

The Investment Trading Behaviour of Australian Self-Managed Superannuation Fund Trustees Before, During and After the 2008 Global Financial Crisis

A thesis submitted by

Justin Paul Baiocchi

Bachelor of Business Science, University of Cape Town, South Africa

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ABSTRACT

Self-Managed Superannuation Funds (SMSFs) play an increasingly important role within Australian retirement planning, with over a third of all superannuation savings held by SMSFs. This study adds to the relatively limited research on SMSFs through an examination of the investment decisions of SMSF trustees over the period prior to, during and after the 2008 global financial crisis.

Anecdotal evidence suggests that SMSFs out-performed other superannuation providers during the 2008 global financial crisis, largely due to the high cash weightings within SMSFs. This study investigates whether or not there is evidence of an ideal investment strategy by SMSF trustees over the period 2005 to 2011, a period which encompasses a period of significant financial stress. The investment transactions of a sample of SMSFs over the period 2005 to 2011 were analysed in order to allow for observations to be made regarding the timing and nature of SMSF trustee investment decisions. The results of the analyses suggest that there is little evidence of an ideal investment approach adopted by SMSF trustees. SMSFs tended to increase market risk exposure prior to the global financial crisis, failed to take advantage of lower asset prices during the financial crisis and adopted a more defensive investment approach in the period following the financial crisis. The relationship between SMSF size and SMSF risk profile and trustee investment decision-making was also investigated, finding that smaller SMSFs tended to adopt the least appropriate investment approach and that only a weak relationship exists between SMSF risk profile and the investment approach adopted by the fund's trustees. SMSFs within the sample also exhibited a number of behavioural biases and heuristics, including loss aversion, representativeness and cognitive dissonance.

The findings of this study suggest that greater attention from policymakers and regulatory authorities on the investment decision-making of SMSF trustees may be required and that further research on the prevalence and impact of behavioural biases on SMSF trustees may be warranted.

CERTIFICATION OF THESIS

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

.....
Signature of Candidate

.....
Date

ENDORSEMENT

.....
Signature of Supervisor

.....
Date

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The Self-Managed Superannuation sector plays an important role in the Australian retirement system, with nearly \$500 billion of assets held within Self-Managed Superannuation Funds (SMSFs) (Australian Taxation Office 2013). Given the importance of the SMSF sector within the context of the Australian retirement system, it is vital that policymakers, SMSF members and SMSF trustees are fully informed regarding the ability of SMSFs to meet member retirement needs, regardless of the prevailing state of the economy and financial markets. Whether or not SMSFs are able to fulfil the role of meeting member retirement needs depends largely on the investment decisions of fund trustees. Trustee investment decisions are of even greater importance during periods of financial stress and volatility, where inappropriate investment strategies and decisions can result in the erosion of member retirement assets. This study considers the impact of the 2008 global financial crisis on the SMSF sector. This study undertakes the first investigation into the investment trading behaviour of SMSF trustees in the period leading up to, during, and after the 2008 financial crisis.

1.2 Existing Research on the SMSF Sector

The Australian superannuation system has been the subject of relatively extensive research, although the SMSF sector has received substantially less attention. This study adds to the growing body of research focused on the SMSF sector, with a particular focus on SMSF trustee investment decisions and the outcomes resulting from such decisions. Investor behaviour, decision-making and the various theories of investment management have a long history of research, however the SMSF sector has only attracted modest attention with regard to these avenues of investigation.

The individual investment decisions of SMSF trustees are the key determinant of whether or not SMSFs are able to meet the primary requirement for SMSFs; that of meeting the retirement income needs of fund members. In this regard an assessment of the trading behaviour of SMSF trustees provides an approach for determining the likelihood of fund trustees fulfilling this requirement. This is particularly relevant over the period 2008 to 2009, which includes the global financial crisis. Research has shown that other investors traded more frequently during the crisis (Kallberg, Liu & Wang 2012; Tang et al. 2011), behaviour which may have been repeated by SMSF trustees. It has also been shown that investor wealth (Yamaguchi 2006) and the asset allocation decisions by investors have an impact on the level of investor trading activity (Mitchell et al. 2007). The extensive literature on the various theories of investment management and investor behaviour is also relevant to the SMSF sector and this study. This includes investment theories such as Modern Portfolio Theory, Arbitrage Pricing Theory and the Efficient Markets Hypothesis; concepts which all offer SMSF trustees potential investment strategies to adopt in the management of the fund's assets. Behavioural finance theories and concepts such as Prospect Theory, loss aversion, overconfidence, representativeness and risk aversion are also of interest, given that the investment outcomes of SMSFs are simply a result of the decisions of the individual trustee(s). This study explores these relationships within the context of the Australian SMSF industry.

1.3 Research Objective

The objective of this study is to examine the trading behaviour of Australian SMSFs within the context of the 2008 global financial crisis. Specifically, the study investigates whether or not SMSF trustee investment decision-making was ideal, given the period of substantial investment stress which accompanied the financial crisis. This is done by comparing the trading behaviour of SMSF trustees during the crisis with their trading behaviour both prior to and following the crisis.

To assist with this process a number of research questions were developed to be answered through the analysis of SMSF trustee trading behaviour over the period 2005 to 2011. These questions are:

1. Did SMSFs increase their exposure to cash and other defensive investments in the period leading up to the global financial crisis?
2. Did SMSFs increase their exposure to market risk assets as stock markets bottomed and recovered in 2009?
3. Have SMSFs become more conservative in their investment approach since the global financial crisis?
4. Did larger or less risk-averse SMSFs behave differently as compared to smaller or more conservative SMSFs over the course of the global financial crisis?

To assist in answering these questions, a number of hypotheses regarding the trading behaviour of SMSF trustees were developed. These hypotheses are based on the initial assumption that SMSF trustees within the sample did not make ideal investment decisions prior to, during and following the financial crisis, and that there is no significant difference in the trading behaviour of SMSF trustees based on risk profile or fund size. These hypotheses are outlined in further detail in Chapter 2.

1.4 Significance of the Research

The level of assets now held within the SMSF sector accounts for over a third of all Australian superannuation savings (Australian Taxation Office 2013) . Over the period June 2000 to June 2011 the SMSF sector was the fastest growing segment within the superannuation system, with an increase in assets over that period of 461% (KPMG ACFS 2011). There is little evidence to suggest any imminent decrease in the popularity of SMSFs among Australians, with the establishment of 41,017 SMSFs in the 2012 financial year, the second-highest annual number of new SMSFs since the introduction of legislation permitting SMSFs (Australian Taxation Office 2013). Given the importance of the SMSF sector within the overall context of Australian retirement planning, it is desirable that the assets held within the sector are managed as appropriately as possible. In this regard it is important that the relevant legislation covering the SMSF sector and the approach taken by the

appropriate regulatory bodies act together to ensure the integrity of the SMSF sector. Academic and other research can play a role in assisting policy-makers to determine the most appropriate rules, regulations and strictures under which the SMSF sector must operate, yet to-date there has been comparatively little research into the SMSF sector. This study seeks to add to the body of literature concerning the SMSF sector, with a specific emphasis on the behaviour of SMSF trustees in times of financial stress. This complements other research which has examined the behaviour, performance, investment approach and activities of SMSFs (Phillips 2007, 2009, 2011a, 2011b; Phillips, Baczynski & Teale 2009a, 2009b; Phillips, Cathcart & Teale 2007).

