). In this study to reflect the broader thinking about Type 1 and Type 2, the term fast is also used for automatic processes and slow used for the controlled processes. Four quadrant processes and the characteristics of each quadrant are detailed below.

Controlled processes require conscious attention to consider circumstances, to evaluate and to make decisions. Shiffrin and Schneider (1977) defined controlled process as a intentionally-initiated sequence of cognitive activities. When the full attention of an individual mental resources is required for a task, the process guiding that act is said to be

controlled. This control of behaviour occurs when an automatic process has not been learnt. Compared to automatic processing, controlled processing is usually much slower, requiring more effort (Colman 2015). An example of a task that requires controlled processes is driving a car for the first time. When the task is well-practiced, it becomes automatic.

Automatic processing does not require an individual to pay attention or require much effort for the task. An automatically processed task requires little or no working memory or conscious attention (Shiffrin & Schneider 1977). The process may be undertaken at the same time as other tasks. Examples are frequently practised activities such as riding a bicycle, playing a game, or driving a car (Colman 2015). It is beneficial that many behaviours become automatic, for if all actions required conscious thought, individuals would spend time planning every decision made (Wheatley & Wegner 2001). In contrast, the pitfall of doing things repetitively may be that decision-making is determined by automatic processes beyond conscious control; an example is stereotyping an individual based on their membership of a particular demographic group (Macrae, Milne & Bodenhausen 1994).

The term cognitive is used in psychology to explain mental processes including attitudes, attributions, and perception (Sternberg 2003). Cognitive characteristics are slow, controllable, analytical nature, and they demand maximum cognitive potential. The assumption of neuroeconomics is that economic behaviour is the result of interplay between two different systems; an automatic process (affective-reality) and a controlled process (cognitive-rational) (Kiviniemi Voss-Humke & Seifert 2007). The potential of cognitive perception is to allow an individual to evaluate, analyse and synthesise in the decision-making process. Camerer, Loewenstein and Prelec (2005) stated that cognitive processes answer true/false questions.

Affective decision-making processes are based on an emotional reaction, rather than being the outcome of a rational thought process (Schwarz 2012). In cognitive processes, individual decisions do not result in emotionally significant consequences. In affective processes, however individual decisions result in emotionally significant consequences (Camerer, Loewenstein & Prelec 2005). The characteristic of affective processes is to continuously evolve or automatically evolve the process quickly, requiring minimal cognitive resources (Cappelletti 2009). Camerer, Loewenstein and Prelec (2005) provided a simple means of understanding these processes by viewing affective processes as go/no go questions, which are questions that encourage or invoke avoidance.

Quadrant I (controlled/cognitive) has similar characteristics to Type 2 in serial, controlled, intentional, conscious, and effortful. These characteristics are driven by experience, language, and formal reasoning (e.g. Sloman 1996). The Type 2 dual process is a slower process, involving conscious deliberation and analysis; facts are represented and weighed, options are generated and compared, potential outcomes are modelled and learned reasoning strategies are applied (Fenton-O'Creevy et al. 2010). An individual investor would typically review their investment strategy, having regard to their risk profile, then undertake or seek research on the investment products and evaluate the outcomes. They make decisions based on their goals, and then decide on the appropriate strategies to implement (Baker, Filbeck & Ricciardi 2017).

Quadrant II (controlled/affective) characteristics are both serial and effortful and they include displaying feelings and fast decision-making. This sits within the realms of dual processing and the interaction between competing processes.

An individual investor demonstrates controlled characteristics and regulates the possible biases induced by feelings. It is considered that they experience those feelings during

decision-making process (Lucey & Dowling 2005). Because feelings experienced at an unconscious level are faster than conscious thought, the former can influence the latter. As an example, once an individual starts to think about a decision, they may have already attached an affective reaction to the alternatives that are available.

Quadrant III (automatic/controlled) characteristics are both parallel and effortless and display slow and analytical in decision-making. The question is how much the decision is influenced by automatic process compared to intentional thought or a cognitive process (Cameron, Brown-Iannuzzi & Payne 2012; Krueger 2012). This inhabits the realms of dual processing and how these processes may interact where the automatic is thought to dominate the cognitive.

An individual investor may demonstrate automatic responses when they are unmotivated or unable to use a thinking process. These thoughts, impulses and a lack of introspection spring quickly to the mind and the cognitive process evolves slowly. Stating that the process operates in an automatic or non-automatic manner refers to the process operation but does not specify how the process translates inputs into outputs. Therefore, the conditions under which a given process operates are closely related to when each process is used (Gawronski & Bodenhausen 2009).

Quadrant IV (automatic/affective) has similar characteristics to Type 1, which are fast, effortless, emotional and lack introspection. Winkielman and Berridge (2004), state that automatic-affective reactions may influence preferences and behaviour. Automatic and affective experience has the potential to both help and hurt those making important decisions. This can be largely determined by how individuals experience and handle those feelings (Rubaltelli et al. 2010). Affective is a part of Type 1 dual processing, which means it is fast and automatic. Individual and groups who display automatic and affective reactions exhibit

investors' use of the heuristic, intuitive, processing system (as opposed to the slower, conscious, analytical system).

Table 3.3 Summary of Properties associated with Four Quadrant Model (Camerer, Loewenstein & Prelec 2005)

Quadrant I		Quadrant II	
Controlled	**Cognitive**	**Controlled**	**Affective**
Serial	True/False questions	Serial	Go/No go questions
Effortful	Analytical	Effortful	Automatic
Evoked deliberately	Slow	Evoked deliberately	Quickly/fast
Introspective	Controllable	Introspective	Emotional/feeling
e.g. refinance your house PV calculations (Type 2)		e.g. rarest form – method actor	
Quadrant III		Quadrant IV	
Automatic	**Cognitive**	**Automatic**	**Affective**
Parallel	True/False questions	Parallel	Go/No go questions
Effortless	Analytical	Effortless	Automatic
Reflexive	Slow	Reflexive	Quickly/fast
No introspective	Controllable	No introspective	Emotional/feeling
e.g. return serve in tennis		e.g. you jump at 'boo' (Type 1)	

3.3.3   Evaluating the Four Quadrant Model

Although Lovric, Kaymak and Spronk (2010) suggested using computational techniques, such as agent-based models, and noted that shifting to field experiments in a real-world financial market would increase validity. The field of investor behaviour offers an opportunity for the study of decision-making, considering that it happens in real-world settings instead of laboratory-controlled settings (Orasanu & Connolly 1993). A real-world financial market is a complex environment with many factors including financial services industry data, government policy, and other individuals investor behaviour affecting individual investment decision-making (Wang, Vieito & Ma 2015; Rubaltelli et al. 2010). The FQM is tested in the Australian financial market using SMSFs.

There are concerns with the environmental or laboratory-controlled validity of experimental methods and its general applications to real-world settings (Holleman et al. 2020; Klein et al. 1993). The difference between the study of decision-making in artificial financial markets and real-world settings is an important distinction.

Early studies of decision-making using expected utility theory, placed much reliance on the experimental method where an individual gambles money, winning or losing (Levy 1997). This experimental approach was to integrate preferences and uncertainties to a model of rational behaviour. Recent research has questioned whether this is the best strategy to describe and explain how decisions occur in real-world settings (Huber Wider & Huber 1997). Real-world setting studies have been limited to professional decision-making (Klein et al. 1993). There is a paucity of research on the interplay between factors involved in real-world decision-making, particularly when it comes to individual decision-making (Fischhoff 1996; Karlsson 1988).

Lovric, Kaymak and Spronk (2010) show that the FQM can explain investor behavioural heuristics and psychological biases. This is discussed in the next section.

3.3.4   Heuristics and Biases from the Four Quadrant Model for Investment Decisions

There are seventeen[3] common psychological heuristic and biases detailed by Lovric, Kaymak and Spronk (2010). Nine of these heuristics and biases, which may have possible implications for SMSF trustee investment decisions are examined in this thesis and these are set out in Table 3.4 below. The table outlines their potential allocation to the quadrants and

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[3] Ambiguity Aversion, Anchoring and Adjustment, Availability, Conditional Probability Fallacy, Conservatism, Endowment Effect, Frame Dependence, Gamblers Fallacy, Hedonic Editing, Law of Small Numbers, Loss Aversion, Money Illusion, Overconfidence, Regret, Representativeness, Self-Control, Status Quo Bias.

notes their key effects on investor decision-making and the possible consequences of those decisions.

Table 3.4 Heuristics and Biases with Implications for Investment Decisions

Heuristic/bias	Quadrant	Key effects	Consequence
Anchoring	I & IV	Influenced by purchase points or arbitrary price levels	Missed investment opportunity or poor timing
Availability	I	Estimate the probability of an outcome based on how prevalent that outcome appears to be in the present	Influenced to select shares from prominent companies, missing opportunities
Conservatism	I & IV	Adhere to a prior view or forecast at the expense of acknowledging new information	Reduced ability to make rational and fair investment decisions
Endowment	IV	Tend to assign a greater value to an investment they already own	Missed investment opportunity
Frame Dependence	I	Responding to situations differently based on the context in which a choice is presented (framed).	Inappropriate risk-taking response and risk-averse behaviour
Loss aversion	IV	Feel the pain of losses more than the pleasure of gains	Hold only losing investments too long
Overconfidence	IV & I	Unwarranted faith in one's own thoughts and abilities	Pay too much brokerage and taxes, chance of high losses
Representativeness	I & IV	Flawed perceptual framework when processing new information.	Purchasing overpriced shares
Self-control	I	Tendency to ascribe their successes to their own innate talents and to blame failures on outside influences.	Asset allocation imbalance problem

The following section discusses how the FQM can be used to understand the use of financial advisers and the general investment behaviour of SMSF trustees.

3.4. Dependent Variable: Financial Advice (Seeking/Adverse)

Individuals can obtain financial advice from several sources (including accountants, financial planners, lawyers, sharebrokers, and financial institutions) and the type of adviser chosen varies based on their needs and demographic factors. Studies have shown that wealthier individuals were more likely to use professional financial advice, where less wealthy individuals are more likely to rely on informal social networks such as family and friends (Robb, Babiarz & Woodyard 2012; Chang, 2005). Wealthier individuals typically use financial advice due to both the number and complexity of investment decisions they are required to undertake, and have the resources to fund the advice (Peterson 2006).

Pursuing financial advice for a financial planning issue, problem or objective is a form of help-seeking behaviour (Grable & Joo 2003, 2001, 1999). Marsden, Zick and Mayer (2011) found that seeking advice on the retirement planning process results in positive financial outcomes. Olsen and Whitman (2007) suggested that a lack of financial knowledge results in poor retirement outcomes. Lusardi and Mitchell (2005) however observed that individuals with financial knowledge, were more likely to engage in seeking financial advice. While seeking advice is one possible way to over-come a lack of knowledge there is minimal research examining the role of financial advice and its effectiveness in investment decision-making (Lusardi & Mitchell 2014).

Investment advice for individuals is complex, with a range of advice providers available to meet their wealth management needs (Madden & Scaife, 2008). Most wealthier individuals use accountants for services including but not limited to financial planning and wealth management assistance (Madden & Scaife, 2008). Professional accountants provide non-compliance advice, which is supplementary to their core compliance work of taxation, compilation and audit. It was acknowledged by the Super System Review (2010) that

professional accounting bodies were best placed to ensure high levels of competency for accountants and administrators in providing services to SMSF trustees.

The value of advice depends largely on the relationship between adviser and client (Bennett & Robson, 1999). Advice often goes beyond mere information transfer and can involve a series of integrated steps, which results in an enhanced relationship between the principal and agent (Bennett & Robson, 2004). The variable roles of trust, relationships and professional ethics also determines advice (Blackburn, Carey & Tanewski 2010). Ongoing relationships with expert and experienced advisers also influence major consumer decisions (Schwartz, Luce & Ariely 2011; Javalgi et al. 1999).

Howcroft, Hewer and Hamilton (2003) and Shostack (1977) refer to the clear distinctions between services and goods which includes intangibility, inseparability, and perishability. Advice is an intangible, with an adviser making a recommendation and communicating it to an individual allowing a judgment. (Harvey & Fischer 1997; Sniezek & Buckley 1995). Investment advice is defined as having credibility characteristics and it can be challenging for the involved parties due to a multitude of factors affecting investment decisions (Oehler & Kohlert 2009; Engelmann et al. 2009).

Behaviour coaching is becoming an important service which financial advisers can provide to investors, guiding them to avoid investment mistakes (Fisher 2014). For example, investors may feel compelled to react to short-term market volatility, which can undermine their long-term investment objectives (Russell Investments 2019). Research on investment mistakes has found that investors with limited financial literacy respond better to financial advice, as opposed to a financial adviser trying to educate them in financial matters (Hackethal, Haliassos & Jappelli 2012).

SMSF trustees rely on advice providers, such as financial advisers and accountants (Thorp et al. 2020). Bird et al. (2018) found that 59% of trustees used professional help from advisers to establish their SMSF. A SMSF is considered a financial product under the *Corporations Act 2001* (Cth) and any advice given to trustees is considered 'financial product advice', and hence a 'financial service'. To provide personal financial advice, an adviser is required to have a license or act as an authorised representative (Lindsay & Kelly 2015).

In contrast, individual investors may not feel the need to seek advice. Inderst and Ottaviani (2009) highlighted that seeking financial advice is dependent on an investor personality characteristic, which in turn affects the likelihood of following advice. This approach may be linked to seeking better-than-average returns by working against trends in the market using independent thinking (Kaniel, Saar & Titman 2008). Further barriers to advice are that individuals believe they cannot afford it and do not believe their circumstances justify the need (Fidelity International 2019).

Psychological research has examined the relationship between making investment decisions and investors being over-confident (Barberis & Thaler 2003). This overconfidence may lead investors to make decisions autonomously leading to unprofitable trading behaviour and lower investment competence (Barber & Odean 2001). Lambert, Bessière and N'Goala (2012) defined overconfidence as the tendency for individuals to overestimate their own knowledge and abilities.

Over-estimating one's own knowledge and financial abilities may lead to a reduction in the willingness to seek external advice. Mihaylov, Yawson and Zurbruegg (2015) found that self-directed investors are at risk of managing underperforming SMSFs if they are overconfident and financially illiterate. Further, the impacts that may occur from this may be

mitigated by seeking technical and financial advice. Therefore, the first research objective of this study is:

3.4.1 Research Objective and Hypotheses 1-4

Research objective 1

Does the FQM explain the advice seeking behaviour of SMSF trustees?

Four hypotheses were developed to address the identified research objective. Each of the following hypotheses is seeking to explore whether there was a statistically significant relationship between the FQM and the dependent variable of seeking advice. The literature review undertaken in sections 3.2.2 and 3.4 led to the proposition that Quadrants I and II may be positively associated with SMSF trustees seeking advice. Further that Quadrant III may be positively associated with independent investment decision-making and Quadrant IV may be a possible predictor of independent investment decision-making.

H1: Quadrant I (controlled-cognitive) - slow thinking is positively associated with SMSF trustees seeking advice.

H2: Quadrant II (controlled-affective) - slow feeling is positively associated with SMSF trustees seeking advice.

H3: Quadrant III (automatic-cognitive) - fast thinking is positively associated with trustees independent investment decision-making.

H4: Quadrant IV (automatic-affective) - fast feeling is a predictor of SMSF trustees independent investment decision-making.

3.5.   Dependent Variable: Investment styles (Active/Passive)

Individual investors are commonly portrayed in the behavioural finance literature as unsophisticated or naïve, and being unduly influenced to trends and psychological biases in their investing activity (Kaniel et al. 2012). Investment decision-making is a complex process consisting of significant judgements required by an individual including asset allocation and risk/reward trade-off (Chalmers, Kaul & Phillips 2013).

The primary considerations when setting an asset allocation strategy for an investment portfolio are: to determine the overall investment aim, how much risk the investor is prepared to take, and what types of investments they can access. The purpose of dividing securities into asset classes is so the asset classes can be combined into portfolios that achieve optimal outcomes. Optimal in the context of the model, refers to modern portfolio theory (Markowitz 1959). Detailed in the theory, the term 'efficient frontier' refers to the combination of asset classes that can generate a higher ratio of return to risk.

Individual investors are commonly portrayed in the behavioural finance literature as unsophisticated or naive who are subject to trends and psychological biases in their trading activity (Kaniel et al. 2012). They are also prone to excessive trading, which can be to their detriment according to Barber and Odean (2000). In regards to investors undertaking research, it was found that sophisticated investors respond to the detailed information and undertake their own research, such as conveyed by analysts reports. Where unsophisticated investors would only trade investments in response to a recommendation, regardless of its depth and rely on intuition (Loibl & Hira 2009; Mikhail, Walther & Willis 2007). Tan, Wang and Zhou (2014) also found that unsophisticated investors were unable to fully process detailed investment analysis whereas, sophisticated investors appear to dissect such investment analysis. Research to identify the underlying factors of investment behaviour of individual

investors has been inadequate (Kaniel et al. 2012). An important characteristic of trading activity is the style or investment strategy chosen such as active or passive approach (Sharpe 1992).

The role of active versus passive investment management in relation to all tradeable investments, is of interest to researchers (Baiocchi 2014). Active investing style is where an investor selects their own strategies, undertake investment trades, measure portfolio performance and rebalance portfolios. Passive investing style involves less buying and selling whereby an investor would adopt a 'set and forget' approach, investing in such financial products as index funds or other managed funds (Evanson Asset Management 2011). Phillips, Cathcart and Teale (2007) observed that some SMSF trustees adopted a 'buy and hold' methodology, which is seen as a passive investment strategy.

The finance literature has established that risk and return are strongly inversely correlated (see for example, Fama & French 1992; Fama & MacBeth 1973; Markowitz 1959): the higher the risk, the higher the return, and vice-versa. One significant area that individuals have trouble coming to terms with, and putting into practice, is the relationship between risk and return, acknowledging and being able to manage the level of risk they are willing to take.