A distinguishing feature of this study is that it considers the trading decisions of SMSF trustees over a period of time, a period which includes the 2008 global financial crisis. While other studies have examined the investment decisions of SMSF trustees, these have focused on the investment exposure of SMSFs at a point in time. While such an approach can provide insights into the investment choices of SMSF trustees at that point in time, it does not allow for conclusions to be drawn regarding changes in SMSF trustee behaviour or decision-making over time. The time period covered by this study offers an opportunity to investigate SMSF trustee behaviour across a varied set of economic and financial circumstances. This period encompasses the relatively strong market returns in those years leading up to the financial crisis, the severe bear market of 2008-09 and the gradual recovery in those years following the financial crisis. This set of varied economic and market conditions may allow for a robust set of conclusions to be drawn regarding the investment trading behaviour of SMSF trustees.

SMSFs have been generally viewed as having weathered the financial crisis better than other superannuation providers such as industry and retail superannuation funds. This out-performance was largely due to the comparatively larger cash holdings of SMSFs as compared to the other superannuation structures (Phillips, Baczynski & Teale 2009b). However there has been no investigation as to whether or not this high allocation to cash was a result of superior investment decision-making by SMSF trustees or simply a result of good fortune. The results of this study may

provide an insight into the existence or otherwise of appropriate investment choices by SMSF trustees.

1.5 Scope of the Study

The scope of the study is restricted to the time period 2005 to 2011 and concerns only the investment transactions of a sample of SMSFs. The impact of the 2008 financial crisis on the wider superannuation sector will not be discussed, nor will this study address matters such as the relevance of SMSF trustee demographics or the impact of regulatory change on the SMSF sector.

The study seeks to address the primary research question of whether or not there is evidence that trustees of Australian SMSFs employed an ideal investment strategy over the period 2005 to 2011. With the benefit of hindsight, the ideal investment strategy have been one that resulted in decreased investment risk exposure on the eve of the financial crisis and increased investment risk exposure as markets bottomed and subsequently recovered following the financial crisis. Anecdotal evidence and recent research appears to indicate that SMSFs generally out-performed other superannuation providers over the period encompassing the financial crisis (Phillips, Baczynski & Teale 2009b). The results of the study may clarify whether or not this outperformance was due to luck or the superior investment approach of SMSF trustees compared to alternative superannuation providers.

The study analyses the investment decisions of SMSF trustees as a whole and also on the basis of SMSF size and risk profile. In this regard SMSFs within the sample are segmented according to the level of assets held within each fund on 1 January 2005 (fund size) and the level of exposure of each fund to higher risk assets as at 1 January 2005 (risk profile). This segmentation allows for conclusions to be drawn regarding the impact of fund size or risk profile on the investment decisions of fund trustees and also whether or not trustees of larger or more aggressive funds behaved differently to trustees of smaller or more defensive funds.

1.6 Summary of Main Findings

The results of the analysis of the investment trading behaviour of SMSF trustees within the sample tends to suggest that trustees were not making ideal investment decisions over the period 2005 to 2011. There is little evidence that trustees acted to reduce market exposure prior to the onset of the financial crisis; nor is there evidence that trustees acted to take advantage of low asset prices as equity markets bottomed in early 2009 (although when segmented by size, there is evidence that medium-sized funds within the sample were more likely to take advantage of low asset prices). There is also evidence that SMSFs within the sample adopted a more conservative investment approach in that period following the financial crisis, behaviour which may not have been appropriate given the recovery in equity markets following the crisis. The results of the study suggest that the apparent outperformance by SMSFs over alternative superannuation structures during the financial crisis may be more a result of good fortune rather than good judgement. SMSFs within the sample appeared to hold high levels of cash during those years when market returns were positive leading up to the crisis (in 2005, 2006 and 2007) but there is little evidence to indicate an increase in cash holdings over that period, activity which would suggest that SMSF trustees were appropriately reducing their market exposure in the lead up to a significant bear market. SMSF trustees within the sample also tended to make investment decisions in a reactive manner; that is, they adopted a more conservative approach following the crisis, a period which saw most asset markets record strong growth. When considered on the basis of fund risk profile, the results indicate that SMSF trustee risk profiles change over time, seemingly in response to changes in investment conditions. The analysis also provides information with regards to the ideal size of a SMSF, suggesting that smaller SMSFs tended to adopt the least appropriate investment strategy over the period 2005 to 2011.

The results of the analysis also suggest the existence of a number of behavioural biases within the sample group. These include loss aversion and regret avoidance, where SMSF trustees appeared unwilling to sell assets which would have fallen in value during the financial crisis. SMSF trustees within the sample also exhibited other biases and heuristics such as cognitive dissonance, representativeness

and the availability heuristic. SMSFs within the sample tended to behave as though they expected the prevailing set of market conditions to continue indefinitely and appeared to place too great a weight on recent events and the likelihood of these events re-occurring in the future. The findings of this study suggest that greater focus on the investment related aspects of a trustee's role may be appropriate, rather than the existing legislative and regulatory focus on SMSF compliance and administration.

1.7 Structure of the Study

The study is organised as follows. The next chapter, Chapter 2, presents a review of the literature relevant to the SMSF sector and this study in particular. This review includes key concepts and theories such as investor behaviour, theories of investment management and the impact of the global financial crisis on investor trading patterns. Chapter 3 describes the data that forms the basis of this study and outlines the analysis of this data. The study is based on a sample of SMSFs and the nature of the data and the limitations of the sample data are also outlined in this chapter. Chapter 3 also outlines the research objective, questions and hypotheses which form the basis for the study. Chapters 4, 5 and 6 present the results of the analysis. Chapter 4 presents the results of the analysis of the SMSF sample as a whole, while Chapters 5 and 6 present the results of the analysis on the basis of fund segmentation according to size and risk profile respectively. Chapter 7 discusses the results of the analysis presented in Chapters 4, 5 and 6. The study concludes with Chapter 8, which summarises the key findings, provides answers to the research questions identified in Chapter 3, identifies any implications resulting from the study and outlines areas for potential further research relating to the SMSF sector.