The risk-return trade-off is a principle that links high risk with high reward. The appropriate risk-return trade-off depends on a variety of factors including an investor's risk tolerance, the investors numbers of years to retirement and the opportunity the investor has to replace lost funds. Time also plays an crucial role in determining the appropriate levels of risk and reward for a portfolio.

Lovric, Kaymak and Spronk (2010) identify several important independent contextual and psychological attributes that may influence investment decision-making which include risk attitude, time preference, strategies, goals, motivation, emotions, heuristics and biases,

personality, demographics and other factors. To reduce the complexity of investment decision-making in a real-world setting, Lovric, Kaymak and Spronk (2010) reduce these attributes to seven. Their first three important attributes are the investment decision-making purpose, for example: risk, portfolio allocation and portfolio management. The remaining four are decision-making attributes primarily concerning either information sources or heuristics and biases (see Table 3.4). The attributes are split into two categories of contextual and psychological. The attributes presented in the rest of the study may not constitute an exhaustive list. However, the most important attributes revealed by the literature review.

Investment decision-making models including the cognitive model of an individual investor, use a minimum of four attributes as inputs in developing investment plans (Australian Taxation Office 2018; McKeown, Kerry & Olynyk 2012). These inputs are an investor's goals, timeframe, risk capacity, and risk tolerance. Determining goals begins with definition and discussion of the investors circumstances and expectations for a portfolio. Examples of goals include educational, buying a home, and saving for retirement. Each of these examples has different timeframes before the investor will begin to see investment returns. Wang, Rieger and Hens (2011) investigated investment time preferences in 45 countries and found distinct differences between regions, possibly because of uncertainty around delayed cash flows producing a preference to choose immediate cash flows.

Risk capacity applies to the objective ability of an investor to take on financial risk and refers to concepts such as the nature and stability of an investors employment, liquidity needs, income, and net wealth. Taylor and Juchau (2017) outline that investment risk relates to the variability of income returns, capital returns and the combined result from income and capital movements. Risk tolerance is defined as the amount of risk the investors is willing to accept when they confront investment decisions with uncertain outcomes. It is a combination of psychological traits and emotional responses that determine the investors willingness to

take on financial risk. The combination of the four factors creates what the investment industry calls the investor risk profile. Risk profiling tools may categorise clients according to their risk tolerance and are an incorporation of factors that help develop an individual's risk taking behaviour (Taylor & Juchau 2017). The demographics and socioeconomic attributes of investors also play a critical role in deciding their risk approach (Faff, Hallahan & McKenzie 2009; Bhandari & Deaves 2008; Moreschi 2005). Lovric, Kaymak and Spronk (2010) included these attributes in the cognitive model of an individual investor as they may have effects on investor behaviour and cognition. Therefore, the second research objective of this study is:

3.5.1 Research Objective and Hypotheses 5-8

Research objective 2

Does the independent behavioural attributes influence the investment decision-making styles adopted by SMSF trustees?

Four hypotheses were developed to address the identified research objective. Each of the following hypotheses is seeking to explore whether there was a statistically significant relationship between the FQM and the dependent variable of styles of decision-making. The literature review in sections 3.2.2 and 3.5 led to the proposition that Quadrants I, III and IV and II may be a positive predictor associated with SMSF trustees using an *active* investments style. Further that Quadrant II is a possible predictor of SMSF trustees using a *passive* investments style.

H5: Quadrant I (controlled-cognitive) - slow thinking is a positive predictor of SMSF trustees using an *active* investment style.

H6: Quadrant II (controlled-affective) - slow feeling is a positive predictor of SMSF trustees using a *passive* investment style.

H7: Quadrant III (automatic-cognitive) - fast thinking is a positive predictor of SMSF trustees using an *active* investment style.

H8: Quadrant IV (automatic-affective) - fast feeling is a positive predictor of SMSF trustees using an *active* investment style.

3.6.   Summary

A wide range of literature on decision making behaviour has been reviewed and key research papers are discussed throughout the chapter. This chapter has in addition referred to and analysed the literature on the relevant prior research on the theories of decision-making, neo-classical economics, behavioural finance, DPT, FQM and independent behavioural attributes related to the FQM. Whilst the cognitive model of individual investor has many components, the study in this thesis is concerned with the FQM and the related interplay with independent behavioural attributes.

In summary this chapter focused on individual investor decision making with emphasis on the role of heuristics and biases in behavioural finance literature. By taking a descriptive approach, the study is interested in how investors make their investment decisions in a real-world setting, as opposed to rational/optimal behaviour studied in laboratory or more artificial contexts.

The study in this thesis, addresses the gap between decision-making and the real-world environment of SMSFs. The following chapter details the method to collect data for the study.

Chapter 4 Methodology

4.1. Introduction

The previous chapter outlined a number of the key theories of decision-making and behavioural finance. A Four Quadrant Model (FQM) and independent attributes related to investor decision-making were discussed. Chapter 3 was also used to identify and outline the research questions and hypotheses to be addressed by the study.

This chapter illustrates the research design, quantitative and qualitative data collection method. The research design provides the framework for collection, measurement and analysis of data (Saunders, Lewis & Thornhill 2015; Ghauri & Gronhaug 2005). The approach to research design was developed from the aims of the study, review of the literature associated with the research objectives and hypotheses, the population to be studied and the type of investigation undertaken (Cavana, Delahaye & Sekaran 2001).

The research design appears in Section 4.2 of this chapter, which measures the FQM and the interplay with independent attributes as identified in Chapter 3. The investment environment proposed by Lovric, Kaymak and Spronk (2010) is an untested, agent-based, artificial trading market. They outline that these markets are models that study the link between individual investor behaviour and financial market dynamics.

Section 4.2 also outlines the process to access the sample groups for the stages of the study. The study comprises three stages formed by the research objectives and hypotheses: the literature review, participant population, and type of survey used. This chapter presents the overall methodology and method adopted for each stage in the sequence conducted. Stage one of the research design is the survey instrument and its constituent questions, which is influenced by semi-structured interviews with self-managed superannuation funds (SMSF) trustees and financial service industry advisers. Stage two is a pilot test of SMSF trustee

participants, to test the questionnaire. Results from these first two stages was used to finalise the survey instrument. Stage three involves the collation and analysis of all data. These aspects of the study are considered in Section 4.4.

This chapter describes the process undertaken for ethics committee approval and the confidentiality of respondent information obtained during the project in Section 4.5. The chapter concludes with a summary.

4.2. Research Design

The FQM and independent attributes are tested using a mixed method approach. In this chapter the study uses a qualitative research, as part of the measurement development process and a quantitative approach to collect the data in order to evaluate the hypotheses. A sequential mixed method approach was used in scale development (Heslehurst et al. 2015; Bryman 2006; Ivankova, Creswell & Stick 2006). The approach also demonstrated content validity of the measurements where participants and financial advisers would relate to the terms used. It has been argued that a mixed method approach provides a better understanding of the research question through synergies and enriching results than either approach alone (Creswell & Creswell 2018; Padgett 2009; Johnson & Onwuegbuzie 2004).

4.2.1 The Design

The sequential design used consists of: collecting qualitative exploratory data, analysing the information, then using the findings to develop a survey instrument adapted for the sample population (Tashakkori & Teddlie 2010). This instrument in turn is administered to a sample of the proposed population. To examine relationships between attributes at a point in time, a quantitative, cross-sectional study was used to complete this study (Neumann 2011).

The study in this chapter seeks to measure the relationship between SMSF trustee decision-making, the FQM and independent attributes. The attributes were identified from the cognitive model of individual investors in Chapter 3, and further informed by academic literature as well as practitioner journals, industry reports and regulatory sources. The review ensured that the attributes were contemporary and relevant to the sample population in an Australian financial services environment. The attributes in the cognitive model of individual investor and their characteristics identified in Chapter 3 are detailed in Table 4.1.

Table 4.1 Independent Attributes of Individual Investor

Category	Attributes
Contextual	Demographics
	Risk attitude
	Time
	Strategies
	Information sources
Psychological	Goals/Motivation
	Heuristics
	Personality
	Feelings/Mood

(Source: Table based on Lovric, Kaymak & Spronk 2010)

4.2.2 Selection of Sample

This section provides information about potential issues related to the sample population. The composition and framing of the sample groups needed for Stages one, two and three are discussed in more detail later in this chapter.

The process of selecting the sample commenced with initial discussions and email correspondence with representatives from the Self-managed Independent Superannuation Funds Association, (SISFA), and the Self Managed Superannuation Fund Association

(SMSFA). Both organisations, subject to viewing the survey instrument and associated documents, were agreeable to emailing their members the details of the proposed 'full survey' and inviting their members to participate. The researchers had no direct involvement in the data collection process. SISFA decided to send out a member satisfaction survey during November 2019 which would significantly delay the distribution for the survey. In late November 2019, The SMSFA gave a commitment to allow the study to access its SMSF Connect trustee member database to draw a representative sample group of SMSF trustees to take part in the main survey questionnaire. Copies of the proforma letters are at Appendices 4g and 4h.

As the population from which the sample was drawn for the full survey is 400 (i.e. the group of interest for the survey) the minimum sample size of 200 participants was required to achieve a 95% confidence level with a 5% margin of error (Baruch 1999; Saunders, Lewis & Thornhill 2015). This translated to a minimum required response rate of 50% from the target population of 400. The 55% achieved is above the response rates of 15–30% commonly obtained for online surveys (Nulty 2008).

Table 4.2 below outlines the sample groups for design Stages one, two and three of the research and the number of subjects for each stage.

Table 4.2 Sample Groups for the Research Phases of the Study

Sample Used	Stage of Project	Sample Size
SMSF trustees	Stage 1 – Semi-structured interviews	10
Financial service industry advisers	Stage 1 – Semi-structured interviews	8 (4 accountants and 4 financial planners)
SMSF trustees	Stage 2 – Pilot testing- questionnaire	33
SMSF trustees	Stage 3 – Main research questionnaire	221

SMSF trustees who took part in the interviews but not in the pilot test and who were not subject to survey questions were eligible to participate in the main research questionnaire. However, SMSF trustees who participated in the pilot test of the main research instrument were not eligible to participate in Stage three of the research.

4.2.3   The Research Stages

Stage one utilises a qualitative research method consisting of semi-structured interviews with SMSF trustees and financial service industry advisers. The purpose of this stage is to provide an in-depth description of the perceptions and attitudes of the study's participants to the current investment decision-making issues facing them in their respective roles as SMSF trustees and advisers. This phase of the research also describes the factors that the participants believe maybe influence investment decision-making to develop the survey instrument. The methodology associated with this stage of the research is detailed in Section 4.3 of the chapter.

Stage two comprises the further development and testing of the main research questionnaire through a pilot test. The purpose of the survey instrument is to collect quantitative data, which are used to address the research objectives and hypotheses of the thesis. The design and pre-testing of this instrument is discussed in more detail in Sections 4.3 of this chapter.

The third stage of the study involves the collection and analysis of the data from the responses to the main research questionnaire. This analysis includes descriptive statistics, Cronbach's Alpha test, exploratory factor analysis, hierarchical cluster method, K-Means Method, regression and multivariate analysis. Modes, medians, and standard deviations were taken for the demographic section as well as reliability scales for all sections of the questionnaire.

Figure 4.1 Summary of Mixed Methods Model Research Design

Purpose: to investigate the effect of the FQM on the SMSF trustee investment decision-making together with the interplay of independent behavioural attributes on this process
(SEQUENTIAL MIXED METHODS MODEL)

Stage one:
Semi-structured interviews exploring perceptions and attitudes of SMSF trustees and financial service industry advisers
QUAL

Stage two:
Pilot test for the further development and testing of the main research questionnaire. Feed back through interviews
QUANT + QUAL

Stage three:
the collection and analysis of the data from the responses to the main research questionnaire

QUANT

Integration and interpretation of research components:
Methodological triangulation (QUAL +(QUANT +QUAL) + QUANT)
Triangulation for design of survey instrument (SMSF trustees, financial advisers and an academic/expert panel supporting content validity)

Each stage of the development of measurement will now be discussed in turn.

4.3. Measurement

Measurement is the process of observing and recording the observations undertaken for this research. Two different types of measures were adopted for the purposes of this study. The qualitative study presents results from 18 semi-structured interviews with SMSF trustees and SMSF advisers, as well as a survey result of 221 SMSF trustees. The results of the qualitative study provide support for the quantitative study, which uses an FQM to explain investment decision making. A triangulation method was used with SMSF trustees, financial advisers and an academic/expert panel supporting content validity by cross-checking data sources of information and collection procedures (Patton 1999).

4.3.1   Semi-structured, In-depth Interviews

Qualitative research techniques in the form of semi-structured, in-depth interviews are used to collect data related to the research question, and the data inform the development and design of the main research questionnaire. According to Krause (2002) and Morgan (1998), the insights provided by qualitative methods, such as semi-structured interviews and focus groups, may be useful for developing high-quality, closed-ended survey questions. Questions in the questionnaire were developed specifically for the study and these were designed to generate data that is intended to answer the research objectives and hypotheses. SMSFs are a recent phenomenon therefore questions developed for the semi-structured interviews went beyond the academic literature. Sources included practitioner journals, industry reports and regulatory sources and international academic literature relating to individual decision making, socio-economic, wealth creation, legislative and advice elements.

The collection and analysis of interviews is an iterative analytic process that may provide valuable information on emergent and unexpected themes (Driscoll et al. 2007). Semi-structured interviewing, according to Bernard (1988), has the advantage that the interviewer is in control of the process of obtaining information from the participants, but free to follow new paths as they arise. Interviews conducted for qualitative research rely for their quality on the nature of the interaction with the interviewees (Wisker 2001). There are disadvantages to semi-structured interviews in that data might be misunderstood or misinterpreted, results might be difficult to replicate, and validity relies heavily on the participant's integrity (Marshall & Rossman 2006).

The strategy involved in undertaking semi-structured interviews for this research is to pose open-ended questions about the participants' activities in relation to the key topics covering this research and to allow discussion at length from their perspective. Interviews are

one-off, in-depth and approximately 45 minutes in duration. The semi-structured, in-depth interviews are non-standardised and open-ended, with the researcher having a list of themes and questions. (See Appendix 4c.).

Three professional accounting bodies (Australian CPAs, Chartered Accountants Australia and the New Zealand and Institute of Professional Accountants) provided a selection of practising accountants in the southern Tasmanian region who offer services to SMSF trustees. Two Australian financial planning bodies (Financial Planning Association and SMSFA) provided a selection of financial planners in the Southern Tasmanian region who provide services to SMSF trustees.

A criterion for selection was the number of SMSF clients they service. The aim of the sampling was to have a range of serviced SMSF clients reflecting key trustee demographics with various levels of financial service advice (Australian Taxation Office 2018). SMSF trustees were chosen using a 'snowballing' technique (Streeton, Cooke & Campbell 2004). Snowballing sampling is a multi-stage technique and necessary for compliance with the privacy rules under Tasmanian legislation (*Personal Information Protection Act, 2014*). Parameters provided to the professional advisers were that the trustees were aged over 45, and in the accumulation phase. Participants signed a form consenting to their participation in the interviews. The consent form is appended to this thesis as Appendix 4b.

The interviews were recorded and transcribed for analysis. The model explorer tool in NVivo was used to allow for a thematic analysis of the transcripts. NVivo was chosen for its simplicity using a small data set enabling the researcher to analyse the data manually (Bazeley & Jackson 2013; Welsh 2002). Three stages were involved in the analysis: transcription of interview data; a vertical analysis of data by chronologically summarising the key issues; and statements and analysing the data horizontally, identifying the themes across a range

comparing them to the research objectives. The data obtained informed the development and design of the survey instrument questionnaire.

4.3.2 Questionnaire Development

A custom-made questionnaire was developed including a preamble and introduction, then questions pertinent related to the FQM and the nine attributes related to the dependent variables. It includes questions on risk attitude, time, strategies, demographics, information sources, heuristics, personality, goals/motivation, and personality/moods. The questions were informed from research undertaken by Nguyen, Gallery and Newton (2019), Chandra and Sharma (2010) together with work on behavioural finance by Russell (2019). Table 4.5 summarises the structure of the questionnaire for SMSF trustees.

According to Dillman and Dillman (2000), there are typically three types of data variables that influence the construction of survey questions: opinion, behavioural, and attribute. Opinion relates to what participants believe or think is true or false. Behavioural records experiences past, present or future. The attribute variable details participant characteristics such as age and gender. The survey instrument primarily consisted of behavioural questions. The questions were designed based on input gathered from the literature review and interviews. As discussed in Chapter 3, the FQM was tested in a real-world setting and includes all relevant attributes. Responses from the stage one semi-structured interviews related to the FQM were used in the development. (See Table 4.3.)

Table 4.3 Semi-structured Interviews Summary of Responses: Stage one

Measures	Summary of responses
Demographic	Primarily in accumulation and an average age in the mid-50s.
	Wanted flexibility and transparency over their own money.
	Need to have input into managing wealth and retirement funds.
Control	Seeking a solution to a wealth or retirement issue.
	Not necessarily thought of an SMSF but wanted control.
	Wanted input into investment decisions towards retirement.
Financial literacy	Prior to establishment their knowledge of SMSFs and the commitment involved was minimal.
	Did not feel that they could do without advice and assistance.
	Came to realise they were too busy to undertake all trustee roles.
Legislative and regulatory advice	Trustees were not aware of all the investment and taxation advantages available to SMSFs.
	Majority trustees sought assistance from an accountant and/or financial adviser in establishing the SMSF.
	Clients were mainly given SMSF strategy and investment advice from advisers.

In designing the questionnaire, the study concentrates on the research objectives and considers how the data is to be analysed prior to collection ensuring suitable format for the statistical package chosen. Three main elements were considered, first decide on the questions to be included. Second, select the appropriate type of question and phrasing for each question. Third, determine the overall arrangement and question order, and last, it must have been able to generate reliable and valid data. The questions asked relate directly back to the research objectives. The questionnaire designed for the survey was formed into five sections to guide participants with 56 questions (See Appendix 4i.)

The questionnaire is structured around the key attributes of this study. The attributes are presented in the form of 56 questions with a six-point Likert scale to collect data from sample SMSF trustees. All items were operationalised using a six-point Likert scale to yield measures of agreement with statements made in the survey. Likert-style rating enabled the

participants to be asked how strongly they agree or disagree with a statement or series of statements (Saunders, Lewis & Thornhill 2015; Malhotra 2010). This study uses six-point Likert scales to ask the individual investors to evaluate the level of their agreements with the impact of dependable variable and independent attributes on their investment decisions.

SMSF trustees are individually liable for all the decisions made by a fund whether or not they receive help from a professional or another member who makes the decision (Moneysmart 2019). Therefore the six-point Likert scale was chosen to avoid giving the participants a neutral or ambivalent answer choice requiring them to commit to either the positive or negative end of the scale.

For a question to be included it needed to pass several criteria. First, it must have been able to generate relevant data and, second, it must have been able to generate reliable and valid data. The questionnaire designed for the survey was structured around five sections to guide participants with 56 questions (See Appendix 4i.)

There are various forms of validity, of which two types were important to this study: content validity and facial validity (Field 2009). The content validity of an instrument refers to the degree to which individual items represent the construct being measured and cover the full range of the construct. Content validity is judgmental and can be approached in a panel evaluation. In this study, the content validity of the measurement instrument was assessed by referring to a panel of experts including active researchers in the area of accounting, management and finance. After they reviewed the questionnaire, minor changes were made to clarify and eliminate ambiguous statements in instructions and questions according to the panel's recommendations.

4.3.3   Pilot-testing

Pilot-testing of the survey instrument has the following purposes, according to Saunders, Lewis and Thornhill (2015):

- identify problems associated with the way in which the instrument and instructions are presented,

- identify ambiguous questions that may lead to a misunderstanding or convey a meaning different from that intended,

- identify issues with links and technical aspects of the online questionnaire,

- test the structure of the questions and identify the confusing use of terminology,

- test the reliability and validity of the scales.

For the pilot testing, three Australian professional accounting bodies (Australian CPAs, Chartered Accountants Australia, and the New Zealand and Institute of Professional Accountants) were approached to provide a selection of practising accountants in the southern Tasmanian region, who provide services to SMSF trustees. The accountants contacted their SMSF clients via emails and participant letters informing them of the pilot survey. The pilot test was conducted using a pilot survey instrument titled 'The investment decision-making of trustees of self-managed superannuation funds (SMSFs)'. The pilot survey was distributed to the SMSF trustees by the accounting practitioners via an email link that formed an access pathway to the online survey site.

A sample of 33 participated in the pilot test, representing SMSF trustees who were identified though a snowballing technique (Streeton, Cooke & Campbell 2004). The pilot survey was accessible by the targeted participants for a period of three weeks. A single reminder was sent

to all participants at the end of week two. The aim of the pilot testing was to check the suitability of the number of questions and the time estimated to complete the survey.

After pilot-testing the instrument on a selected number of individuals, feedback was gathered primarily through semiformal interviews using open-ended questions. The design and the questions required minimal adjustment following feedback, such as changes to phrasing and grammar. Based on this feedback, the number of questions were increased from 53 to 56.

Question development involved identifying the FQM and independent attribute data required to inform the research question. A summary of the nine attributes and potential underlying attributes are listed below. The methodologies capturing the independent attributes are outlined below. (See Table 4.4). For the specific questions, see Appendix 4i.

Table 4.4 Independent Attributes of Individual Decision-making

Attributes	Questions	Quadrant alignment
Demographic	1–6	N/A
Risk attitude	7–14	Q I and Q II
Time	15–18	QI and QII
Strategies	19–32	QI and QII
Goals/Motivation	33–37	QI and QII
Heuristics	38–43	QIII and QIV
Personality	44	QI
Feelings/Mood	45-48	QIII and QIV
Information sources	49-56	QII and QIV

4.3.4 Demographics and Other Measures

In order to present a demographic profile of the sample Questions 1–3 were intended to set up the background of the participants. Age and gender may influence participants (Davar & Gill 2007). For example, younger investors might hold a higher level of tolerance for risk because they have more time (Bolster, Janjigian & Trahan 1995). The purpose of Questions 3-6 was to measure the relationships between the experience of SMSF trustees and their investment decision-making behaviour. These characteristics allow their opinions and behaviours to be placed in a context, while also enabling establishment of the specific features of the population. This demographic information was relevant to the measurement of a number of the study's hypotheses.

4.3.5 The Four Quadrant Model

First an analysis of semi-structured interviews revealed responses that informed question development and found support for the use of Four Quadrant Model. (See Table 4.5.)

Table 4.5 Sample Interview Responses related to the Four Quadrant Model

Sample of interview responses[4]	Quadrant
According to the trustee interviewees, SMSF trustees were seeking a solution to a wealth or retirement issue – a framework that would facilitate their taking control of their wealth and retirement outcomes (C6 and C7).	I
All trustees except C4 and C5, who relied on advice, believed that when establishing their SMSF they would decide on and control investment decisions, however they came to realise they were too busy to undertake all trustee roles.	II
AP2 expressed a view shared by all practitioners: ' that trustees have no clear strategy at commencement of the SMSF for investment decision-making or monitoring ongoing investment performance'.	III
As indicated by one member of C4: 'My wife and I are still unfamiliar with all aspects of the SMSF and rely on a financial planner and an accountant; and as confirmed by one member representing C5: 'We use a professional adviser, tried the other, doing it by ourselves, and it didn't work.'	IV

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[4] AI (Accountant individual), AP (Accountant partnership), FP (Financial Planner individual, FPP (Financial Planner Partnership), C (Corporate Trustee). See Appendix 4.d.

Second, the literature review revealed that all independent attributes would potentially influence the FQM and discussed further, with an example of correlated quadrants which demonstrate the related core properties.

This category of questions is related to risk attitude. Risk attitude is a complex construct and includes a number of interrelated aspects (Corter & Chen 2006). Questions 7–14 were designed to capture several aspects of risk attitude including comfort with risk and investment choice. They are a way of finding out a respondent's willingness or reluctance to take on risks. The questions seek to explore the alignment of risk tolerance and risk capacity with long-term goals and objectives for investment portfolios. This alignment would relate to characteristics of controlled-cognitive (Quadrant I) and controlled-affective (Quadrant II)

Questions 15–18 are designed to find the amount of time participants spend managing their investments, identifying the level of commitment to their investment decision-making. This would be evident in controlled-cognitive (Quadrant I). This will show the types of decisions participants have chosen to make themselves versus those that handled by other trustees or advisers. For example, common decision-making biases related to taking frequent action are influenced by short-term financial market noise and by an investors emotional reaction to experiencing losses (Bailey, Kumar & Ng 2011). In contrast, the risk of taking infrequent action may be a symptom of a lack of time or loss aversion and related to controlled-affective (Quadrant II).

Insights into investment strategy, portfolio construction and portfolio performance evaluation are represented in Questions 19–32. SMSF trustees experience market and political volatility with differing views on where their domestic economy is headed, leading to a subsequent impact on their portfolio. For an investor it is easy to be distracted by short-term

noise, show bias and neglect the strategies and asset allocation that they need to follow to achieve their objectives (Bodie, Kane & Marcus 2014). These characteristics are shown in controlled-cognitive (Quadrant I).

Goals and motivations are explored in Questions 33–37, particularly goal-setting processes and investors' different timeframes. Investors may spend a significant amount of time and energy focusing on their financial situation but not have specific investment goals (Nevins 2004). The risk of not ensuring goals are articulated and investment decisions are cross-checked against both those goals and risk profile, is that their investment portfolio fails to achieve its objectives. This might be the result of taking too much risk or not taking enough of the right risks. Motivation to establish investment goals provides purpose and energy and assists an investor to stay disciplined in their investment process. The adoption of this decision-making behaviour by SMSF trustees would be the controlled-cognitive (Quadrant I) and controlled-affective (Quadrant II).

Questions 38–43 deal directly with recording the heuristic and bias behaviours of the participants. This is relevant in SMSF trustee investment decision-making, when the number of investment products and the density of information have increased significantly. Using heuristics allows for speeding up decision-making compared to rationally processing the presented information. Nine heuristics and biases are examined in Chapter 3 as having possible implications for individual investment decisions. The questions also examine the participants' frame dependence. How investors frame a decision can sometimes change the conclusion they draw, even if it is the same decision based on the same information. This is important because some ways of framing investment decisions are more likely to lead to error. These decision-making behaviours characteristics would be revealed by automatic-cognitive (Quadrant III) and automatic-affective (Quadrant IV).

Certain personality traits can influence investors preferences and these are recorded directly in Question 44, although other questions cover the variable. Attitudes about risk stem from personality traits and may influence an investor's decision (Pak & Mahmood 2015). For example, conscientious people pay close attention to details. Conscientious investors are most successful when they use their powers of perception to avoid risky investments, as well as use their organisation skills to develop a well thought-out investment plan. These characteristics are shown in controlled-cognitive (Quadrant I).

The aim of Questions 45–48 is to study different feelings/mood attributes and the influence of this attribute on investors' investment decisions. Different emotional states have both positive and negative outcomes. Positive outcomes may be related to increased creativity whilst negative outcomes may relate to excessive gambling. How investors use their feelings and moods will determine the success or failure of their investment decisions (Lowenstein et al. 2001). For example, a well-considered, pre-planned approach to dealing with this attribute, is one strategy that can potentially help to overcome some of the emotional and cognitive traps associated with selling underperforming investments. The decision behaviour making characteristics are seen in automatic-cognitive (Quadrant III) and automatic-affective (Quadrant IV).

Questions 49–56 concern the different tools and sources of information the participants use in investment decisions. The alternatives available are examples of internal and external influences. The purpose is to provide information regarding the factors that underline the investment decision. How influential the media and advisers are considered amongst the external influences can describe several tendencies that investors may have, such as following the herd, having low confidence in ones judging ability, or having

overconfidence. These characteristics are seen in controlled-affective (Quadrant II) and automatic-affective (Quadrant IV).

4.3.6 Financial Advice

The next objective was to assess the importance of the independent attributes on seeking of advice and the impact on SMSF trustee investment decision-making in the questionnaire development. The independent attributes of strategies, demographics, information sources and heuristics were considered in related questions for the survey. The semi-structured interviews revealed a strong reliance on financial advice on establishment of an SMSF, however it was less obvious for investment decision-making. (See Table 4.6).

Table 4.6 Sample Interview Responses related to Financial Advice

Sample of interview responses	Related
In regards to financial advice C1 stated: 'I changed advisers because they were chopping and changing my investments all the time'.	Advice
According to all accountant and financial planner practitioners the majority of trustees either at establishment or annual review ' were not actively involved in preparation of their fund investment strategy'.	Fund Investment Strategy
Question posed to C6 -How do you gain investment experience? Response: 'We rely on our new financial adviser'.	Investment experience
As stated by AP2: ' ….financial literacy of SMSF clients at establishment anywhere on a scale between 0 and 100'.	Financial literacy

4.3.7 Trustee Decision-Making and Financial Behaviour

The literature review revealed that the independent attributes may impact SMSF trustee decision-making and financial behaviour. The independent attributes of risk attitude, strategies and heuristics were considered in related questions for the survey. The semi-structured interviews revealed SMSF trustees strategic approaches and heuristics/biases influencing decision making. (See Table 4.7).

Table 4.7 Sample Interview Responses related to Trustee Decision-making and Financial Behaviour

Sample of interview responses	Related
AP2 stated that '. We prepare or assist with annual return or audit however clients usually outsource rest due to complexity- investment and compliance'.	Passive investment style
According to C3 the purpose of running an SMSF'… is to do her own share trading, picking the stocks like her father used to do'.	Active investment style
What is key driver for establishment and running an SMSF from your viewpoint? FP3 said: 'control of investment decisions'.	Control/active investment style
AP1 stated when asked about their clients purpose for running an SMSF: '… is that they have a significant amount of confidence in some investment strategy of their own, real-estate or share trading in particular would be the two that I'd be looking at'.	Active investment style

4.4. Data Collection and Analysis

Following the questionnaire development and pilot test, the next stage of this study was the distribution of the questionnaire. The primary data were collected through a self-administered online questionnaire where participants answered the questionnaire through a webpage without supervision.

Several methods were adopted to ensure objectivity. First, responses to the main research questionnaire were provided anonymously in an online environment, which identified participants by a number allocated to them by the online service provider. No direct contact was made between the researcher and the participant. Second, responses were analysed and aggregated using these numbers. Third, no written content or responses that could identify any participant were required and no sensitive information was sought. Fourth, participation was voluntary and participants advised they could choose not to answer any question or could withdraw from the study at any time. In addition, participants were advised that their responses would be kept confidential and that any queries about their participation in the project should be directed to Dr Nagaratnam Jeyasreedharan at the University of Tasmania.

For the purposes of this study, it was assumed that online survey participants consented to participate in the study by definition of their response. Therefore, a consent form was not used for the survey instrument, nor was it required for the purposes of Ethics Committee approval. All participants were advised of the purpose of the study and the rights, obligations and responsibilities of the researcher and the participants in the written preamble to the survey instrument to ensure that the consent of participants to participate in the study was informed (Buchanan 2004).

The questionnaire was distributed to 400 participants on 25 November 2019. Participants met the eligibility criteria to undertake the survey as representatives of the trustee group required for the study. The main survey sample did not include any participants who had completed the pilot survey and the results of the pilot survey are not included in the data analysed in this chapter. Data screening and cleaning were performed based on the data collected.

To carry out the questionnaire as a self-administered test had several advantages. These include the high number of potential participants in a large geographical area and reaching them fast and at a low cost (Neumann 2011: Baron 2000). Practical considerations of sufficient response rate, number of questions, and time availability are considered in designing the research instrument (Saunders, Lewis & Thornhill 2015; Thorne 2000). Determining sample size is an important issue ensuring proper use of time, resources, money, and sufficient sample size.

Online implementation of the surveys adopting Survey Monkey provided access to the targeted participants and allowed participants to complete the survey at their own pace, making it easier and more convenient for them to respond. The purpose-built questionnaire comprised questions structured around nine key attributes of risk attitude, time, strategies,

demographics, information sources, heuristics, personality, goals/motivation and personality/moods. The member organisation provided details of access to members via an email. Members were provided with the information sheet and access to the questionnaire by the member organisation. Members were able to ignore the email, access the site and ignore it, or choose to move forward and complete the questionnaire.

For both the pilot and full surveys, the raw data were collected through an independent online questionnaire where the targeted participants answered the questionnaire through the website. Survey Monkey allowed the researcher to manage the questionnaire in three major steps: survey design, response collection and results analysis. The data could be accessed once each participant completed the survey. Completion of the survey was expected to take 20 minutes and participants were required to complete the survey in one attempt.

The responses were collected anonymously, and participants status was deemed Incomplete or Partial if they quit the survey at any time in the process by not clicking the Done button on the last page of the survey. However, these 'Partial' or 'Incomplete' responses were recorded by the system if the participant entered at least one answer and clicked 'Next' on at least one survey page, even if they did not click 'Done' on the last page of the survey.

The full survey was accessible by the targeted participants for a period of seven weeks. Initial reminders were sent by the distributors at the end of week three, with further reminders at the end of weeks five and six. The data were collected at the end of week seven and then downloaded, filtered and analysed using the SPSS software.

This research used quantitative methods to analyse the survey responses. Development of measures based on results from factor analysis lead to regression analysis. A cluster analysis of the variables of SMSFs in the study was followed by a discriminant analysis.

Codes were assigned to identify variables of the nine attributes to develop representative clusters of the variables. The representative clustered variables were interpreted within the dual mental processes as identified in Chapter 3.

Demographic variables contribute to the analysis of SMSF trustee investment behaviour through understanding the relationship between these variables and individual investment decision-making. In relation to the individual variables affecting investment decision-making therefore, the study explored the existence of statistically significant relationships between the individual attributes of gender, age, size of fund, investment experience and trustee decision-making style.

Factor analysis was considered for the data analysis to clearly explain underlying dimensions of the independent variables and any correlations between them. It reduces or summarises a large number of variables, mostly correlated, to a manageable level (Malhotra 2010). The data reduction is achieved by combining variables that are found to approximately measure the same thing. Factor analysis was used to find a smaller group or combination of variables that are representative of a data set's original variables, called factors.

Two basic types of factor analysis exist: exploratory and confirmatory. Exploratory factor analysis (EFA) is a statistical method that is used to summarise the data by grouping variables that are correlated with each other. Confirmatory factor analysis is used to test a theory of an underlying process. The research used EFA as it increases the reliability of the scale by identifying inappropriate items that can then be removed.

Following factor analysis to rule out the redundant variables, further analysis using regression modelling was conducted with a reduced number of variables. Regression analyses are commonly-used statistical procedures in the social sciences, treating all observations as a whole and examining how well they correlate.

Cluster analysis was also chosen as one of the primary methods of data analysis for the purposes of this study. It was used to determine how many clusters underlie the data. Cluster analysis is a multivariate method and the objective is to assign observations to clusters so that observations within each cluster are similar to one another with respect to variables or attributes of interest and the clusters themselves stand apart from one another (Malhotra 2010).

Two types of clustering procedures were chosen: hierarchical and non-hierarchical or partitioning (Malhotra 2010). Hierarchal procedures can be either agglomerative, which proceeds by a series of successive fusions of the attributes into clusters; or divisive which separates the attributes successively into finer clusters (Everitt 1993). The procedure used in this study for attribute clustering was an agglomerative algorithm. Non-hierarchal procedures try to find the most optimal grouping of the data into a predetermined number of clusters. A well-known example that was used is the K-means algorithm.