1.8 Conclusion

The SMSF sector is an important component of Australia's retirement system, yet there has been comparatively little empirical research into the ability of SMSFs to meet the requirements of their members and satisfy the policy objectives of law-makers and regulatory bodies. This study aims to add to the body of knowledge concerning the SMSF sector, with a specific emphasis on the investment

decision-making of SMSF trustees. This is done within the context of the time period encompassing prior to, during and after the 2008 global financial crisis. Theoretical areas which are relevant to the study include investment strategies and decision-making, regulatory theory, and behavioural finance. We now proceed to Chapter 2 where the literature related to these theoretical areas and their relevancy to the SMSF sector will be surveyed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The Australian superannuation sector is now an entrenched and vital component of the Australian financial system. With over \$1.5 trillion of assets, the sector is an important source of investment capital and plays a key role in the retirement funding plans of a majority of retired and working Australians (Cooper Review 2010). With general support from all major Australian political parties, it is likely that the sector will only grow in scale and importance in coming years. Given this significant role within the Australian financial system, it is no surprise that the sector has attracted a significant level of academic research. On the other hand, the SMSF sector has attracted far less attention, a surprising situation given that over a third of superannuation assets are held within SMSFs (Cooper Review 2010).

As is the case with much of the financial sector, SMSFs operate within a strict regulatory framework, largely underpinned by federal government statute. These include the *Superannuation Guarantee Administration Act 1992* and the *Superannuation Industry (Supervision) Act 1993*. It is important that this regulatory environment is considered when assessing the nature of the SMSF sector or the behaviour of participants within the industry. As SMSFs are fundamentally the retirement savings investment vehicle for one or more fund members, the investment decisions of fund trustees are an important determinant of whether or not SMSFs are in a position to meet the needs of fund members. The behaviour and decision-making of SMSF trustees can therefore be assessed with reference to the body of financial and economic theories and models which seek to explain the investment decision-making of investors.

This chapter provides the theoretical basis for a study of the investment decision-making of SMSF trustees, through a review of the literature relevant to

SMSFs and investment decision-making. This chapter is organised as follows. Section 2.2 outlines literature relevant to the general Australian superannuation system, detailing the history and purpose of superannuation. Section 2.3 details current research relevant to the SMSF sector in particular. This section serves to outline both the importance of the SMSF sector, and to illustrate the relevant paucity of published academic research regarding the SMSF sector. Section 2.4 highlights the theories of investor behaviour and decision-making that are relevant to the SMSF sector, while Section 2.5 considers the regulatory framework within which the SMSF sector operates. Section 2.6 discusses the theoretical investment strategies that may be utilised by SMSF trustees, and finally, Section 2.7 focuses on those studies which have considered investor trading purely within periods of financial stress, including the global financial crisis of 2007-08.

2.2 The Australian Superannuation System

The Australian superannuation sector is now a permanent and important fixture within the Australian retirement income system. Superannuation in Australia can be traced as far back as the mid-19th century, although at that stage it was restricted to certain occupations, most notably banking and the public sector (Bateman 2002). A National Superannuation Scheme was debated in the years following World War II and was outlined and recommended in the Hancock Report (National Superannuation Commission of Enquiry 1976), though this was later rejected by the Fraser government (Carmichael & Plowman 1985). It was not until 1992 and the implementation of the Superannuation Guarantee Administration Act (Cwlth) and the subsequent Superannuation Industry (Supervision) Act (Cwlth) that superannuation became recognisable as the system we know it today (Australian Treasury 2001). The introduction of superannuation was intended to assist individuals in saving for their eventual retirement through compulsory employer contributions to an eligible employee's superannuation account.

2.2.1 The Superannuation Contributions Guarantee

The defining characteristic of the current Australian superannuation system is the effective requirement that employers contribute a certain percentage of an

eligible employee's salary, over and above their actual wage, to a specified superannuation fund, known as the Superannuation Guarantee Charge (SGC) (Morling & Subbaraman 1995). This was a significant change to the superannuation system, which until that point had been predominately voluntary in nature and covered only a small proportion of employees. The SGC effectively penalised those employers which did not make superannuation contributions for employees at the minimum prescribed rate. Commencing in 1992-93 at 4 per cent of the salary of eligible employees of firms with payroll in excess of \$1,000,000 (and 3 per cent for firms with payroll below that level), the minimum contributions rate has increased to be 9.25 per cent as of 1 July 2013 as per the Superannuation Guarantee (Administration) Amendment Act (Cwlth). In 1995-96 the federal government had announced plans to increase the superannuation contributions rate over time, reaching a minimum of 15 per cent for most employees by 2002-03, however this pledge was not upheld by subsequent governments (Morling & Subbaraman 1995). Despite the failure to increase the minimum superannuation contributions rate as promised, the superannuation sector grew in size as the number of eligible employees increased over time. As the superannuation industry grew in both size and importance, it attracted an increasing level of attention from researchers. Not all conclusions drawn were complimentary to the concept of involuntary superannuation. Freebairn (1998) considered the impact of superannuation on the labour market under both a flexible and rigid wage model, concluding that the minimum superannuation contributions requirement acted much like a tax, with people on lower incomes worse off than in the absence of the minimum contributions requirement. A later paper by the same author assessed the long run labour market effects of the SGC, finding that wages and employment both fall in the presence of the SGC (Freebairn 2004).

2.2.2 Superannuation and Choice of Fund

Other researchers have focused on the issue of choice of superannuation fund, which came to the fore following the passage of the *Superannuation Legislation Amendment (Choice of Superannuation Funds) Act 1993* (Cwlth). This legislation was significant in the development of the superannuation industry, in that it allowed the majority of employees to select their own superannuation fund, rather than be

restricted to a union or employer selected fund. Fry, Heaney and McKeown (2007) suggested that few fund members would switch their superannuation following passage of the legislation, a view confirmed by Clare (2006) who found that switching rates were lower than had been expected prior to the implementation of the legislation. Fry et al. (2007) did however expect that the SMSF sector would be a beneficiary of the new freedom of employees to select their superannuation fund, although this change was downplayed by Clare (2006), who found that the rate of establishment of SMSFs actually decreased in the years immediately following the implementation of superannuation choice. Choice of fund in terms of switching from a defined benefit plan to a defined contribution plan has also been the subject of investigation, with research showing that fund members did not necessarily act rationally in making the decision to switch funds and that there was a correlation between demographics and the choice made by the fund member (Clark-Murphy & Gerrans 2001, 2004; Clark-Murphy, Kristofferson & Gerrans 2002). It was found that younger males with lower incomes tended to find the decision to switch superannuation funds an easy one, while women and older age groups tended to find the decision comparatively more difficult. Overall the evidence is somewhat mixed as to whether or not the advent of superannuation choice resulted in better outcomes for fund members.

2.2.3 Active and Passive Investment Management

As superannuation is essentially a structure for holding and managing assets set aside to fund retirement, the theoretical and empirical aspects of portfolio management theory and practice play an important role in the ability of superannuation to meet the retirement income needs of fund members (Phillips 2007). The question of active versus passive investment management has been of considerable interest to researchers, not only in the context of superannuation but also with regards to the management of all tradeable investments (active investment management involves making deliberate investment decisions so as to outperform an identified benchmark, while passive management does not try to outperform the benchmark (Evanson Asset Management 2011)). The literature reports extensive investigations into the relative merits of active and passive investment strategies, with arguments made both in favour of active management (Cremers & Petajisto

2009; Grauer, Hakansson & Shen 1990) and passive management styles (Barber & Odean 2000; French 2008; Malkiel 2003b). A related debate concerns the relative importance of asset allocation as compared to asset selection. It has been argued that asset allocation is the primary determinant of returns, with asset selection playing a secondary role (Ibbotson & Kaplan 2000), an argument that has been viewed as providing support to advocates of passive investment management.