Discriminant function analysis was used to predict group membership (dependent variable) from several independent variables following cluster analysis. The procedure is multivariate and provided information on the individual constructs. The analysis was conducted to determine if the expected and observed constructs differ and whether the deviation of the observed constructs were statistically significant.

4.5. Ethics Approval and Confidentiality of Participant Information

This section of the chapter discusses ethics committee approval for the research and how the confidential information and data of individual participants was handled.

Ethics approval numbers H0012128 and H0018029 were granted by the Human Research Ethics Committee of the University of Tasmania prior to conducting the interviews and survey of SMSF trustees. Permission from the ethics approval committee is required

before conducting any research that involves interaction with human participants. The application for ethics approval was sent to the University of Tasmania Human Research Ethics Committee 30 working days prior to the formal interviews. The project classification was identified as minimal risk from an assessment of the level of risk to participants according to the Risk Classification of Research Projects guidelines. The ethics approvals allowed us to conduct both the interviews and the survey.

4.6. Summary

This chapter presents a description of the methodology undertaken for this study, which examines the FQM and independent attributes that influence individual investment decision-making. The research design employed a cross-sectional, questionnaire-based survey to gather data from the SMSF trustees. A triangulation method was used to test validity through the convergence of information from different sources.

The next chapter, Chapter 5, provides a detailed analysis of data and findings.

Chapter 5 Analysis and results

5.1. Introduction

Chapter 4 discussed the methodology that was adopted for the purpose of this thesis to measure the research questions posed.

This chapter presents the analysis of the data collected for the purpose of this study and is divided into three sections. The first section provides an overview of the data collection, how the measurements were collected and then examines the hypotheses of the study. The second section provides information about the questionnaire participants, including SMSF trustee demographic details. The third section presents the quantitative results of the questionnaire survey, including tests for reliability of the data collection. In this section, the analytic procedures of the initial analysis are presented: (1) Development of measures based on results from factor analysis; (2) Regression of these factor scores, with each measure a quadrant of using dual process theories, with behavioural measures of financial decision-making; (3) A cluster analysis of type of self-managed super funds (SMSF) in the study; (4) a discriminant analysis of how well the Four Quadrant Model (FQM) and behavioural measures predict membership of different types of self-managed superannuation funds. The chapter concludes with a discussion of the findings.

5.2. Data Analysis

Participant data from the online version was entered into SPSS 24 for statistical analysis (Coakes, Steed & On 2010), The analysis contained several steps to identify the model that contains the factors that have the most significant impact on SMSF trustee investment decision-making. The steps used include descriptive statistics, Cronbach's Alpha test, exploratory factor analysis, hierarchical cluster method, K-Means Method, regression and multivariate analysis.

So as to present a demographic profile of the sample for the main research questionnaire, descriptive statistics of the demographic variables were conducted using the data from responses to the demographic survey in section one of the main research questionnaire.

5.2.1   Data Screening

The data was screened and cleaned using descriptive analysis for out-of-range values and missing values. Frequency analyses were conducted for each variable to screen for out of range values. Survey responses with more than 25% missing variables could lead to interpretation of the results being problematic and therefore these results were discarded (Byrne 2010, Cohen & Cohen 1993). This brought the total number of valid responses to 201.

Exploratory factor analysis (EFA) requires a complete data set (McNeish 2017). There are various methods to handle missing data. One of the most popular methods is imputing missing values by replacing with means (Tabachnick & Fidell 2007). A missing rate of 5% or less is inconsequential and acceptable (Mahorta 2010; Schafer 1999). The mean was used for missing values of less than 5% for 22 participants.

5.3.   The Sample

Of the 400 trustees contacted through the survey distributor via an email, 221 responded to the survey. All participants completed the questionnaire online. The response rate to the main research questionnaire represented a percentage response rate of 55% of the sample group, which was above the anticipated response rate of 50% as outlined in Chapter 4.

The largest representative age group was 60–69 years (69 participants or 34.3%), followed by 70 years and over (62 participants or 30.8%) and 35–49 years (31 participants or 15.4%). According to the Australian Taxation Office (2019c) as at the end of June 2019, the largest SMSF trustee age group is 60–69 years at 26.4%, followed by 50–59 years at 24.5%,

and 70 years and over at 24%. The survey sample included 50 females (24.9%) and 151 males (74.9%). According to the Australian Taxation Office (2019c) as at the end of June 2019, females represent 49.3% of SMSF trustees and males 50.7%. It was found that 75.6% of the funds are represented by two members. The next most represented is one member at 12.4%. The proportion of members as at the end June 2018 (Australian Taxation Office 2019b) are 69.5% for two members and 23.4% for one member.

The data presented shows that 157 participants or 78.1% are experienced (35.8%) or have some experience (42.3%) in investing in a wide range of investments. The remaining 44 participants or 22.9% had minimal or little investment experience. Question 5 of the demographic section sought information from the participants about their input to the decision-making process within the SMSF. The data presented shows that 129 participants or 64.2% undertake the investment decision process for themselves and other members. A further 42 participants or 20.9% undertake the investment decision process jointly with other members.

The data showed 71 participants or 35.3% make investment decisions with the help of other members or advisers. The next largest group of 58 participants or 28.9% make decisions by themselves and a further 37 participants or 18.4% make decisions with other members. The remainder rely on advisers or have little input into the investment decisions. Further, calculation of means, frequency distributions and percentage distributions to summarise data. More details of the analysis done by SPSS are presented in Appendix 5.0 (pp. 154 to 155).

It is recognised that this is a relatively small sample which may have caused bias, but the sample size is consistent with other research found in the literature and the results from the 221 respondents is of appropriate size to conduct the detailed analysis which was undertaken in this stage of the research (Saunders, Lewis & Thornhill 2015; Bujang et al.

2012; Cattell 2012). This detailed analysis has generated the results presented in the rest of this chapter.

5.4. Factor Analysis

Factor analysis is used for data reduction in this research, reducing a large number of variables to a small number of underlying factors. The purpose was to identify firstly, the number of factors to extract, and secondly the rotation of the factors and their interpretation. To understand and identify variables of SMSF trustee decision-making, the statistical method of EFA was used on questionnaire responses. EFA was employed to increase the reliability of the scale by identifying inappropriate items that may be removed and the dimensionality of constructs by examining the existence of relationships between items and factors (Netemeyer, Bearden & Sharma 2003).

Principal component analysis (PCA) method with varimax rotation was selected as it considers the total variance in the data and improves interpretability. PCA is recommended when the primary concern is to determine the minimum number of factors that will account for maximum variance in the data for using subsequent multivariate analysis.

A standard sequential approach was undertaken for conducting an exploratory factor analysis (Costello & Osborne 2005). Firstly, identifying the number of meaningful factors to retain based on the scree test and the percentage of variance accounted for by a given factor. From the scree test, eigenvalues greater than 1 (that is, the amount of variance that is accounted for by a given factor) associated with each factor was charted and identified the break between the factors with meaningful large eigenvalues and those with smaller eigenvalues, separating them accordingly. In addition, we prespecified the amount of the explained variance for each derived factor (over 10%).

The second step involved a varimax (orthogonal) rotation on the retained factors to help with interpretation. An orthogonal rotation was applied because it was hypothesised that the factors would be uncorrelated with one another. Orthogonal and oblique rotations were compared. The final step involved interpreting the rotated solution by identifying which items load on each retained factor. Pattern loadings near 0.40 or greater (in absolute value) were used to interpret the results.

Following rotation, initial factors were extracted from the matrix. A shared variance of each variable was partitioned from its unique variance and error variance to identify the underlying factor structure to determine simple structure. The communalities and explained variance for each item were examined. The percentage of total variance explained is central in determining factors and 60% serves as the acceptable minimum (Hinkin, Tracey & Enz 1997).

The KMO and Bartlett's tests were extracted for sampling adequacy. According to Field (2009) KMO values between 0.80 and 0.90 are great values to perform a factor analysis. The KMO value was 0.815. The Bartlett's Test of Sphericity should be significant (less than .05) and we have met this criterion as the test is significant (p =.000). Based on Bartlett's test, patterned relationships amongst the variables exist and using factor analysis is appropriate.

The purpose of PCA is to reduce our set of variables. One criterion is to choose components that have eigenvalues greater than 1. The eigenvalue represents the total amount of variance that can be explained by a given principal component. Starting from the first component, each subsequent component is obtained from regressing out the previous component. The first component explains the most variance, and the last component explains the least.

An initial analysis was conducted with 49 items to obtain the eigenvalues for each component. Under the Total Variance Explained table, 13 components had eigenvalues greater than Kaiser's criterion of 1 and together they explained 66.62% of the variance. To confirm what components should be retained, a scree plot graphing the eigenvalue against the component number was conducted (see Figure 5.1). The decision of the number of components is based on the scree plot and the change in slope occurs between 3 and 6.

As the scree plot is not clear, this was tested by running multiple factor analyses and setting the number of components to retain manually while trying to select one with fewer retained components. The cumulative percentage of variance shown in the agglomeration schedule, accounted for by the current and all preceding factors, was the fourth row with a value of 41.00%. This means that the first four components together account for 41.00% of the total variance. Following an iterative estimation process four components were chosen which is consistent with the FQM developed by Camerer, Loewenstein and Prelec (2005).

Figure 5.1 Scree Plot for Four Quadrant Model-factor Solution
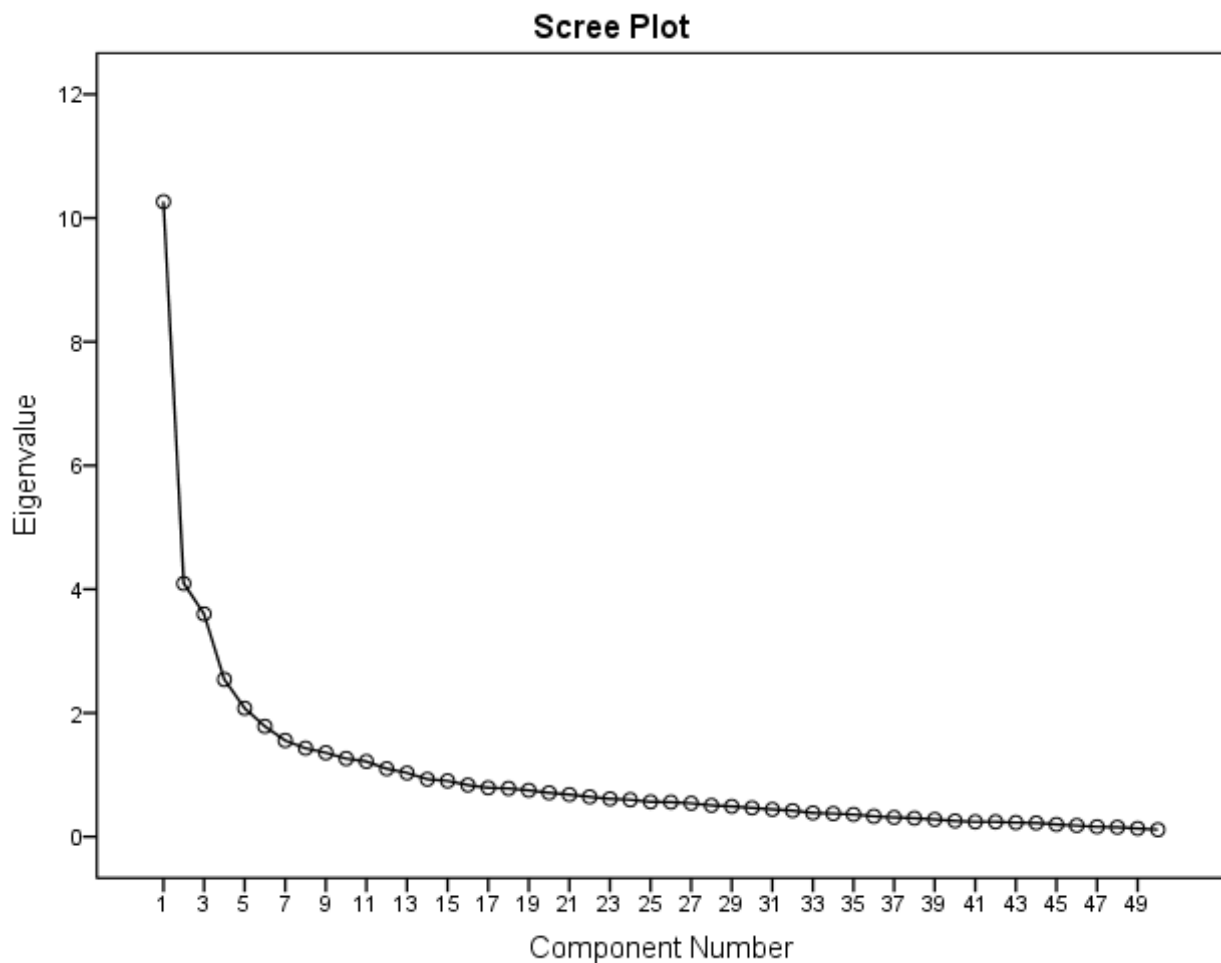
5.4.1 Development of Measures of the Four Quadrant Model

A factor analysis with a rotated component matrix was undertaken analysing the four quadrants and provided some usable results. Factor scores were saved and used as independent variables in later analysis. Variables that were not strong enough with low factor loadings were eliminated, although additional criteria was considered before taking out a variable. The standardised factor loading of all the items ranges was set above the threshold limit of 0.4 as suggested by Hair et al. (2006). Further, to ensure a simple structure, each of the identified factors have at least three variables with high factor loadings, and each variable should load highly on only one factor. On the rerun, the KMO value was .815. The Bartlett's Test of Sphericity should be significant (less than .05) and we have met this criterion as the test is significant (p =.001).

Table 5.1 Rotated Factor Matrix of Four Quadrant Model

Factor Analysis – Quadrants				
	Controlled/ Cognitive	Controlled/ Affective	Automatic/ Cognitive	Automatic/ Affective
Q14 I check financial conditions before I invest	0.69			
Q25 Use technical analysis to make decisions	0.65			
Q33 Review investment goals before decisions	0.61			
Q13 I assess risk tolerance before I invest	0.61			
Q18 I use ROI before I invest	0.61			
Q30 Consider a variety of alternatives before investing	0.60			
Q31 Assess liquidity / marketability of investments	0.59			
Q36 Review investment performance with market benchmarks	0.59			
Q32 Assess the convenience in which an investment can be traded	0.57			
Q15 Manage investments on a weekly basis	0.47	-0.44		
Q45 I am calm when I have to make investment decisions quickly	0.47		0.47	
Q34 Committed to achieving investment goals	0.41			
Q27 Investments will return good returns in the medium-long term	0.40			
Q55 I consult with financial advisors before I make investment decisions		0.84		
Q29 Confident in my financial advisers forecasts		0.79		
Q22 Consult financial advisors to improve performance		0.79		
Q49 Sources of investment information are professional advice (stockbroker, financial advisor, accountant)		0.75		
Q28 Rather have someone else manage my investments		0.67		
Q42 I avoid selling investments that have fallen in value and sell those that have increased in value		0.56		
Q51 Sources of investment decisions are family, friends, and peers		0.54		
Q21 Wait to anticipate future improvements		0.44		
Q50Sources of investment information are media (television, internet, print media)		-0.43		
Q47 I stick with my investment decisions regardless of outcomes		0.42		
Q53 I generate my own ideas / own research		-0.42		
Q20 Use judgement to improve performance		-0.42	0.41	

Factor Analysis – Quadrants				
	Controlled/ Cognitive	Controlled/ Affective	Automatic/ Cognitive	Automatic/ Affective
Q08 Look for safe investments			-0.75	
Q07 A cautious person			-0.72	
Q09 Long time to make up my mind			-0.65	
Q12 Willing to take risks to earn returns			0.65	
Q44 I enjoy making investment decisions			0.61	
Q19 Confident of a quick decision if an opportunity presents			0.58	
Q10 Risk is opportunity			0.56	
Q38 My skills and knowledge outperform the market			0.51	
Q11 Investments are easily to understand			0.50	
Q26 Confidence in the performance of my investments	0.43		0.46	
Q39 Rely on experience for investment decisions	0.44		0.46	
Q46 Rely on instinct to make investment decisions				0.58
Q52 Make investment decisions without having all the information available				0.57
Q37 Often invest in alternative products that are not properly researched				0.54
Q41 After a gain on investments, I become more risk seeking				0.53
Q43 I favour one option of investing but then change to another option				0.50
Q56 I have made an investment decision contrary to advice from my financial advisor(s)				0.47
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalisation.				
Rotation converged in six iterations.				

In the development of the analysis, the original data set was used. In sum, the 50 factor variables influencing SMSF trustee investment decision-making as suggested by the literature review, were reduced to 28 as a result of factor analysis. Table 5.1 presents the item loadings and weights obtained from the analysis. The loading of variables in the matrix is grouped into the respective factors and listed in order of strength, providing a very clear and interpretable 4-factor solution. Cross-loadings on factors and negative factor loadings were

retained for the analysis. The remaining variables have factor loadings above the cut-off value of 0.4 and were included. On examining the weights and loadings for each of the 4 constructs, 6 of the items had loadings of 0.70 (+ or -) or higher whereas 10 items had loadings of at least .60 (+ or -), 26 items had loadings below .60 (+ or -). Five items were cross-loaded. To interpret and to give a title to each component, the initial variables were examined carefully along with their respective correlations with the concerned factors. Components were then labelled into four components, namely Quadrant I (controlled-cognitive), Quadrant II (controlled-affective), Quadrant III (automatic-cognitive), and Quadrant IV (automatic-affective). The factor loadings from the principal component analysis was then used to weight each variable for further analysis. That is, the factor scores obtained from SPSS were used to measure each quadrant.

5.4.2 Development of the Measures of Investor Behaviour

A factor analysis with a rotated component matrix was repeated, analysing the investment behaviour attributes using the same principles and process as for Table 5.1 and provided some usable results. Factor scores from the above analysis were saved and used as independent variables in later analysis. The cumulative percentage of variance shown in the agglomeration schedule, accounted for by the current and all preceding factors, was the fourth row with a value of 50.76%. This means that the first four components together account for 50.76% of the total variance. On the rerun the KMO value was .677. The Bartlett's Test of Sphericity should be significant (less than .05) and met the criterion as the test is significant (p =.001).

Table 5.2 Rotated Factor Matrix of Financial Behaviour

Factor Analysis: Financial Behaviour		
	Financial Advice	Independent Thinking
Q55 I consult with financial advisers before I make investment decisions	0.83	
Q49 Sources of investment information are professional advice(stockbroker, financial adviser, accountant)	0.75	
Q53 I generate my own ideas / own research	-0.64	
Q51 Sources of investment decisions are family, friends and peers	0.63	
Q50 Sources of investment information are media (television, internet, print media).	-0.6	
Q54 I check with fellow trustee before I make investment decisions	0.46	
Q52 Make investment decisions without having all the information available		0.78
Q56 I have made an investment decision contrary to advice from my financial adviser(s)		0.72
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser, 51% of the variance explained, Normalisation.[a,]		

The remaining factor variables influencing SMSF trustee investment decision-making as suggested by the literature review were reduced as a result of factor analysis. Table 5.2 presents the remaining item loadings and weights obtained from the analysis. The remaining variables have factor loadings above the cut-off value of 0.4 and were included. Examining the weights and loadings for each of the two constructs, 4 of the items had loadings of 0.70 or higher whereas 3 item had loadings of at least .60 (+ or -), and 1 item had loadings below .60. Negative factor loadings were retained. The two components were labelled Financial Advice and Independent Thinking . Factors were labelled to provide an appropriate name for the extracted factors providing an accurate, useful description of the underlying construct. The factor loadings obtained from principal component analysis were used to calculate the weighted scores for each dimension of financial behaviour.

5.5. Cluster Analysis

The cluster analysis using non-hierarchical, *K*-means method was done, using the four dependent variables. Cluster analysis is the separating of data into meaningful subgroups, when the number of subgroups and other detail about their composition may be unidentified or not defined in advance (Tan, Kumar & Steinbach 2005; Fraley & Raftery 1998). The endpoint of cluster analysis is a set of clusters, where each cluster is distinct from each other cluster and the objects within each cluster are broadly similar to each other (Anderberg 1973). The analysis using Hierarchical clustering to determine the number of clusters and the K-Means Method using demographics as the inputs.

Hierarchical is used as it generates a series of models with cluster solutions from *1* to *n* (each case is an individual cluster). It also clusters variables together in a manner somewhat similar to factor analysis. *K*-means is a straightforward and widely used clustering technique. It is a centroid-based clustering algorithm where '*K*' represents the number of clusters and is also an input parameter. The algorithm is called *k*-means due to the fact that the letter *k* represents the number of clusters chosen.

5.5.1 Hierarchical Cluster

The hierarchical cluster analysis follows three basic steps. The first step is to measure the distance between objects with similarity. The analysis used Ward linkage method and (squared) Euclidean distance measure. The aim in Ward's method is to join variables into clusters such that the variance within a cluster is minimised. The second step is to link the clusters where an agglomerative approach was used. The agglomerative approach starts with each object forming a separate group. It successively merges the objects or groups close to one another, until all the groups are merged into one, or a termination condition holds (Coroiu, Găceanu & Pop 2016).

The final step is to choose a solution by selecting the right number of clusters. In the bottom-up mode known as an agglomerative approach, each pattern is treated as a single-element cluster and then successively merged with the closest clusters. The agglomeration schedule lists all of the stages in which the clusters are combined until there is only one cluster remaining after the last stage. The process is repeated until we get to a single data set or reach a certain predetermined threshold value. To decide on the number of clusters, researchers should consider what are the desired data analytic characteristics of the clusters. The researcher can dictate the cluster membership to have a single solution (fixed number of clusters) or a range of solutions (a range of clusters).

The agglomeration schedule displays how the hierarchical cluster analysis progressively clusters the cases. The number of stages in the agglomeration schedule is one less than the number of cases in the data being clustered. In this analysis, there are 200 stages because the data consists of 201 cases. The coefficients at each stage represent the distance of the two clusters being combined. As shown in Figure 5.2, there is a jump in the coefficient values between stages 198 and 199. With a difference of approximately .141, this is the first noticeable increase that we encounter as we move down the list of coefficients in the agglomeration schedule. Therefore, a decision was made to stop the clustering after stage 198.

Figure 5.2 Agglomeration Schedule Coefficients for Two-cluster Solution

Agglomeration Schedule
Coefficients
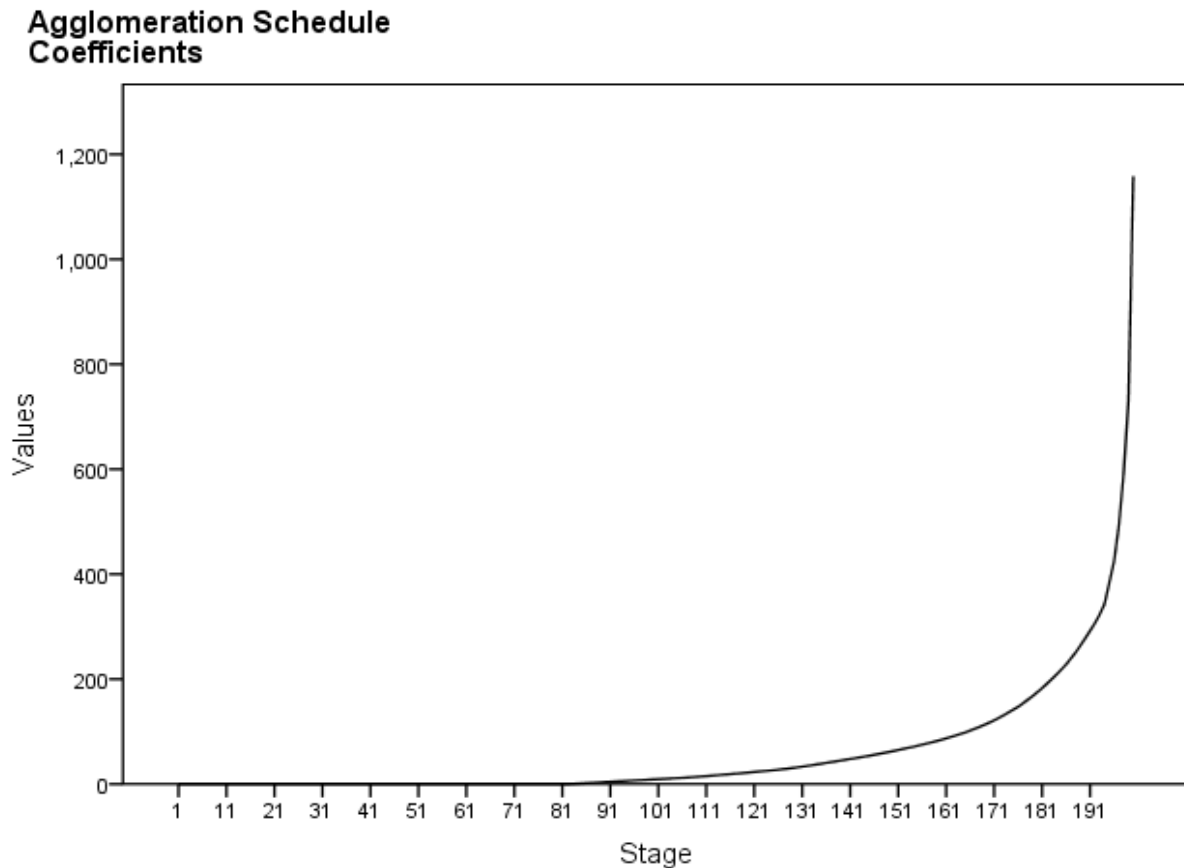
It can be difficult to calculate the differences of the coefficients. A solution was to plot

the coefficient values by stage in a scree plot (elbow), a visual representation of the

agglomeration schedule. In Figure 5.2, the scree plot shows a large increase in the coefficients

after stage 195.

A hierarchical cluster analysis is best illustrated using a dendrogram, a visual display

of the clustering process (Yim & Ramdeen 2015). Examining the dendrogram from left to

right, clusters that are more similar to each other are grouped together earlier. The cut-off

should thus be placed where there are no closely plotted lines while eliminating the vertical

lines with large values. As there is no formal stopping rule for hierarchical cluster analysis, a

cut-off needs to be determined from the dendrogram to signify when the clustering process

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should be stopped (Bratchell 1989). To determine the number of clusters in the data, information was incorporated from both the agglomeration schedule and the dendrogram. From the agglomeration schedule, we had concluded that it would be best to stop the cluster analysis after stage 198, eliminating the last two stages (stages 199 and 200). The results of the hierarchical cluster analysis suggested that there were two clusters, with the Silhouette measure of cluster cohesion an separation being around 0.25, a 'fair' result.

5.5.2 K-Means Cluster Analysis

Cluster analysis, using the *K*-means method was carried out on the data. The six variables which were considered for analysis were demographic and investment behaviours as detailed in Chapter 3. *K*-means cluster analysis is normally completed on a table of raw data, where each row represents an object and the columns represent quantitative characteristics of the objects. *K* represents the number of groups pre-specified by the analyst. The number of clusters chosen based on the hierarchical cluster analysis was two. The final number of cases in each cluster was calculated as 168 for Cluster 1 and 33 for Cluster 2.

Two clusters were then subjected to one-way ANOVA to establish the heterogeneity between the clusters and the homogeneity within the clusters. The minimum distance between the final cluster centres is 4.098 between Clusters 1 and 2. The final number of cases in each cluster was calculated as 168 for Cluster 1 and 33 for Cluster 2. Table 5.3 provides a description of each cluster. Cluster 1 was labelled 'Active' investors and Cluster 2 was labelled 'Passive' investors.

Table 5.3 Description Summary of Clusters

Measures		Self-Managed Cluster Membership					
		Active (n=168)			Passive (n=33)		
		Count	%	Mean	Count	%	Mean
What age range do you fall into?	Under 34	4	2.40		5	15.20	
	35–49	18	10.70		13	39.40	
	50–59	23	13.70		7	21.20	
	60–69	61	36.30		8	24.20	
	70 and over	62	36.90		0	0.00	
What is your gender?	Male	139	82.70		12	36.40	
	Female	29	17.30		21	63.60	
How many members are there in your SMSF?				2			2
How familiar are you with investing in a wide range of investment types such as shares, managed funds, property, inside or outside superannuation?	Experienced as an investor	72	42.90		0.00	0.00	
	Some experience as an investor	83	49.40		2	6.10	
	Minimal experience as an investor	13	7.70		14	42.40	
	Have experience with superannuation and personal debt only	0	0.00		4	12.10	
	Not very familiar	0	0.00		13	39.40	
What best describes you with regards to decision-making?	I do most of the research and analysis of investment decisions	129	76.80		0	0.00	
	Decisions are made jointly with members sharing equally	36	21.40		6	18.20	
	While our decisions are made jointly, I have minimal input	3	1.80		10	30.30	
	I have minimal involvement in investment decisions	0	0.00		13	39.40	
	I am not involved in research and analysis	0	0.00		3	9.10	
	I am not involved in investment decisions	0	0.00		1	3.00	
In terms of investment decisions made, how would you describe your SMSF?	Self-initiated investment decisions by member	58	0.35		0	0.00	
	Primarily self-initiated investment decisions in discussion with other decision makers	37	22.00		0	0.00	
	Self-initiated investment decisions with occasional help of other decision-makers and advisers	65	38.70		6	18.20	
	Investment decisions dependent on the advice of experts	8	4.80		12	36.40	
	I have minimal involvement in investment decisions	0	0.00		15	45.50	
	I am not involved in investment decisions	0	0.00		0	0.00	

In terms of Age, the active cluster had older trustees with those 60 and above making up 73.2% of respondents. Active investors are predominately male (82.70%). In contrast, the passive investors are much younger, with an age group is between 35 to 49 (39.40%) and are, predominantly female (63.60%).

A study of the characteristics of the two clusters, revealed the following:

- **Cluster 1 (label: Active style***)* consists of SMSF trustees who score high on financial investment product experience. This would be beneficial with trustees having the discretion to decide which products their SMSF invests in. It may ensure that all investments are consistent with the SMSFs investment strategy and trust deed. This cluster also shows a high score for trustees displaying skill, care and diligence to self-initiate investment decisions which may indicate sound investment decisions. The trustees are inclined to actively manage their investments in an effort to achieve their goals.

- **Cluster 2 (label: Passive style)** consists of SMSF trustees who score low on investment experience. They have limited investment decision-making experience and prefer to take a passive role by delegating the initiation and making of investment decisions to someone else. They have little knowledge of the investment process and are willing to have a positive relationship with their financial advisers.

The next step in the analysis was the examination of hypotheses one to four, with regression analysis. The results of the cluster analysis being used as the dependent variable in the tests of hypotheses five to eight with discriminant analysis.

5.6. Regression Analysis of Factors Influencing Investor Behaviour

The multiple regression analysis enabled an examination of the relationships between the behavioural measures of financial decision-making and quadrants using dual process theories. Factor scores were saved and used as independent variables. A regression analysis assesses whether independent or predictor variables account for variability in a dependent variable. The dependent variables of 'financial advice' and 'independent thinking', were correlated with the four independent variables. They are Quadrant I (controlled-cognitive), Quadrant II (controlled-affective), Quadrant III (automatic-cognitive), and Quadrant IV (automatic-affective). There are two models conducted using multiple regression analysis. As shown in the factor analysis, seeking financial advice and independent thinking are two different dependent measures.

The first multiple regression model correlates behavioural measures of financial decision-making, namely 'financial advice' with the four independent variables. ANOVA shows that the independent variables statistically significantly predict the dependent variable, $F(4, 196) = 1321.978$, $p < .000$. The second multiple regression model correlates 'independent thinking' with the four independent variables. ANOVA shows that the independent variables statistically significantly predict the dependent variable, $F(4, 196) = 1927.119$, $p < .000$.

Table 5.4 Coefficients for the Multiple Regression Models

Model	Financial Advice			Independent Thinking		
	Standardised Coefficients Beta	t	Sig.	Standardised Coefficients Beta	t	Sig.
(Constant)		0	1		0	1
Controlled/ Cognitive	-0.19	-6.97	0.00	-0.06	-1.15	0.25
Controlled/Affective	0.85	30.71	0.00	-0.03	-0.55	0.58
Automatic/ Cognitive	-0.29	-10.53	0.00	-0.16	-2.99	0.00
Automatic/Affective	-0.12	-4.29	0.00	0.62	11.45	0.00
Adjusted $R^2 = 0.85$				Adjusted $R^2 = 0.41$		

5.6.1 Regression Results for Seeking Financial Advice

Table 5.4 shows The SPSS model summary for the above regression contains the following information: Adjusted R Square = 0.85. With the high R-squared, the model fits the data and indicates a good level of prediction. All four independent variables of the FQM or predictors were significant. Seeking and taking Financial Advice is associated with slow feeling or being Controlled-Affective (QII, β = 0.85, p<0.01), but surprisingly not associated with being controlled-cognitive (QI), or slow thinking, (QI, β = -0.19, p<0.01), thus support was found for H2, but not for H1. Thinking fast or Automatic-Cognitive reasoning (QIII) was also found to be negatively associated with Financial Advice (β = -0.29, p<0.01). This meant that H3 was not supported. Lastly, feeling quickly or Automatic-Affective (QIV), is also not associated with Financial Advice (β = -0.12, p<0.01). It seems that the greatest predictor of seeking Financial advice is not judgment but the reassurance (feeling or affect) that brings over time.

5.6.2 Regression Results for Independent Thinking

The results for Independent Thinking showed a lower level of prediction with an Adjusted R Square = 0.41 The greatest influence upon Independent Thinking in financial terms, was Automatic-Affective, QIV, (β = 0.62, p<0.01) and QIII, fast thinking (Automatic-Cognitive, β=-0.16, p<0.01). These results show that Independent thinking by trustees in SMSFs seems to occur quickly and without too much introspection, or perhaps by intuition.

5.7. Discriminant Analysis

Discriminant analysis is a statistical method to classify objects into two or more groups based on a number of independent variables. Discriminant analysis for this study uses the two-group method to identify a relationship between the dependent variable category data

with several independent variables (predictors). The cluster analysis undertaken in *K*-means (1. Active style, 2. Passive style) was chosen as the dependant variable dependant variable whilst the FQM scores and the behavioural measures of financial advice were the independent variables.

The analysis proceed in three steps. First, to test if the discriminant function as a whole is significant. Second, if significance is shown is to assess the contribution of each independent variable to discriminant function. Third, to examine the classification matrix as to how many cases were correctly allocated to the two groups (clusters of active versus passive investors).

5.7.1 Overall Discriminant Function

The Eigenvalue was 1.042 for the discriminant function, which explained 100% of the variance around group membership. Consistent discriminant function explained a significant variation in group membership (Wilks Lamba=0.48, Chi-Square=142.18, $p<0.01$).

5.7.2 Discriminant Coefficients

Table 5.5, shows the group centroids. The group centroid represents the mean discriminant score of members of a group on a given discriminant function, in this case Active (0.46) and Passive (-2.32) investment styles. For classification and prediction purpose, the discriminant score of each case is compared to each group centroid and the probability of group membership is calculated. The closer a score is to a group centroid, the greater the probability that the case belong to that group. The standardised canonical correlations coefficients (similar to beta loading on a regression) provides an indication of each variable contribution to the discriminant function the practical value of the discriminant function. In other words, how each variable predicts membership of the two clusters (Active-Passive).

The Eigenvalue was 0.50 for Cluster 1 providing 100% of the variance showing a lessor function. The canonical correlation was 0.577 which is of moderate level. The Wilks' lambda was 0.668 with a p value = .000.