This path of investigation has also been applied to the investment performance of Australian superannuation funds. Early work by Drew and Stanford (2001) showed that fund trustees could earn higher risk-adjusted returns with a passive rather than active asset selection strategy. Later work reinforced the notion that a passive investment management style was in the fund members' best interests (Drew, Stanford & Taranenko 2001). The relationship between past and future performance has also been considered. Researchers found that there was no indication that past performance was a useful predictor of future returns (Drew, Stanford & Taranenko 2001; Drew, Stanford & Veeraraghavan 2002).

2.3 The Self-Managed Superannuation Sector

As a sub-sector of the Australian superannuation industry, SMSFs have not attracted the same level of research attention as that focused on the retail and industry superannuation funds. As the level of assets invested through SMSFs has grown however, so has the interest of researchers, although it was not until 2004 that the first paper specifically focused on the SMSF sector was published. In this initial paper Valentine (2004) largely concentrated on the regulation of SMSFs, recommending that the investment strategies of SMSF be more closely regulated, a stance somewhat at odds with the *raison d'être* of SMSFs.

Phillips (2007) published a more detailed consideration of SMSFs, analysing the microstructure of a sample of 41 SMSFs. Although the small SMSF sample size was acknowledged, the analysis still provided the first detailed published investigation of the contents of SMSFs and of the biases and investment choices of SMSF trustees. Of particular interest was the observation that SMSFs adopted a 'buy and hold' methodology, which is a variant of a passive investment strategy. This

hints that, despite the ‘self-managed’ moniker of SMSFs, few trustees may actually practice active management of their SMSF assets.

2.3.1 The Investment Performance of SMSFs

The investment performance of SMSFs is important, as the introduction of SMSFs essentially allowed for the transfer of investment decision-making responsibility away from professional investment managers in industry and retail superannuation funds and into the hands of the trustees of each SMSF. As SMSF trustees are not required to meet any educational qualification requirements or possess any minimum level of investment expertise, it may be reasonable to assume that the investment performance of SMSFs would lag their larger counterparts. The first investigation of the investment performance of SMSFs was undertaken by Phillips et al. (2007). Based on sample of 40 SMSFs, the authors found that SMSFs not only suffered from a lack of diversification, but also underperformed the broader market index on a risk-adjusted basis. Later research considered the performance of SMSFs specifically over the period 2007-08 (Phillips, Baczynski & Teale 2009b). In this instance it was found that SMSF investment performance over the period compared favourably with retail superannuation funds, although the risk-adjusted equity component of SMSFs underperformed the broader market index. It was suggested that the high cash levels of SMSFs may have insulated SMSFs from the steep equity market falls during 2007-08 to a certain extent, although the question of whether or not this was a deliberate strategy by SMSF trustees leading into the bear market (being a market fall in excess of 20%) was not addressed. If SMSF trustees deliberately increased cash levels leading up to the GFC, this would potentially indicate the existence of a well-timed investment strategy by SMSF trustees to reduce market exposure immediately prior to a significant bear market. However, if SMSF trustees have consistently over-weighted cash regardless of the economic environment and stock market returns, this may indicate that the relatively favourable investment performance of SMSFs through 2007-08 was largely due to luck.

This issue forms the rationale for a number of the questions addressed through this thesis. Firstly, with the benefit of hindsight, were SMSF trustees making

ideal investment decisions leading up to the 2008 financial crisis? For example, it would have been ideal for SMSF trustees to be reducing their equities exposure and increasing their exposure to defensive assets (cash and fixed-interest investments) in the period prior to the stock market falls in 2008-09. This leads to a second question to be answered by the dissertation: do SMSF trustee investment decisions over the period under investigation show evidence of an ideal and consistent investment strategy? For example, once the Australian stock market ‘bottomed’ in 2009, it would have been ideal at that time for SMSF trustees to increase their market exposure and reduce their level of defensive assets, thereby benefiting from the recovery in equity markets in 2009-10.

Given the size of the SMSF sector, where SMSF trustees are now responsible for the management of over a third of total Australian retirement savings, the issue of whether or not SMSF trustees are making appropriate investment decisions is worthy of further consideration. Poor investment decision-making by SMSF trustees potentially poses a threat to the efficient operation of Australian capital markets, given the level of assets now controlled by SMSF trustees (Phillips, Baczynski & Teale 2009b). It is easy to envisage competing superannuation providers such as retail and industry funds making claims that the largely unregulated investment decision-making process of SMSF trustees poses a risk to member’s retirement savings, thereby requiring a greater level of regulatory scrutiny and perhaps the eventual erosion of the advantages which initially attracted SMSF members to the sector in the first place.

2.3.2 SMSF Risk and Returns

While the investment performance of SMSFs is important, this must be assessed within the context of the level of investment risk adopted by SMSF trustees. The ability of SMSFs to generate returns in excess of the equity risk premium has been considered, with results showing, inter-alia, that SMSF returns were below the riskless rate of interest (Phillips, Baczynski & Teale 2009a). This raises important questions about the rationale for the existence of SMSFs and the ability of SMSF trustees to adequately manage their assets. The risk/return trade-off and its relevance within the SMSF sector has also attracted the attention of researchers. Phillips (2009)

considered whether larger SMSFs would have a higher allocation to risky assets than smaller funds, finding that the size of the fund was irrelevant in determining SMSF allocations to risky assets (this conclusion has a bearing on this study, which considers whether or not larger SMSFs exhibited a different pattern of investment trading behaviour as compared to smaller funds. Chapter 5 presents the results of the analysis of SMSF trustee trading behaviour on the basis of fund size). The high cash allocations of SMSFs were again noted, tying in with findings from earlier research (Phillips, Baczynski & Teale 2009b). Phillips (2011a) determined the relative risk coefficient of the average SMSF trustee, finding that SMSF trustees were too risk averse, to the point where SMSF trustees would be unable to grow or maintain their share of economic wealth. This raises further questions about the ability of SMSF trustees to appropriately manage SMSF assets. A question which has not yet been considered is the extent to which SMSF trustees receive and follow investment advice. It may be that SMSF trustees who pay for expert advice regarding their investment decisions achieve superior results compared to those trustees who opt not to receive such advice, or it may be that the perceived fee savings of a ‘do-it-yourself’ superannuation fund more than outweigh any benefit offered by expert investment advice. This question is as yet unanswered by the existing literature regarding SMSFs, however it is beyond the scope of this study and potentially presents an avenue for further research.

2.4 Investor Behaviour

The investment outcomes of SMSFs are a direct consequence of decisions made by either the trustees or their investment advisors. Behavioural finance, which seeks to provide explanations and reasons as to why market participants make the decisions they do (Sewell 2007), can therefore be utilised as a tool for assessing the decisions of SMSF trustees.

2.4.1 Prospect Theory

One of the earliest contributions to behavioural finance (which is considered a sub-section of behavioural economics) was Prospect Theory, outlined by Kahneman and Tversky (1979). Prospect Theory showed how individuals evaluate

potential gains and losses from a range of alternatives with varying degrees of probability. Most importantly they found that individuals tend to discount outcomes subject to uncertainty in comparison to outcomes of which there is no uncertainty (Sewell 2007). Through empirical evidence Kahneman and Tversky were able to show that individuals, far from showing the indifference expected of rational agents, exhibited loss aversion in that a loss was felt more keenly than a gain of equal magnitude. Further refinement of Prospect Theory by Kahneman and Tversky resulted in the development of Cumulative Prospect Theory (Kahneman & Tversky 1992). Cumulative Prospect Theory differed from the original Prospect Theory in that it allowed for the weighting of the cumulative probability function, rather than the individual probabilities as under the original Prospect Theory. According to Kahneman and Tversky (1992), the value of a prospect can be determined as:

$$V(f) = \sum_{i=-m}^n \pi_i v(x_i)$$

for $\pi_i = \pi_i^+$ if $i \geq 0$ and $\pi_i = \pi_i^-$ if $i \leq 0$

Therefore the value of a prospect V , is a function of the decision weight (π_i) and the value of each of the prospect's potential outcomes (x_i). See Barberis (2013) and Edwards (1996) for a review of Prospect Theory and the application of the theory in mainstream economics. Building on the work by Kahneman and Tversky, further research showed that loss aversion was also dynamic: losses were felt more keenly if they were preceded by other losses, but less keenly if preceded by other gains, otherwise known as the 'house-money' effect (Barberis & Huang 2001; Thaler & Johnson 1990). Loss aversion is closely related to the disposition effect, which refers to the tendency for investors to sell their winners and hold on to their losers, first outlined by Shefrin and Statman (1985) and later covered by Odean (1998).

2.4.2 Mental Accounting and Other Cognitive Biases

A further extension of Kahneman and Tversky's work was outlined by Thaler (1980), who introduced the notion of 'mental accounting', which describes the

process whereby households and individuals exhibit multiple attitudes to risk. This entails compartmentalising financial assets such that assets set aside for different purposes are treated differently with respect to risk. Other common behavioural biases of investors which have been identified include regret avoidance (Bell 1982), ‘naïve’ diversification (Benartzi & Thaler 2001), overconfidence (which manifests itself in over-trading) (Barber & Odean 2000; Glaser & Weber 2007) and herding (Hong, Kubik & Stein 2005).

An important aspect of behavioural finance is the role of heuristics in decision-making, which describes the use of ‘rules of thumb’ by investors. Faced with complex decisions in uncertain environments, investors simplify the decision-making process according to rules of thumb (Tversky & Kahneman 1974). One of the more common heuristics is the representative heuristic, which describes the tendency of people to rely on the categorisation of events as typical or representative of that type of event (Kahneman & Tversky 1972). Another important heuristic is the availability heuristic, whereby investors rely on the ease of recalling a specific incident as an indication of the probability of such an incident repeating itself (Frieder 2004). The availability heuristic is closely related to the concept of recency bias, whereby investors place greater emphasis on recent events in framing their expectations of future events. For a comprehensive review of the literature associated with behavioural economics, including discussions regarding concepts such as overconfidence, the endowment effect, framing and choice confusion, see DellaVigna (2009).

2.4.3 Risk Aversion

As the investment transactions of SMSFs are a function of the decisions of SMSF trustees, the concept of risk aversion plays an important role in shaping the decision-making process of SMSF trustees. With respect to investor behaviour, risk aversion describes an individual’s preference for a lower return with a relatively known probability as compared to a higher return with an uncertain probability. Seminal work by Pratt (1964) and Arrow (1965) established the existence of both relative and absolute risk aversion. Relative risk aversion describes an investor’s willingness to accept risk based on a percentage of wealth, while absolute risk

aversion describes the amount of wealth an investor is willing to expose to risk as wealth changes. While some have argued otherwise, it is generally accepted that investors exhibit constant relative risk aversion and decreasing absolute risk aversion (Chiappori & Paiella 2011; Kihlstrom, Romer & Williams 1981), behaviour which would be expected to be replicated by SMSF trustees.

Given that SMSFs are commonly managed by trustees without the assistance of professional advice, it is possible that the investment decisions of trustees exhibit a number of the cognitive biases explained by behavioural finance (and indeed this is possibly the case even where trustees have sought professional advice). As yet SMSFs have not been comprehensively examined within the framework of behavioural finance, with the exception of work by Phillips (2007) and Phillips et al. (2007). This suggests an avenue for further research concerning SMSFs. This study addresses a number of the concepts of behavioural finance within the context of SMSFs, however a full analysis of the relationship between SMSF trustee investment decisions and behavioural finance is beyond the scope of the study.

2.5 Regulation

The regulatory regime which applies to any specific industry or sector plays an important role in setting out the structural framework within which the relevant industry participants must operate. There are a number of different regulatory regimes which can be implemented by policymakers, the selection of which depends on the aims of policymakers and the relevant industry and regulatory authority.

2.5.1 Rules, Risk and Principles-Based Regulation

In terms of the regulatory regime which applies to financial services in general, the regulatory system chosen by policymakers tends to be a varying mix of principles, risk or rules-based regulation (Black, Hopper & Band 2007; Black 2008; Peterson & Fensling 2011). Principles-based regulation relies less on detailed or prescriptive rules and more on broad or high-level guidance or principles which are intended to be followed by participants (Black, Hopper & Band 2007). Principles-based regulation has been viewed as allowing industry flexibility while encouraging

innovation and competition, however the global financial crisis of 2008 has led to questions regarding the effectiveness of such regulation, given that much of the financial sector in developed economies was subject to principles-based regulation (Black 2008).

Risk-based regulation focuses on prioritising the activities of regulators and making the most efficient use of available resources according to evidence-based assessments of risk. Regulators focus attention on those areas where the risk of a negative event is highest, according to a pre-determined measure of the event's likelihood and its severity (Peterson & Fensling 2011). Criticism of risk-based regulation has focused on the requirement for accurate measurement of risks, and the difficulty in validating whether or not the regulation was effective in regulating behaviour (Danielsson 2003; Peterson & Fensling 2011).

Rules-based regulation is generally viewed as the direct opposite to a principles-based regulatory system. Rules-based regulatory systems are implemented on the basis that principles-based systems may lead to situations where good faith judgments lead to differing outcomes for identical events or circumstance. In contrast, rules-based regulation is seen as being less 'grey', with greater clarity over allowable or forbidden actions (Benston, Bromwich & Wagenhofer 2006). One of the reasons commonly cited for favouring rules-based regulatory systems over principles-based systems is the increasingly litigious nature of modern economies. The downside of rules-based regulations however, is the propensity for it to lead to a 'tick-the-box' approach to compliance, where risks are perhaps not fully understood or investigated (Anand 2009).