Table 5.5 Cluster Centroids

Functions at Group Centroids	
Self-Managed Cluster Membership	Function 1
Active	0.46
Passive	-2.32
Unstandardised canonical discriminant functions evaluated at group means	

As shown in Table 5.6, being an Active investor in a SMSF is associated with being Controlled-Cognitive (QI, Discriminant coefficient = 0.72), or thinking slowly and thinking fast or being Automatic-Cognitive (QIII, Discriminant coefficient = 0.72). To lesser extent Active investors (trustees) were associated with Automatic-Affective thinking, or quick feeling when making decisions (QIV, Discriminant coefficient = 0.27). Thus, support was found for H5, H7 and H8 respectively.

Table 5.6 Discriminant Coefficients

Standardised Canonical Discriminant Function Coefficients	
	Function 1
Controlled/Cognitive (QI)	0.72
Controlled/Affective (QII)	-0.81
Automatic/Cognitive (QIII)	0.72
Automatic/Affective (QV)	0.27
Financial Advice	0.03
Independent Thinking	-0.22

Passive SMSF trustees or investors are guided by an interplay of controlled-affective thinking (QII, Discriminant Coefficient = -0.81, which provides support for H6), and to a lesser extent displaying independent thinking characteristics with respect to financial advice (Discriminant Coefficient = -0.22). Following financial advice, seems only to have a small impact in being

associated with either investment decision making style of being Active or Passive (Discriminant Coefficient =0.03).

5.7.3   Validation of the Discriminant Model

Table 5.7 shows how well the discriminant function or model correctly classified cases or individuals into the two groups of active and passive styles. The results showed that 94.5% of individuals were correctly classified by the analysis and this result is mirrored closely in cross-validation of 94%, when the scores off all other cases are used to derive the discriminant function. The validation of the discriminant model provides strong support that the FQM predicts actual investment behaviour.

Table 5.7 – Classification Results

Classification Results [a,c]		Cluster Number of Case	Predicted Group Membership		Total
			1 (Active)	2 (Passive)	
Original	Count	1	165	3	168
		2	8	25	33
	%	1	98.2	1.8	100.0
		2	24.2	75.8	100.0
Cross-validated [b]	Count	1	164	4	168
		2	8	25	33
	%	1	97.6	2.4	100.0
		2	24.2	75.8	100.0
a. 94.5% of original grouped cases correctly classified. b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case. c. 94.0% of cross-validated grouped cases correctly classified.					

5.8. Summary

The combined findings show that the FQM model explains well SMSF trustee use of or avoidance of financial advice, and their broad investment styles of being active or passive. Although the results are not always as expected. Table 5.8 summarises support for each of the hypotheses of the study.

As discussed, seeking financial advice is associated with finding peace of mind, as shown by the support for H2, but not by thinking or considering quickly or slowly (Automatic Cognitive and Controlled Cognitive), thus H1 and H3 were not supported.

Being independent minded is guided by quick reactions and feelings such as being Automatic-Affective, supporting H4 and unexpectantly thinking quickly (Automatic-Cognitive). This may reflect very much a reliance on intuition and feel, rather than any detailed deliberation, which is astonishing given the responsibilities of trustees for their own and financial future.

Table 5.8 Summary of Results for Hypotheses 1 to 8

Hypothesis	Results
H1: Quadrant I (controlled-cognitive) - slow thinking is positively associated with SMSF trustees' seeking advice.	Not supported
H2: Quadrant II (controlled-affective) - slow feeling is positively associated with SMSF trustees' seeking advice.	Supported
H3: Quadrant III (automatic-cognitive) - fast thinking is positively associated with trustees independent investment decision-making.	Not supported
H4: Quadrant IV (automatic-affective) - fast feeling is a predictor of SMSF trustees independent investment decision-making.	Supported
H5: Quadrant I (controlled-cognitive) - slow thinking is a positive predictor of SMSF trustees using an *active* investment style.	Supported
H6: Quadrant II (controlled-affective) - slow feeling is a positive predictor of SMSF trustees using a *passive* investment style.	Supported
H7: Quadrant III (automatic-cognitive) - fast thinking is a positive predictor of SMSF trustees using an *active* investment style.	Supported
H8: Quadrant IV (automatic-affective) - fast feeling is a positive predictor of SMSF trustees using an *active* investment style.	Supported

The results also showed the FQM can predict well broader investment decision making styles of being Active versus Passive. Being an Active investor or trustee who makes these decisions in SMSFs is associated with thinking slowly (Controlled-Cognitive), being nimble or thinking fast (Automatic-Cognitive), with feelings about decisions being made quickly being consistent (Automatic-Affective).

Passive investors (16.41% of the respondents), on the other hand, are associated with being Controlled-Affective and acting Independently of Financial Advice. They feel that they are very much in control, but are not following nor do they seek outside help or advice. This may be a concern given the complexity of SMSFs and sustainable returns in a post-covid-19

environment. They are also much younger so that poor investment decisions over the long term are likely to be detrimental to them.

Chapter 5 has presented the results of the research associated with the two research objectives and hypotheses posed by the thesis. The data associated with the quantitative analysis of a survey questionnaire of key independent attributes using the FQM was presented in this chapter.

This chapter presented the description and nature of the research constructs. Firstly, the demographic and descriptive data provided by the SMSF trustees were presented. A number of different methods of data analysis were applied, including descriptive statistics, factor analysis leading to regression analysis and cluster analysis followed by a discriminant analysis. The next chapter, Chapter 6 will provide further results and address the research objectives and hypotheses.

Chapter 6 Discussion and Conclusion

6.1. Background

The aim of this thesis was to authenticate the models components parts of the Four Quadrant Model (FQM) of financial thinking and feeling, both slow and fast, and to do so in the context of Self-Managed Superannuation Funds (SMSF) trustee investment decision-making. As mentioned in Chapter 1, there were two research objectives:

Research objective 1

Does the FQM explain the advice seeking behaviour of SMSF trustees?

Research objective 2

Does the independent behavioural attributes influence the investment decision-making styles adopted by SMSF trustees?

This chapter sets out the conclusions of the thesis and examines the evidence for each research objective. The contribution to the broader behavioural financial literature is then discussed. Next implications for policymakers and financial service industry participants are outlined. Limitations are then addressed and finally, future research possibilities are explored.

6.2. Does the Four Quadrant Model explain the Advice Seeking Behaviour of SMSF Trustees?

The results identified a relationship between Quadrant II (controlled-affective) and Quadrant IV (automatic-affective) with the dependent variable of financial advice, that could influence the investment decision-making of SMSF trustees. The use of Quadrant I (controlled-cognitive), and Quadrant III (automatic-cognitive) by SMSF trustees were not supported by the findings. The results showed that the use of financial advice was influenced

by Quadrant II (slow thinking, or controlled-affective thinking (H2), and independent thinking by automatic-affective (Quadrant IV, or fast feeling, H4). Previous research (Mikhail, Walther & Willis 2007; Stanovich & West 2000) has suggested affective or Type 2 processes related are not usually linked to seeking financial advice. However, Hilbig, Schol and Pohl (2010) suggested that controlled processes may be overridden by use of intuition by investors. This also confirmed by Kahneman and Tversky (1979, 1974), who theorise that the majority of human judgements are led by intuition rather than reason and logic. It is also quite possible for this to occur with SMSF trustees who are not sophisticated or expert investors.

Independent thinking, or being advice adverse was found in this study to be linked to Automatic-Affective thinking (QIV), which is similar to that found in previous research (Smith & DeCoster 2000; Sloman 1996). This may be similar in part Type 1 processing (automatic decision making) which relies on prior experiences and existing association, where an investor as a result of this could exhibit a heuristic and bias such as overconfidence in their decision-making (e.g. Mihaylov, Yawson & Zurbruegg 2015). The role of controlled versus automatic in financial decision making though, may still be important. As the results show it is not merely a choice between thinking (type 2 process) and feeling (type 1 process).

The next section considers whether evidence exists to support the notion that the FQM and SMSF trustees individual behavioural attributes of the cognitive model of an individual investor plays a role in SMSF trustee investment decision-making.

6.3. Does the Independent Behavioural Attributes Influence SMSF the Investment Decision-making Styles adopted by SMSF Trustees?

Cluster analysis suggested two types of broad investment decision making occur with SMSF trustees, an active and passive approach. An active approach to investment decision-making was found to be used by 83.59% of SMSF trustees who are older (60 years and above) and predominately male. They had significant investment experience, conducting their own research and self-initiating the investment process. Results show that SMSF trustees who adopt an active style, exhibit characteristics of Quadrant I (controlled-cognitive), Quadrant III (automatic-cognitive), and Quadrant IV (automatic-affective).

Similar studies investigating investor research approaches have found that Type 2 (cognitive) processing representing Quadrant I are prevalent with such a population (e.g. Tan, Wang & Zhou 2014; Fenton-O'Creevy et al. 2010; Mikhail, Walther & Willis 2007). Less clear in literature is the use of QIII (Automatic-Cognitive) and QIV (Automatic-Affective) as a predictor of an active style investment approach. Literature has found that a Type 1 fast thinking automatic process (Quadrants III and IV) is expected to occur first for decision-making, then the Type 2 cognitive processing (Quadrant I) would then intervene and improve the decision (e.g. Glockner & Betsch 2008c; Kahneman & Frederick 2002). The findings suggest that a Type 1 fast feeling process also occurs with an active style investment approach influencing preferences and behaviour with no intervening Type 2 process (Rubaltelli et al. 2010). As an example, this may exist when Type 2 processing is compromised by cognitive load and individual decision-making will fall into a range of Type 1 errors (Kahneman 2003, 2011).

The second cluster labelled as passive style and representing 16.41% of SMSF. This cluster group had demographic attributes of limited investment decision-making experience,

undertook minimal research and were not involved in initiating investment decisions. The SMSF trustees were linked to Quadrant II (controlled-affective) and the cluster group was primarily in the 35–49 years age group with most of this cluster being female. It could be that this cluster may represent the partners of males who are small business people or sole traders, as well as the investment vehicles of the women themselves. If the former is the case, then it understandable that these trustees are driven by finding peace of mind in financial advice over the long term, given that they may lack the expertise to investigate financial matters in detail. This may also in part explain that passive trustees tend to follow independent thinking and not seek or follow advice.

The study in this thesis used the setting of a real-world financial market rather than an artificial laboratory setting. Behavioural factors are decision-making biases that are produced internally by SMSF trustees through the properties of the FQM. Lovric, Kaymak and Spronk (2010) placed particular emphasis on psychological biases of individual investors. A list of heuristics and affective biases discussed in this section are summarised in Chapter 3, Table 3.4.

6.4. Theoretical and Policy Implications

The thesis provides empirical evidence that SMSF trustees use multiple processes in decision-making within the framework of the FQM. In addition, evidence is also provided that two distinct independent behavioural variables and two investment styles influence SMSF trustee decision-making. The theoretical and policy implications for each finding are set out below.

6.4.1 Implications of Four Quadrant Model for Behavioural Finance beyond Dual Process Theory

Previous studies have proposed that any individual decision-making relies on two systems or processes, which one can simply label Type 1 (automatic) and Type 2 (controlled, Sherman, Gawronski & Trope 2014; Chaiken & Trope 1999). Type 1 (also referred to as the affective system) is proposed to operate fast and effortlessly. Type 2 (also referred to as the cognitive system) is proposed to be slower and more effortful. While the dual-process framework is on the exterior compelling, evidence from the results show that at best incomplete (Grayot 2020; Frank, Cohen, & Sanfey 2009). It may well be that as suggested in the findings of this study, that there are four distinct types of decision making, which are more holistic, than the simplified model of DPT, and are a more precise explanation of financial behaviour.

The second contribution is that the research contributes to FQM by testing in a real-world investment environment. There is criticism of dual processes models in that the operating conditions of the processes cannot be tested empirically (Grayot 2020). Due to testing in controlled laboratory settings, resulting evidence for dual systems only predicts behaviours and does not provide clarity of decision-making processes in a real-world financial setting (Buturovic & Tasic 2015). The findings provide some insight into the use of financial advice and the investment strategies adopted by SMSF trustees. The research demonstrates that a FQM may be suitable for testing in a real-world setting to see how the processes respond to features of such an environment. Future research is able to use real-world settings to develop important implications for dual process theorising.

Finally, this research provides empirical support for the impact of investor characteristics and different participant approaches to investment decision-making, using

different processes and therefore potential outcomes. This contrasts with research that decision-making is driven by many interactions of the dual processes or systems; as an example, default interventionism (Evans 2008).

In summary, this research has examined whether the FQM can be used to interpret the decision-making behaviour of SMSF trustees. The findings provide support for current decision-making literature. The research makes a contribution to dual process literature by bringing a divergent decision-making approach in the FQM versus single or dual processes. The findings suggest that the FQM may be superior than DPT, as it provides a richer and more nuanced understanding of behaviour.

6.4.2 Implications for Behavioural Finance from SMSF Investment Decisions

A key premise for this thesis was that real-world settings are suitable for studying behavioural finance topics because they are able to link the independent behavioural attributes of the market participants. Lovric, Kaymak and Spronk (2010) developed a cognitive model of an individual investor to test the interplay between the FQM and these attributes. It was stated that this interplay is not visible and testing would determine the strength of those relationships and also determine which heuristics and biases that individual investor would use.

The research makes two identifiable contributions to behavioural finance theories. First, the evidence suggests that investment experience and involvement in the investment process impacts the decision-making judgement of individual investors (Mikhail, Walther & Willis 2007; Simon 1982). Quadrants I, III and IV were associated with active style investors and are shown to be experienced and initiate the investment decision process. In contrast, little or minimal input into investment decision-making was evident of a passive style. The active style is shown as related to the fast thinking and fast feeling Quadrants of III and IV

respectively. This is contrary to prior research where individual investors use Type 2 controlled process (e.g. Mikhail, Walther & Willis 2007). This may lead to the conclusion that individual investors display bounded rationality therefore recognising shortcomings in individual cognition that lead to judgment biases (Kahneman 2003). For future research, the question could be explored as to how the background and knowledge of SMSF trustees with an active style differs from trustees with a passive style and how this impacts their investment-related judgments.

Second, the findings identify that the independent behavioural attributes play a role in influencing individual investor decision-making. Active and passive styles have shown a propensity to investment heuristics and biases: overconfidence and self-control for active; endowment and loss aversion for passive (Barber & Odean 2013; Pompian 2011). Implementing investment strategies is also a feature of active style and is a key attribute in the model (Barber & Odean 2013). Further, the effect of demographic factors, especially gender, as concluded by the current research also confirms the findings of previous researchers (Davar & Gill 2007). For future research, a study could be conducted to understand the role of demographic attributes such as investment experience, as determinants of SMSF trustee decision-making.

In summary, the conclusion is that the interplay between the FQM and independent behavioural attributes have an effect on various aspects of SMSF trustee investment behaviour. The cluster analysis lead to the formation of two separate clusters, with distinctive investment behaviours. Heuristics and biases, along with demographic factors such as gender, appear to be the significant influences on investment behaviour. The assumption that the investor behaves rationally is not entirely evident from the results of research; as the study shows, investors apparently behave non-rationally. The behaviour of investors whether rational or nonrational is a small part of the complexity of investor behaviour. Most

importantly the FQM shows that seemingly nonrational investor decision making behaviour is occurring (ignoring financial advice, being disinterested in investment decisions).

6.4.3   Implication of Findings related to SMSFs

Lovric, Kaymak and Spronk (2010) asked whether similar investor behaviour would occur in a real-world financial market versus a laboratory-controlled setting. They suggested that quantitative analysis of data may answer the question, however it will not provide clarity about exact behaviour of market participants. The research allowed an observation of individual investment behaviour within the context of a real-world financial market. The research identified two behaviours of seeking financial advice and independent thinking used by the SMSF trustees within the investment environment. Seeking financial advice was linked to Quadrant II (controlled-affective), displaying controlled characteristics and regulating the possible biases induced by feelings. Independent thinking was linked to Quadrant IV (automatic-affective), displaying characteristics of fast, effortless, emotional decision-making behaviour that lacked introspection.

Establishing an investment style is potentially the most important decision a SMSF trustees can make. Deciding on an active or passive style or a mix of both, is critical leading to strategies to achieve retirement goals. The research shows that SMSF trustees are using a style but there little understanding of the efficacy. The development of a decision-making framework is required to guide SMSF trustees on the portfolio construction process, investment strategies and understanding risk/reward trade-off for their investment decision-making.

The research makes an identifiable contribution to individual investor decision-making by the interaction of the investment environment factors and the cognitive model of individual investor. An SMSF trustee is expected to have a high level of financial literacy to

make informed financial decisions (ATO 2018). Behavioural finance assumes that individuals are boundedly rational actors having limited ability to process information. Prior research explored how available information affects the quality and outcomes of decisions (Kahneman 2003; Simon 1982). In seeking financial advice and adopting an independent thinking approach to investing, SMSF trustees may be displaying a lack of financial knowledge and information to make educated or informed investment decisions.

6.4.4   Policy Implications

The results of the research present a number of implications for policy relating to the SMSF sector. First, a greater understanding of the influence of FQM on the investment decision processes undertaken by SMSF trustees, may improve their decision utility to maximise retirement incomes. The thesis contributes to the literature on investor decision-making by showing that potential loss of utility due to inconsistent choices is not necessarily a result of the decisions driven by one specific type of process directly. It could be the conflicting choices driven by multiple types of processes separately. To aid this potential loss of utility, the findings suggests that many SMSF trustees may not fully develop or implement appropriate investment strategies beyond treating them as a regulated compliance action.

Second, the research brings out the potential existence of a number of investor heuristics and biases within the SMSF trustee investment behaviour. These behavioural factors may impact the investment decisions of individual investors. For policymakers, the extent to which these behavioural factors are indicative of sub-optimal investment decision-making behaviour is not well understood. Knowledge of these behavioural factors will provide a useful foundation for policymakers by obtaining detailed information about individual decision-making behaviour.