The Australian SMSF sector, in line with much of the Australian financial sector, is subject to a mixed regulatory regime encompassing both rules and principles-based regulation (Bateman 2003). The usage of principles-based regulation within the SMSF sector has tended to focus largely on the investment selection processes of SMSFs, which is attractive to superannuants who seek flexibility in managing their retirement assets. Conversely however, the degree of flexibility allowed by principles-based regulation may also be responsible for some of the reported failings and abuses of SMSFs. While components of the SMSF sector

regulatory regime exhibit a principles-based approach, a proportion of the legislation adopts a rules-based approach. This includes rules governing trustee eligibility, the lodgement of SMSF accounts and documents, the treatment of in-house assets and procedural requirements for receiving and paying member contributions and withdrawals, as outlined in the *Superannuation Industry (Supervision) Act 1993* (Cwlth).

In general the rules-based components of superannuation legislation tend to focus more on the procedural aspects of SMSFs, while the investment related aspects of SMSFs are subject to principles-based regulation. This distinction between the two regulatory approaches is both a reason for the apparent popularity of SMSFs, yet also explains some of the instances of abuse and mismanagement of SMSFs which can occur. An important question that as yet remains unanswered, is the extent to which changes to the financial services regulatory regime, as a consequence of the 2008 global financial crisis, have impacted (or will impact) the SMSF sector. The predominate regulatory changes to the financial service sector since the crisis are encapsulated in the Future of Financial Advice bill (*Corporations Amendment (Future of Financial Advice) Act 2012*) and the reforms which form part of the federal government's Stronger Super program (Australian Treasury 2012). Given the short time frame that has elapsed since the implementation of these reforms, the precise impact on the SMSF sector is as yet unclear. This again suggests an avenue of further research related to the SMSF sector, although this too is beyond the scope of this study.

2.6 Investment Strategies and Theories

A SMSF is essentially a portfolio of investment assets which must be managed by fund trustees for the benefit of members. Although the size of SMSFs may differ from investment portfolios managed by institutions on behalf of their clients or members, the basic approach of maximising returns while minimising risk remains the same. In that regard, the different theories and approaches of portfolio management are highly relevant to the SMSF sector, as they offer trustees a number of alternative methodologies to follow in the management of SMSF assets.

2.6.1 Modern Portfolio Theory

One of the most well-known portfolio management theories available to SMSF trustees is Modern Portfolio Theory (MPT), which focuses on the use of diversification as a tool for maximising portfolio returns for a given level of risk. MPT is based on the principle that the level of risk of a portfolio can be lowered by taking into account the correlations between the assets which make up the portfolio (Markowitz 1952). Expected portfolio return for a given level of portfolio risk can be maximised by careful selection of the weightings of each available asset. Alternatively, the level of portfolio risk can be minimised for a given level of expected portfolio return. A number of extensions to MPT have been developed, however the classical calculation of the expected return of a portfolio can be expressed as:

$$\begin{aligned}\mu &= E[R] = \sum_{i=1}^n \mu_i x_i \\ \sigma^2 &= \text{Var}[R] = \sum_{i=1}^n \sum_{j=1}^n \sigma_{i,j} x_i x_j \\ \sum_{i=1}^n x_i &= 1 \\ x_i &\geq 0, i = 1, 2, \dots, n\end{aligned}$$

According to MPT, the set of all possible portfolio combinations (σ^2, μ) is the attainable set. An investor is then able to select that combination which provides his or her desired risk/return outcome, as long as reasonable values for μ_i and $\sigma_{i,j}$ can be obtained (Markowitz 1952). MPT has been subject to criticism that a number of the definitions and assumptions underpinning the theory are invalid (Vincent 2011; Resnik 2010). In particular, MPT's definition of risk, which focuses on the volatility of both the investments and the portfolio, has been criticised as being unrealistic (Vincent 2011). MPT treats all volatility as undesirable, whereas volatility which results in increasing asset values would be welcomed by SMSF trustees. MPT has also been criticised for its reliance on historical data, which may not necessarily be an indication of the future behaviour of particular investments or asset classes (Vincent 2011). Resnik (2010) argued that MPT failed investors during the global

financial crisis of 2008, where diversification based on the principles of MPT still resulted in significant losses to investors across most asset classes.

Despite the criticism of MPT, the theory continues to have a role in investment management, being extended to include aspects of behavioural finance (Curtis 2004; Davies & de Servigny 2012) and as the foundation for further development of theories of risk and return. For a review of MPT see Elton and Gruber (1997). While MPT does suffer from some limitations, it does offer SMSF trustees a framework for the management of their fund assets, although previous research has shown that the typical SMSF portfolio is most likely not optimised in terms of mean-variance analysis (Phillips, Cathcart & Teale 2007). Despite concerns regarding the assumptions underpinning MPT, further extensions to Markowitz's work have been published since 1952, most notably Sharpe's Capital Asset Pricing Model (CAPM), which focused on the risk of an investment relative to the overall market (Sharpe 1964). The CAPM itself has been criticised, relying as it does on its close relationship to MPT and with considerable empirical evidence of the real-world failure of the CAPM (Bornholt 2013; Brown & Walter 2013; Dempsey 2013; Roll 1977; Fama & French 1992, 1993). In any event it is unlikely that many SMSF trustees would be familiar with the CAPM and therefore be in a position to apply the principles of the CAPM in their investment approach.

2.6.2 Arbitrage Pricing Theory and the Efficient Market Hypothesis

An alternative investment theory which SMSF trustees may choose to adopt is Arbitrage Pricing Theory (APT), which involves determining the expected return of an asset using a linear equation which takes into account a number of different macro-economic factors, ranging from interest rates and currency levels to changes in inflation (Roll & Ross 1984; Ross 1976). Similar to MPT, APT is based on the premise that an asset's covariance with other assets is more important than the volatility of the asset itself – how the price of the asset moves in relation to other assets matters more for portfolio construction than the magnitude of the asset's own price movements (Shanken 1982). Taking into account asset covariance and a number of macro-economic factors, investors are able to use APT to construct portfolios with the highest expected rate of return. A criticism regarding APT

concerns the choice of macro-economic factors - different researchers have proposed the use of differing factors; this introduces an element of subjectivity into the application of APT (Roll & Ross 1984). As yet there is no evidence that a significant proportion of SMSFs utilise APT as a framework for the management of fund assets, possibly due to a lack of awareness of its existence or the difficulty in applying the theory in real world situations.