Third, regulators do not assess the ability of SMSF trustees to make informed investment decisions and undertake all the roles of implementing a fund investment strategy, including analysis and asset allocation. Thus, a promising avenue for future research is to use FQM to develop and test effective interventions such as decision aids, instructions beyond seeking financial advice. This may lead to independent thinking SMSF trustees using Type 2 processes and rely less on heuristics and biases.

Finally, as evident from the findings of this research study, SMSF trustees have complex investment decision-making needs which are far beyond routine investment advice. Significant implications for financial advisers arise from this research. This research suggests that the financial advice can be enhanced by studying SMSF trustee decision processes and behaviours. Understanding how SMSF trustees actually think and behave would give financial advisers some fresh insights into how to achieve improved investment outcomes for trustees in the future.

The above implications lead to a discussion about education and support for SMSF trustees in the investment decision-making process. There is limited focus by regulators on the investment decisions of SMSF trustees. This is in contrast to the standards of financial literacy that regulators expect potential trustees to have in meeting their statutory obligations.

6.5. Limitations

It is important to acknowledge some limitations of the thesis which can provide directions for future research. Behavioural finance and its measurements are new to the study of the behaviour of SMSF trustees. The decision-making process is an ongoing iteration where the SMSF trustee is seen as learning, adapting, and evolving, reacting with their environment, processing information, then acting upon it (e.g. changes in a portfolio) and adjusting their internal states. While, independent attributes including heuristics and biases

were studied in this thesis, more emphasis in the methodology could have been placed on results of SMSF trustee ongoing investment decision-making through the lens of bounded rational behaviour. There is also consideration that the sample size of the data may have prevented a more thorough analysis. Future research could be undertaken on a larger sample size to test the conceptual model of investor behaviour.

Despite many studies on investor decision-making in artificial financial markets, there are few attempts to incorporate DPT and complex behavioural factors into research on investors in a real-world financial market. This study may not have been fully scoped by limited prior research to guide methodology on DPT, decision-making bias and complexity in a real-world setting.

The investment environment presented in the conceptual model of investor behaviour proposed by Lovric, Kaymak and Spronk (2010) describes a number of asset classes existing in real markets. Asset classes modelled in artificial financial markets are usually only a few and they typically include risky assets (equities), riskless assets (bonds) and cash. Allowing for limits on the scope of the research, this study did not investigate strategies of portfolio construction, performance measurement and asset classes chosen by SMSF trustees. This may have provided further understanding into behavioural factors affecting SMSF trustees decision-making.

6.6. Recommendations for Future Research

Future research should consider an evaluation of the influence of financial advisers on investment decisions made by SMSF trustees. The objective of the research would be to establish the degree to which financial advisers impact these decisions. The research would use the FQM to identify the attributes of financial advisers that influence the decision making of SMSF trustees.

Another focus for research on investment decision-making is a study on how SMSF trustees overcome behavioural biases. Further research on these biases may suggest that improved knowledge and experience should reduce an individual's susceptibility to bias. However, to overcome decision-making bias there needs to be an approach to look beyond knowledge and experience explanations and gain a deeper understanding of decision-making bias in real-world environments.

Future research into SMSF trustees level of financial literacy and processing of information could also provide significant insight into issues and concerns around any deficiency in their decision-making. In summary, SMSF trustees should be aware of the presence of such influences in their background when making important investment decisions.

Future research is needed to observe individual investor decision-making over a series of environments (e. g. family trusts, superannuation fund choice). To go beyond a single investment environment may provide an opportunity to incorporate more complex behavioural factors into a cognitive model of an individual investor. These may include investors learning behaviours and local market behaviour leading to understanding macro patterns in financial markets.

6.7. Conclusion

This thesis presents a cognitive model of an individual investor bringing together various behavioural and cognitive elements that play a role in the behaviour of SMSF trustees. The research extends prior research on the investment decision-making process using a multiple processing system of FQM and independent behavioural attributes. Two stages are used to investigate the driving factors of SMSF trustees decisions and provide empirical evidence on the interplay between the FQM and independent behavioural attributes on investor decision-making. The research makes an important contribution in the study of

behaviour especially investment decision-making. It provides tangible evidence that a decision-making behaviour involves more than two process systems. The cognitive modelling reflects patterns of behaviour that are less precise, however it provides future research guidance for investment approaches adopted by SMSF trustees.

The study considered alternatives that could be interpreted from the results. These were selection bias, investment horizons of the sample, and mutual exclusivity of FQM. Although there is possible self-selection in any survey, the analysis identified both active and passive investors together with seeking financial advice and independent thinking behaviours. This also confirmed findings in the qualitative stage. It suggests that response bias was not an issue in this data set.

As described in cluster analysis, active investors were older, and investment decisions may be impacted by their investment horizons. This could be an avenue for future research. Mutual exclusivity was taken into account where each thinking style is independent of one another. The factors are orthogonal and it is possible to have an element in each component of the FQM.

Complexity of the SMSF product is driving advice needs. Regulators appear to have focused on the accountant practitioner/financial planner as the gatekeeper to the SMSF sector (ASIC 2013). Accountant practitioners and financial planners interviewed accept that decision-making to commence an SMSF required advice due to its complexity. They believe that compliance, administration and educating clients about their trustee responsibilities is becoming complicated and that adviser input is desirable in trustee investment decision-making.

SMSFs remain an important component of the Australian superannuation landscape and, by total assets under management, represent the second largest segment of the industry.

Given this importance, the findings suggest that a regime of SMSF trustee education and training in investment decision-making including using financial adviser may improve SMSF trustees retirement outcomes. The FQM suggests that simply providing more information and advice, better regulation may not provide the best possible outcome in terms of financial behaviour. How people feel about their financial future and how much effort they have to deal with it, is as important, as trying to educate and guide them.

Appendices

Appendix 4a: Qualitative study – Participant Information Sheet

UNIVERSITY of TASMANIA

TASMANIAN SCHOOL OF BUSINESS AND ECONOMICS

Information Sheet

The influence of advisers on Trustees of Self Managed Superannuation Funds in their decision making.

I am writing to you to invite you to participate in a University research study that is currently being conducted within the Tasmanian School of Business and Economics at the University of Tasmania by a team of researchers, being Professor Roger Willett, Dr Colin Jones and myself, Mr Roger Colbeck. This project's aim is to investigate the influence that advisers have on the decision making by trustees of self-managed superannuation funds (SMSF).

The project seeks to investigate the influence that advisers have on the decision making of trustees for self-managed superannuation funds. The objective of the project is to review the situational and contextual factors that influence the decision making of SMSF trustees and identify the attributes of accountants that impact the decision making of trustees.

Participation in this interview process is entirely voluntary. If you do participate in this study, you can decline to answer any question and can withdraw without effect or explanation. If you withdraw, you may also withdraw any interview data you and/or your organisation has supplied to date. It is anticipated that the interview will be fully audio recorded and transcribed. You will be given the opportunity to review and amend any material including any transcripts from these recordings. The interview would be arranged at a time that would minimise any disruptions to you and/or your organisational operations.

The process of assistance requires a semi structured face to face interview. It is envisaged the interview will take approximately 30 minutes and where possible, would be conducted on your employment/organisations' premises or alternatively, a nominated locale at the UTAS Sandy Bay campus.

We are also seeking SMSF Corporate Trustees would be willing to participate in the interview phase of this project. If you know of SMSF Corporate Trustees that might be interested in this study, can you please pass on this information sheet to them so they may contact me to volunteer for the study?

All aspects of the study, including results, will be strictly confidential, assigning pseudonyms rather than names in the written records and only the researchers will have access to information on participants/organisations. A report of the study may be submitted for publication, but individual participants/organisations will not be identifiable in such a report. You will have an opportunity to review transcripts and thesis/articles prior to publication. All raw data collected from this study will be stored at the Tasmanian School of Business and Economics, Hobart in a locked cabinet and password protected computer for a period of five years from publication. At the expiry of this five year period, the data will be destroyed in line with established University procedures.

This study has been approved by the Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study you should contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote ethics approval number H12128.

I can be contacted on 03 662262758 or Roger.Colbeck@utas.edu.au if you have any further questions. Thank you very much in anticipation of your participation.

Chief Investigator:	Co - Investigator:	Student Investigator:
Professor Roger Willett	Doctor Colin Jones	Mr Roger Colbeck
Telephone: 62 262192	Telephone: 62 281937	Telephone: 62 262758
Email:	Email: Colin.jones@utas.edu.au	Email:
Roger.Willett@utas.edu.au		Roger.colbeck@utas.edu.au

Appendix 4b: Qualitative study – Interview Consent Form

UNIVERSITY of TASMANIA

TASMANIAN SCHOOL OF BUSINESS AND ECONOMICS

Interview Consent Form

The influence of advisers on Trustees of Self Managed Superannuation Funds in their decision making.

Dear Participant,

As part of the research project, could you please fill in the information below as part of your consent to be interviewed.

1. I agree to take part in the research study named above.

2. I have read and understood the "Information Sheet" for this study.

3. I confirm that I/We received an 'Information Sheet' on the research project and voluntarily contacted the research team.

4. The nature and possible effects of the study have been explained to me.

5. I understand that the study involves the following procedures:

    a. That the study involves a face to face interview of approximately 40 minutes duration, and which will be semi-structured in nature,

    b. The interview will take place at (add time and place)

6. I understand that the interviews will be recorded into an audio file and kept confidential, transcribed and stored on a password protected computer for a period of 5 years at the University of Tasmania and will then be destroyed.

7. Any questions that I have asked have been answered to my satisfaction.

8. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.

9. I understand that the results of the study will be published so that I cannot be identified as a participant.

10. I understand that my participation is voluntary and that I may withdraw at any time without any effect.

Participant's name: _____

Participant's signature: _____

Date: _____

Statement by Investigator

☐ I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Investigator's name: _____

Investigator's signature: _____

Date: _____

Appendix 4c: Interview questions – Semi-structured

Interview questions: Semi-structured

Source: The researcher

Accountant/Financial Planner Practitioner

1. How many years' experience have you had with SMSFs?

2. What range of SMSF services do you provide?

3. Do you do more than just the SMSF annual return and compliance?

4. How many funds does your practice have? Pension versus accumulation phase?

5. Do you work with other professionals in this sector?

6. Personal demographic/socio economic details of SMSF members/trustee?

7. What circumstances lead clients to set up a self-managed superfund?

8. What factors were considered in their decision-making?

9. How do trustees/members receive their education/responsibilities on SMSF?

10. What do you believe is a minimum balance/costs?

11. How do trustees measure performance?

12. Risk/Return characteristics of clients?

13. A choice of licensing options now faces accountants who want to handle SMSF business, what is your view and approach?

14. Will SMSF work grow organically or actively?

For Corporate SMSF trustees

Demographic

1. Personal demographic/socio economic details of SMSF members/trustee?

   a. Age:

   b. Profession/Self Employed:

   c. What phase is your SMSF in?

2. How many members can a self-managed superfund have?

3. What were the circumstances that led you to set up self-managed superfund?

4. What factors were considered in your decision-making?

5. SMSF education and experience?

1. How much investment dollars did you have to start a self-managed superfund? (Did you have at least $200,000 to invest in your SMSF or did you rollover this amount from another super fund?)

2. What are the costs associated with having your own self-managed superfund?

3. In what circumstances would your self-managed superfund be no longer required or suitable?

4. How do you make investment decisions?

5. Do you control your funds investments and have the time, interest, financial knowledge (or access to professional advice) to do so?

6. How do you measure the performance of your fund?

7. Do you have the time, interest and ability to establish and maintain a fund in accordance with all the rules and regulations, or do you prepared to access professional assistance to do this?

8. Are you fully aware of all the investment and taxation advantages and disadvantages of SMSFs?

Appendix 4d: Semi-structured interview – Participant's Characteristics

Code	No. of proprietors/partners	No. of additional accountants	Support staff	No. of SMSF
Accountant individual one (AI1)	1	0	1	9
Accountant individual two (AI2)	1	1	3	23
Accountant partnership one (AP1)	2	3	7	121
Accountant partnership two (AP2)	2	6	12	125

Code: Accountant	Years' experience	Number of accountant practitioners
Accountant individual one (AI1)	31	1
Accountant individual two (AI2)	19	2
Accountant partnership one (AP1)	17	5
Accountant partnership two (AP2)	24	8

Code: Financial Planner	No. of proprietors/ partners	No. of additional financial planners	Support staff	Number of SMSF
Financial Planner individual (FP1)	1	3	1	37
Financial Planner partnership (FP2)	3	1	5	23
Financial Planner partnership (FP3)	2	0	3	43
Financial Planner AFSL (FP4)	N/A	10	25	70

Code	Years' experience	Number of financial planners
Financial Planner individual (FP1)	17	3
Financial Planner partnership (FP2)	21	3
Financial Planner partnership (FP3)	19	2
Financial Planner AFSL (FP4)	30+	10

Code: SMSF trustee	No. of members	Age	Gender
Corporate 1 (C 1)	1	58	F
Corporate 2 (C 2)	1	46	M
Corporate 3 (C 3)	1	65	F
Corporate 4 (C 4)	2	61/60	M/F
Corporate 5 (C 5)	2	48/44	M/F
Corporate 6 (C 6)	2	56/54	M/F
Corporate 7 (C 7)	1	58	F

Appendix 4e: Ethics approval letter

26 September 2019

Dr Nagaratnam Jeyasreedharan C/-
University of Tasmania

Sent via email

Dear Dr Jeyasreedharan

REF NO: H0018029

TITLE: The Investment decision-making of trustees of self-managed superannuation funds (SMSFs)

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 24 September 2019.

Please ensure that all investigators involved with this project have cited the approved versions of the documents listed within this letter and use only these versions in conducting this research project.

This approval constitutes ethical clearance by the Tasmania Social Sciences HREC. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approvals of other bodies or authorities are required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

In accordance with the National Statement on Ethical Conduct in Human Research, it is the responsibility of institutions and researchers to be aware of both general and specific legal requirements, wherever relevant. If researchers are uncertain they should seek legal advice to confirm that their proposed research is in compliant with the relevant laws. University of Tasmania researchers may seek legal advice from Legal Services at the University.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Human Research* (NHMRC 2007 updated 2018).

Therefore, the Chief Investigator's responsibility is to ensure that:

(1)   All investigators are aware of the terms of approval, and that the research is conducted in compliance with the HREC approved protocol or project description. Modifications to the protocol do not proceed until **approval** is obtained in writing from the HREC. This includes, but is not limited to, amendments that:
    (i)   are proposed or undertaken in order to eliminate immediate risks to participants;
    (ii)   may increase the risks to participants;
    (iii)   significantly affect the conduct of the research; or
    (iv)   involve changes to investigator involvement with the project.

Please note that all requests for changes to approved documents must include a version number and

date when submitted for review by the HREC.

(2)   Reports are provided to the HREC on the progress of the research and any safety reports or monitoring requirements as indicated in NHMRC guidance.

Researchers should notify the HREC immediately of any serious or unexpected adverse effects on participants.

(3)   The HREC is informed as soon as possible of any new safety information, from other published or unpublished research, that may have an impact on the continued ethical acceptability of the research or that may indicate the need for modification of the project.

(4)   All research participants must be provided with the current Participant Information Sheet and Consent Form, unless otherwise approved by the Committee.

(5)   This study has approval for four years contingent upon annual review. A *Progress Report* is to be provided on the anniversary date of your approval. Your first report is due 24/09/2020 and you will be sent a courtesy reminder closer to this due date. Ethical approval for this project will lapse if a Progress Report is not submitted in the time frame provided

(6)   A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of the project.

(7)   The HREC is advised of any complaints received or ethical issues that arise during the course of the project.

(8)   The HREC is advised promptly of the emergence of circumstances where a court, law enforcement agency or regulator seeks to compel the release of findings or results. Researchers must develop a strategy for addressing this and seek advice from the HREC.

Should you have any queries please do not hesitate to contact me on (03) 6226 2975 or via email ss.ethics@utas.edu.au.

Yours sincerely

Jude Vienna-Hallam

Executive Officer I Social Sciences

The investment decision-making of trustees of self-managed

superannuation funds (SMSFs)

PARTICIPANT INFORMATION SHEET

Research team	Dr Nagaratnam Jeyasreedharan*, Tasmanian School of Business and Economics, University of Tasmania
	Dr John Minas, Tasmanian School of Business and Economics, University of Tasmania
	Roger Colbeck PhD student, Tasmanian School of Business and Economics, University of Tasmania
	Contact phone: 03 62262758
	Contact email: roger.colbeck@utas.edu.au

1. **Invitation**

   We invite you to participate in a research study examining the decision-making behaviour of trustees of self-managed superannuation funds (SMSFs).

2. **What is the purpose of this study?**

   This research is about the behavioural decision-making of SMSF trustees. The main objectives of the research are to examine contextual and psychological variables that may influence investment behaviour. Contextual variables include demographics, time frame and asset allocation, psychological variables encompass risk attitude and heuristic driven biases.

3. **How is the study being funded?**

   No external funding has been obtained, any costs of research are expected to be met by internal grant applications.

4. **Why have I been approached to participate?**

   This research involves the study of the investment decision-making process behaviour of SMSF trustees. The reason for approaching you, is that you are a SMSF trustee and

your participation will help us gather requisite knowledge and understanding of the area and conduct useful research. Through this survey we hope you can help us better understand the decision-making of SMSF trustees.

Your participation is voluntary.

5. **What will I be asked to do?**

There are 2 options to access the survey and instructions on how to participate are detailed below:

- Option –1 Online response

  Please follow the URL https://www.surveymonkey.com/r/pilotJ7H25ZR

  - to participate in the survey

- Option – 2 Using your smart phone

The online version of the questionnaire can be viewed on your mobile device by scanning the QR code provided below. If you do not have the QR code reader already available on your phone, please read the instructions below to download QR Code reader.