A potentially more useful investment theory, in terms of the approach adopted by SMSF trustees, is the Efficient Market Hypothesis (EMH). The EMH is based on the premise that current stock market prices reflect all information relating to the specific stock, which implies that it is not possible to achieve investment returns in excess of the market return on a risk-adjusted basis (Fama 1970). Fama outlined three variations of the EMH: weak - where current stock prices reflect past publicly-available information; semi-strong - where current stock prices reflect both current and past publicly known information; and strong - where prices reflect all public and private current and past information. Later work by Fama (1991) reviewed the literature associated with the EMH and made slight changes to the categorisation of the variations of the EMH, although the key principles of the EMH were retained. A more recent review of capital market efficiency by Valentine (2010) noted some of the well-known anomalies of the EMH, notably the Weekend Effect and the Monday Effect. Despite some doubts as to the empirical validity of the EMH, it holds appeal for those investors who believe that selecting individual investments or following investment theories such as MPT or APT will not lead to an outcome which is consistently superior, on a risk-adjusted basis, to holding the market portfolio. Such investors usually construct their investment approach around the use of low-cost exchange-traded index funds which aim to replicate a specific index (Malkiel 2005). Supporters of the EMH are also more likely to advocate the implementation of a 'buy and hold' investment strategy (Malkiel 2003a). Adoption of the EMH as an investment methodology offers SMSF investors a relatively straightforward approach to managing fund assets, and one which may also appeal to the 'do-it-yourself' nature of many SMSF trustees.

Whether or not SMSF trustees have adopted the EMH as a core investment theory may be evident through an analysis of the investment transactions of SMSF

trustees. By analysing the investment decisions of SMSF trustees over a given time period, it should be apparent whether trustees adopted a ‘buy and hold’ investment strategy as advocated by the EMH, or pursued a more active investment approach. Evidence of a tendency of SMSFs to follow ‘buy and hold’ strategies would confirm earlier findings by Phillips (2007), who also noted that a ‘buy and hold’ strategy, in conjunction with infrequent trading, has been shown to outperform more active investment management approaches.

2.7 The 2008 Global Financial Crisis and Trading Activity

Of relevance to this study is existing research which focuses on the trading behaviour of both individuals and institutions during financial crises, including the 2008 financial crisis. With respect to institutional trading decisions during the 2008 financial crisis, it has been found that institutional investors faced a significant increase in trading costs during the financial crisis, while liquidity decreased more sharply for smaller, more volatile stocks (Anand et al. 2011). The authors also found that institutions adjusted their trading toward more liquid stocks at the expense of less liquid stocks, possibly explaining the change in liquidity experienced by smaller, more volatile stocks. Researchers have also considered the role of equity funds (managed funds) in exaggerating the effects of the financial crisis, where it was found that funds with exposure to financial stocks during the crisis were subject to large investor redemptions, forcing those funds into asset fire-sales and thus propagating the effects of the crisis (Hau & Lai 2012). Similar research found that hedge funds were even more likely than equity funds to sell off their holdings during the crisis, thereby potentially amplifying the effects of the crisis (Ben-David, Franzoni & Moussawi 2011).

2.7.1 The Trading Patterns of Individual Investors

While the trading behaviour of institutional investors during the financial crisis is of some relevance, SMSF trustees more closely resemble the typical retail or individual investor, as compared to institutional investors, being as they are essentially ‘do-it-yourself’ funds. Tang et al. (2011) carried out a similar investigation to that of this study, focusing on the trading patterns of 401(k) plan

participants in the United States during the 2008 financial crisis. 401(k) plans bear many similarities to SMSFs, particularly with regards to allowing a substantial level of individual control over the investment of available funds. The authors considered the frequency of trading by 401(k) plan participants, finding that trading increased during the financial crisis. It was also found that participants exhibited a flight to safety as the crisis deepened, although this change was not significant enough to be viewed as panic trading by investors. The demographics of plan participants was also taken into account, showing that novice traders were more likely to trade than traders with greater experience and that female and lower-wealth participants were over-represented in the novice trader category. In a similar vein, a more recent study found that during the 2008 financial crisis Chinese investors increased their trading frequency (Kallberg, Liu & Wang 2012). The authors also found that the financial crisis tended to amplify the disposition effect; that is, during the crisis Chinese investors were more likely to sell their winners and hang on to their losers. It was also shown that investors tended to reduce the level of risk within their portfolios during the crisis. The authors concluded that the investor behaviour was consistent with two behavioural finance concepts; the disposition effect and loss aversion.

2.7.2 Trading Patterns, Investor Wealth and Asset Allocations

It is reasonable to expect that investor wealth has some bearing on the investment trading decisions of individual investors. Individuals with a greater level of wealth (particularly investable wealth) may be either more sophisticated in terms of investment awareness or experience than less well-off investors, or more likely to take greater investment risks. The issue of investor wealth and trading activity was considered by Yamaguchi (2006), who found that wealthier individual investors were likely to trade more frequently than their counterparts with less wealth, although it is not clear that this increased level of trading necessarily resulted in a greater level of exposure to investment risk. It is possible that this finding may be replicated with respect to SMSFs, with larger funds (taken as an indication of greater wealth) potentially making a greater number of investment transactions than smaller funds. It is not obvious however that larger SMSFs would be more active traders under all market conditions – for example, would larger SMSFs make a greater number of trades in both rising and falling markets? These questions form the basis of one of

the hypotheses to be addressed by this study, where the relationship between SMSF size and trading behaviour will be investigated under the premise that larger SMSFs exhibit more frequent trading activity than smaller SMSFs.

The relationship between 401(k) plan trading patterns and the asset allocation of each plan was explored by Mitchell et al. (2007), who found that investors who held index funds or lifecycle funds within their 401(k) plans were less likely to trade. The same study also found that investors holding international funds were also less likely to trade. This potential relationship between existing asset allocations and the level of trading activity forms the basis of one of the hypotheses to be addressed by this study, which is based on the premise that SMSFs with a higher allocation to equities are likely to trade more frequently. For example, it is possible that a higher allocation to equities may be an indication of a more sophisticated investment approach by a SMSF trustee, which would be likely to lead to more frequent trading activity. On the other hand, a less sophisticated investment strategy might be evidenced through a higher allocation to defensive assets, with a corresponding decrease in the expected level of trading activity.

2.7.3 The Financial Crisis and Changes in Investor Risk Appetites

One of the advantages of analysing investor behaviour over the period 2005 to 2011 is that it allows us to determine the impact of a period of acute financial stress on the risk appetites of investors. Standard investor risk profiling, as used by financial advisers, is based on the premise that an individual's risk profile is relatively stable, although it is likely to change over time as an individual grows older and approaches retirement. This approach ignores the potential impact on risk appetite of both rising and falling investment markets. Hoffman et al. (2011) considered the impact of the 2008 financial crisis on the risk tolerance and risk perception of investors, assessing how changes in tolerance and perception subsequently affect both investment performance and risk taking by investors. In general it was found that there was a significant increase in the level of investor trading activity, as also reported by Tang et al. (2011) and Kallberg et al. (2012). The authors concluded that the more successful investors during the crisis traded less during the period and also took on less risk and that this outperformance was linked

to the investor's lower risk tolerance and higher return expectations. However, it was also found that after the crisis the successful investors became more risk tolerant, were more likely to trade and therefore no longer outperformed relative to previously less-successful investors. It was hypothesised that perhaps the investors had become over-confident in their abilities and subsequently altered their investment strategy to their detriment, a behavioural bias previously outlined by Barber and Odean (2000).