6   Go to iTunes App store (for iPhone users) or Google Play (for Android users).

7   Search for "QR Code Reader".

8   Download any of the available QR code readers of your choice.

9   Recommended app for iPhone users is:

10 Recommended app for Android users is:

11 For other smart phone users please go to the respective app store for your phone and follow the process above to download one of the QR readers.

6. **Are there any possible benefits from participation in this study?**

   Participants will have free access to the results of this study when completed and if you would like a final copy of the research results, please email Dr Nagaratnam Jeyasreedharan, Dr John Minas or Mr. Roger Colbeck. The research results will be available in June 2020.

7. **Are there any possible risks from participation in this study?**

   There are no perceived risks with completing this survey.

8. **What if I change my mind during or after the study?**

   You are free to withdraw without consequence before closure of the survey. After this time your data may have been included in the analysis.

9. **What will happen to the data when this study is over?**

   This project will use an external commercial site to create, collect and analyse data collected in a survey format. The site we are using is SurveyMonkey (www.surveymonkey.com). If you agree to participate in this survey, the responses you provide to the survey will be stored on a host server that is used by SurveyMonkey. Once data collection and analysis has been completed the data will be imported to the University of Tasmania server where it will be stored securely for a period of first five (5) years before it is deleted.

10. **How will the results of the study be published?**

    All data in this study will be anonymous. The results of the survey will form part of a PhD thesis.

11. **What if I have questions about this study?**

    If you have any queries, concerns or issues with this study, please feel free to contact us:

    Nagaratnam Jeyasreedharan (**nagaratnam.jeyasreedharan@utas.edu.au** 03 62267671, Dr John Minas (**john.minas@utas.edu.au** 03 63243221 or Mr. Roger Colbeck (**roger.colbeck@utas.edu.au**, 03 62262758).

This study has been approved by the Tasmania Health and Medical/Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, you can contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 6254 or email human.ethics@utas.edu.au / ss.ethics@utas.edu.au. The Executive Officer is the person nominate to receive complaints from research participants. You will need to quote H0018029.

12. How can I agree to be involved?

Your consent to participate in this research is implied by completing and submitting this survey

Thank you for your time

UNIVERSITY *of* TASMANIA

TASMANIAN SCHOOL OF BUSINESS AND ECONOMICS

30th October 2019.

Mr Alistair Shields
SMSF Association

Dear Mr Shields

Mr Roger Colbeck, as part of his doctoral studies within the Tasmanian School of Business and Economics is investigating the decision-making behaviour of Self-Managed Superannuation Funds Trustees in Australia. The study is being conducted under the supervision of Doctors Nagaratnam Jeyasreedharan and John Minas.

As the peak SMSF trustee body in Australia we seek your assistance with this study by advertising this to your members. To guarantee anonymity for your members, we ask that you forward details of the electronic delivery of the survey and associated online link to your members. Once concluded we would make available a summary of the findings to your organisation for distribution to members.

We kindly request your organisation to inform your SMSF trustee members list by sending them an email regarding the survey exercise and providing a link to the Survey Monkey website as provided in the Participants Information Sheet.

https://www.surveymonkey.com/r/pilotJ7H25ZR
https://www.surveymonkey.com/r/7YTZQBM

The privacy of participants is ensured as the survey data, as collected via the online survey, is non-identifiable. In addition , all survey responses will be kept confidential by the research team. As such, participants cannot be identified in any published reports arising from this study.

The participant's information sheet and survey instrument are attached for your information.

This study has been approved by the Tasmania Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, you can contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 2975 or email

ss.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote the ethics approval number: H0018029.

If you have any queries or questions about this project, please contact Dr Nagaratnam Jeyasreedharan (**nagaratnam.jeyasreedharan@utas.edu.au,** (03) 6226 7671), Dr John Minas (**john.minas@utas.edu.au**, (03) 6324 3221**) or Mr. Roger Colbeck (**roger.colbeck@utas.edu.au**, (03) 6226 2758).

We look forward to working with you on this project and its outcomes. Thank you

Yours sincerely,

Dr Nagaratnam Jeyasreedharan
Primary Supervisor
Tasmanian School of Business and Economics
University of Tasmania

UNIVERSITY *of* TASMANIA

TASMANIAN SCHOOL OF
BUSINESS AND ECONOMICS

**The investment decision-making behaviour of trustees of
Self-Managed Superannuation Funds (SMSFs).**

PARTICIPANT INFORMATION SHEET

Research team: Dr Nagaratnam Jeyasreedharan
Tasmanian School of Business and Economics, University of Tasmania

Dr John Minas
Tasmanian School of Business and Economics, University of Tasmania

Mr Roger Colbeck, PhD student
Tasmanian School of Business and Economics, University of Tasmania

Contact phone: (03) 6226 2758

Contact email: roger.colbeck@utas.edu.au

1. **Invitation**
You are being invited to participate in this research study as you are actively engaged in this SMSF industry. This study examines the decision-making behaviour of trustees of Self-Managed Superannuation Funds (SMSFs)

2. **What is the purpose of this study?**
This research focuses on the decision-making behaviour of SMSF trustees. The main objectives of the research are to examine contextual and psychological variables that may influence investment decisions. Contextual variables include demographics, time frame and asset allocation; psychological variables encompass risk attitude and heuristic driven biases.

3. **How is the study being funded?**
This study is being conducted as part of a PhD research project being undertaken by Mr Roger Colbeck. Incidental costs arising, if any, shall be met via internal grants from the Tasmanian School of Business and Economics (TSBE).

4. **Why have you been approached to participate?**
This research study is focused on the investment decision-making behaviour of SMSF trustees. The reason for approaching you, is that you are a registered SMSF trustee, active in the industry and your participation will help us gather relevant background information and perceptions on the key attributes under investigation and subsequently enable us to conduct relevant analysis. Through this survey we hope we can better

understand factors that underlie the decision-making behaviour of SMSF trustees. Your participation in this survey is entirely voluntary, and you may withdraw from participation at any time prior to submission of your responses. Your anonymity will be guaranteed as this information email and the connection to access the Survey Monkey Questionnaire has been sent by your member organisation on our behalf.

5. **What you need to do**
There are 2 options to access, undertake and submit the survey. Instructions on how to access the survey are as follows:

- Option-1 Online response

Please follow the URL **https://www.surveymonkey.com/r/SMSF_assn**

- to participate in the survey.

- Option – 2 Using your smart phone

The online version of the questionnaire can be viewed on your mobile device by scanning the QR code provided below. If you do not have the QR code reader already available on your phone, please read the instructions below to download QR Code reader.

a. Go to iTunes App store (for iPhone users) or Google Play (for Android users).
b. Search for "QR Code Reader".
c. Download any of the available QR code readers of your choice.
d. Recommended app for iPhone users is: 'QR code for iphone' by TapMedia.
e. Recommended app for Android users is: 'QR Driod' by Drioda.
f. For other smart phone users please go to the respective app store for your phone and follow the process above to download one of the QR readers.

Your time commitment to complete the survey is expected to be 30 minutes.

6. **Are there any possible benefits from participation in this study?**
Participants will have no direct and immediate benefits from participating in this study. However, indirect benefit to the SMSF industry is expected to occur as a result of the findings and associated publications that will arise from this research by better informing decision-making practices. The major benefit will be a better understanding within the industry of decision-making behaviours and be available to you through your member organisation once the study is complete.

7.   Are there any possible risks from participation in this study?
There are no perceived risks with completing this survey. In addition, the data as collected is non-identifiable i.e. we collect no records of your identity before, during or after the online survey process.

8.   What if I change my mind during or after the study?
You are free to withdraw without consequence before submitting the online survey. After submitting the survey, there will be no recourse for withdrawals. However, the survey data is non-identifiable i.e. participants identity is not recorded.

9.   What will happen to the data when this study is over?
This project will use an external commercial site to create, collect and transfer the raw data using a pre-specified survey format. The data collection software and website we shall be using is called SurveyMonkey (**www.surveymonkey.com**). If you agree to participate in this survey, the responses you provide will be stored on a host server that is used by SurveyMonkey. Once data collection and analysis has been completed the data will be imported to the University of Tasmania's internal server where it will be stored securely for a period of five (5) years from publication before it is deleted and/or disposed appropriately in conformity with University requirements.

10.   How will the results of the study be published?
All data in this study will be collected and presented anonymously. A summary document of the results will be provided to the member organisation for dissemination to members. Additionally, results of the survey will be published as PhD thesis and published as papers in related industry journals and chapters in books.

11.   What if I have questions about this study?
If you have any queries, concerns or issues with this study, please feel free to contact us:

Dr Nagaratnam Jeyasreedharan (**nagaratnam.jeyasreedharan@utas.edu.au** ; (03) 6226 7671), Dr John Minas (**john.minas@utas.edu.au** ; (03) 6324 3221**)** or Mr Roger Colbeck (**roger.colbeck@utas.edu.au** ; (03) 6226 2758).

This study has been approved by the Tasmania Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, you can contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 2975 or email **ss.ethics@utas.edu.au**. The Executive Officer is the person nominated to receive complaints from research participants. You will need to quote the ethics approval number: H0018029.

12.   How can I agree to be involved?
Your consent to participate in this research is implicit when you complete and submit the online survey.

Thanking you for your time and effort.

University *of* TASMANIA

TASMANIAN SCHOOL OF
BUSINESS AND ECONOMICS

The investment decision-making of trustees of self managed superannuation funds (SMSFs)

Getting to know you

The questionnaire is a series of easy to complete multiple-choice questions. In some instances none of the answers will match exactly what you want to say. When that happens, choose the answer that is closest or 'best fit' to your response.

Similarly, give your 'best fit' answer for questions that ask about a situation that isn't relevant to you, or in situations where you would normally seek further information.

1. What age range do you fall into?

    ○ Under 34

    ○ 35 to 49

    ○ 50 to 59

    ○ 60 to 69

    ○ 70 and over

2. What is your gender?

    ○ Male

    ○ Female

    ○ Other

3. How many members are there in your SMSF?

    ○ 1

    ○ 2

    ○ 3

    ○ 4

4. How familiar are you with investing in a wide range of investment types such as shares, managed funds, property, inside or outside superannuation?

○ Experienced as an investor in a wide range of investment types

○ Some experience as an investor in a wide range of investment types

○ Minimal experience as an investor in a wide range of investment types

○ Have experience with superannuation and personal debt only

○ Not very familiar

5. What best describes you with regards to decision-making?

○ I do most of the research and analysis of investment decisions for myself and /or for other members

○ Decisions are made jointly with members sharing equally in research and analysis of investment decisions

○ While our decisions are made jointly I have minimal input to research and analysis of investment decisions

○ I have minimal involvement in investment decisions

○ I am not involved in research and analysis of investment decisions

○ I am not involved in investment decisions

6. In terms of investment decisions made, how would you describe your SMSF?

○ Self initiated investment decisions by member

○ Primarily self initiated investment decisions in discussion with other decision makers (other members)

○ Self-initiated investment decisions with occasional help of other decision makers and advisers

○ Investment decisions dependent on the advice of experts

○ I have minimal involvement in investment decisions

○ I am not involved in investment decisions

Risk Attitude

7. People who know me would describe me as a cautious person

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

8. I generally look for safe investments, even if that means lower returns

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

9. Usually it takes me a long time to make up my mind on investment matters

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

10. I associate the word risk with the notion of 'opportunity'

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

11. I find investment matters easy to understand

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○

12. I am willing to take substantial investment risks to earn substantial returns

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

13. Before I make specific investment decisions I assess my risk tolerance level

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

14. Before I make specific investment decisions I check the current financial market conditions

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

15. I actively manage my investments on a weekly basis

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

16. I typically check movements in the value of my investment portfolio on a quarterly basis

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

17. I typically check movements in the value of my investment portfolio on an infrequent basis

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

18. Before I make specific investment decisions I determine the return objective for the investment

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

19. I am confident in making a quick decision on placing an investment if an opportunity arises

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

The investment decision-making of trustees of self managed superannuation funds (SMSFs)

Strategies and goals

20. When my SMSF fund investment strategy does not produce the return that was hoped for I make necessary changes to try to improve investment performance, using my own judgement

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
◯	◯	◯	◯	◯	◯

21. When my SMSF fund investment strategy does not produce the returns that was hoped for I wait anticipating future improvements over the longer term

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

22. When my SMSF fund investment strategy does not produce the returns that was hoped for I consult with financial advisors before taking further action

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

23. When my SMSF fund investment strategy does not produce the returns that was hoped for I sell all the affected investments and transfer to cash

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

24. I believe in tried and tested investment strategies, rather than trying new and innovative concepts

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

25. I believe in undertaking fundamental and technical analysis of potential investments before making a decision

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

26. I have confidence in the performance of my investment portfolio

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

27. I believe my investment portfolio will achieve good returns over the medium to long term

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

28. I would rather have someone else manage my investments than deal with it myself

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

29. I am confident in my financial advisor's ability in forecasting the medium to long term performance of the investment portfolio

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

30. Before I make specific investment decisions I consider a variety of investments alternatives

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

31. Before I make specific investment decisions I assess the marketability/liquidity of the investment

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

32. Before I make specific investment decisions I assess the convenience with which the investment can be bought, held and sold

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

33. Before I make specific investment decisions I review my overall investment goals

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

34. I am committed to achieving the goals/objectives for my investment portfolio

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

35. I set clear financial goals with timelines and investment return expectations

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

36. I regularly review and compare my investment performance with market benchmarks

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

37. I often proceed with investing in alternative products that have not been properly researched

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

Thinking styles and preferences

38. I believe that my skills and knowledge of investments will help me to outperform the market

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

39. I rely on my previous experiences in the market for further investment decisions

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

40. I prefer to invest in local assets such as shares rather than international investments because the information regarding local assets is more readily available

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

41. After a prior gain in investments, I become more risk seeking than usual

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

42. I avoid selling investments that have decreased in value and readily sell investments that have increased in value

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

43. When making investment decisions I will first favour one option then change to another option

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

44. I enjoy making investment decisions

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

45. I remain calm when I have to make investment decisions quickly

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

46. I rely on instinct when making investment decisions

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

47. I stick by my investment decisions regardless of the outcome

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

48. I am very aware of my own feelings and emotions, and think about how they might be impacting my investment decision

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

The investment decision-making of trustees of self-managed superannuation funds (SMSFs)

Information sources

49. My sources of investment information are mainly stock broker/financial adviser/accountant

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

50. My sources of investment information include mainly internet/television/print media

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

51. My sources of investment information are mainly family/friends/colleagues

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

52. I often make investment decisions without having all the information available

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

53. I generate my own ideas/own research

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○

54. Before I make specific investment decisions I check with fellow trustees

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

55. Before I make specific investment decisions I consult with my financial advisors

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
○	○	○	○	○	○

56. I have made an investment decision which is contrary to advice from my financial advisors

Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly Agree
○	○	○	○	○	○

APPENDIX 5.0: DESCRIPTIVE ANALYSIS – DEMOGRAPHIC VARIABLES

Appendix 5a: Demographic statistics

		What age range do you fall into?	What is your gender?	How many members are there in your SMSF?	How familiar are you with investing in a wide range of investment types such as shares, managed funds, property, inside or outside superannuation?	What best describes you with regards to decision-making?	In terms of investment decisions made, how would you describe your SMSF?
N	Valid	201	201	201	201	201	201
	Missing	0	0	0	0	0	0
Mean		3.72	1.25	2.09	2.01	1.62	2.49
Std. Deviation		1.18	0.43	0.72	1.08	1.02	1.22
Variance		1.40	0.19	0.52	1.16	1.04	1.48

Appendix 5b: What age range do you fall into?

Age range	Frequency	Percent (%)	Cumulative Percent (%)
Under 34	9	4.5	4.5
35 to 49	31	15.4	19.9
50 to 59	30	14.9	34.8
60 to 69	69	34.3	69.2
70 and over	62	30.8	100
Total	**201**	**100**	

Appendix 5c: What is your gender?

Gender	Frequency	Percent %	Cumulative Percent %
Male	151	75.1	75.1
Female	50	24.9	100
Total	**201**	**100**	

Appendix 5d How many members are there in your SMSF?

Fund members	Frequency	Percent	Cumulative Percent
1	25	12.4	12.4
2	152	75.6	88.1
3	5	2.5	90.5
4	19	9.5	100
Total	201	100	

Appendix 5e: How familiar are you with investing in a wide range of investment types such as shares, managed funds, property, inside or outside superannuation?

Trustee experience	Frequency	Percent	Cumulative Percent
Experienced as an investor in a wide range of investment types	72	35.8	35.8
Some experience as an investor in a wide range of investment types	85	42.3	78.1
Minimal experience as an investor in a wide range of investment types	27	13.4	91.5
Have experience with superannuation and personal debt only	4	2.0	93.5
Not very familiar	13	6.5	100
Total	**201**	**100**	

Appendix 5f: What best describes you with regards to decision-making?

Decision input	Frequency	Percent	Cumulative Percent
I do most of the research and analysis of investment decisions for myself and /or for other members	129	64.2	64.2
Decisions are made jointly with members sharing equally in research and analysis of investment decisions	42	20.9	85.1
While our decisions are made jointly I have minimal input to research and analysis of investment decisions	13	6.5	91.5
I have minimal involvement in investment decisions	13	6.5	98.0
I am not involved in research and analysis of investment decisions	3	1.5	99.5
I am not involved in investment decisions	1	0.5	100
Total	**201**	**100**	

Appendix 5:g In terms of investment decisions made, how would you describe your SMSF?

Decision process	Frequency	Percent	Cumulative Percent
Self initiated investment decisions by member	58	28.9	28.9
Primarily self initiated investment decisions in discussion with other decision makers (other members)	37	18.4	47.3
Self-initiated investment decisions with occasional help of other decision makers and advisers	71	35.3	82.6
Investment decisions dependent on the advice of experts	20	10.0	92.5
I have minimal involvement in investment decisions	15	7.5	100
Total	**201**	**100**	

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