The question of the level of risk taken by investors during the financial crisis, as outlined by Hoffman et al. (2011), has relevance to one of the questions to be answered by this study. That is, have SMSF trustee investment decisions become more conservative since the financial crisis? If the financial crisis had no lasting impact on the risk tolerance of SMSF trustees, an analysis on SMSF trustee investment decisions since stock markets bottomed in early 2009 should show an increase in market exposure by SMSFs as markets recovered. Whether or not this occurred will be evident through an analysis of SMSF trustee investment decisions over the period March 2009 to the end of 2011. This analysis forms the basis of testing one of the study's assumptions, which is that SMSFs have become more conservative in their investment decision-making since the financial crisis.

2.8 Conclusion

This chapter presented a review of the existing literature relevant to this study, focusing on the Australian superannuation system and the Self-Managed Superannuation sector in particular. Areas of literature which are relevant to this study include investor behaviour, regulation and investment strategies and theories. Key investment theories such as the Efficient Markets Hypothesis, Modern Portfolio Theory, the Capital Asset Pricing Model and newer concepts involving behavioural finance all have an impact, however minor, on the SMSF sector. The review has also identified a number of further areas for research which are not covered by this study, but present questions to be potentially addressed through further work. These include questions regarding the usefulness or otherwise of investment advice in relation to SMSFs; the prevalence of well-known investor biases amongst SMSF trustees and the impact of recent financial services sector reforms on the SMSF sector.

Given the size and scope of the SMSF sector, it would be expected that the sector had attracted a concomitant level of attention from researchers. A review of the literature focusing on the SMSF sector reveals this not to be the case. It may be that the heterogeneous nature of the sector is a partial cause of this phenomenon, given that there are over four hundred thousand individual SMSFs with no centralised or standardised reporting or record-keeping obligations, outside of annual taxation returns (Cooper Review 2010). This lack of centralised access to the investment transaction decisions of SMSF trustees potentially acts as a barrier to detailed analysis of the operation of SMSFs and the decision-making of SMSF trustees. The SMSF sector should, however, present a fertile field for academic research, given the relevancy of many topical investment theories and strategies to the SMSF sector. This study seeks to add to the relatively small body of literature concerning the SMSF sector, presenting as it does an analysis of the investment trading decisions of SMSF trustees over the period 2005 to 2011. The next chapter, Chapter 3, outlines the research questions and hypotheses to be addressed by the study and describes the data utilised in the analysis component of the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter outlined a number of the key theories of portfolio management theory and investor trading behaviour. The state of the Australian superannuation system, and more specifically the Self-Managed Superannuation sector, and the impact of the various theories of portfolio management on superannuation were also discussed. Despite the growing importance of SMSFs in Australian retirement planning, there has been relatively little attention paid to the investment decisions of SMSF trustees, who collectively are responsible for the management of over \$416 billion of assets (Australian Taxation Office 2012). This chapter outlines the research methodology adopted in this study of the investing and trading behaviour of SMSF trustees.

The purpose of this chapter is to identify and outline the research questions and hypotheses to be addressed by the study and to describe the data used for the analysis component of the study. Steps taken during the analysis of the data are also explained and any limitations which may apply to the data or to the analysis are outlined. Finally any ethical issues which are relevant to the study are considered. The chapter begins with an outline of the research objective and questions, which are an outcome of the theoretical discussions outlined in Chapter 2.

3.2 Research Questions and Hypotheses

The research objective of this study is to examine the trading behaviour of Australian Self-Managed Superannuation Funds within the context of the 2008 global financial crisis. In consideration of the research objective, the research question may therefore be summarised as follows:

Is there evidence that Australian Self-Managed Superannuation Funds employed ideal investment strategies leading up to, during and after the 2008 global financial crisis?

In the context of the study, ‘ideal investment strategies’ are defined as the implementation of investment strategies which resulted in an increased allocation to cash and other defensive assets as markets rose prior to the financial crisis and an increasing exposure to assets with a higher level of market risk during the period immediately prior to March 2009 when stock markets bottomed. It is likely that such a strategy of prudently reducing exposure to market risk assets as stock markets peaked and then increasing market risk exposure as stock markets neared their lows in early 2009 would have resulted in superior risk-adjusted investment returns.

Following on from the primary research question, a number of secondary research questions were developed. These questions focused on specific areas of investigation of the study, as follows:

1. Did SMSFs increase their exposure to cash and other defensive investments in the period leading up to the global financial crisis?
2. Did SMSFs increase their exposure to market risk assets as stock markets bottomed and recovered in 2009?
3. Have SMSFs become more conservative in their investment approach since the global financial crisis?
4. Did larger or less risk-averse SMSFs behave differently as compared to smaller or more conservative SMSFs over the course of the global financial crisis?

A number of hypotheses were developed in order to address the identified research questions. The null hypothesis was used in testing these hypotheses. That is, the hypotheses to be investigated are based on the expectation that SMSFs did not employ the ideal investment strategies leading up to, during and after the financial

crisis, and that there was no difference in trading behaviour based on fund size or risk profile. The hypotheses are:

Hypothesis 1: There was no significant difference in the cash allocations of SMSFs between the years leading up to the global financial crisis.

Hypothesis 2: There was no significant difference in the exposure to riskier assets by SMSFs between the years leading up to the global financial crisis and as stock markets bottomed in 2009.

Hypothesis 3: There was no significant difference in the exposure to riskier assets by SMSFs between the periods prior to and following the global financial crisis.

Hypothesis 4: There are no significant differences between the trading behaviour of large SMSFs and small SMSFs during the period 2005 to 2011.

Hypothesis 5: There are no significant differences between the trading behaviour of risk-seeking and risk-averse SMSFs during the period 2005 to 2011.

Hypotheses 1, 2 and 3 focus on the specific actions taken by SMSF trustees prior to, during and after the global financial crisis. Hypotheses 4 and 5 examine more general behaviours of SMSFs, in particular whether or not specific characteristics of SMSFs such as size or asset allocation are relevant with regards to the trading behaviour of SMSFs over the time period 2005 to 2011.

3.3 Research Design

The question of research philosophy plays an important role in the research design and in the approach taken in data collection. In terms of the paradigm adopted by this study, it most closely falls within a functionalist paradigm, which is problem oriented in approach (Saunders, Lewis & Thornhill 2009). The study adopts a quantitative approach to an investigation of the various attributes of SMSFs; seeking out rational explanations for SMSF trustee decisions and behaviour and identifying

potential opportunities for policymakers to improve the ability of the SMSF sector to meet fund member needs.

The study primarily follows a deductive approach, although some aspects of the study may also be seen as inductive in nature. A substantial component of the study meets a number of the characteristics which define the deductive approach (Saunders, Lewis & Thornhill 2009). Firstly, causal relationships between variables are identified; for example, was an over-weight cash position in SMSFs brought about by deliberate actions by trustees or was it simply a reflection of an unsophisticated investment strategy? Secondly, the researcher is independent of what is being observed. That is, the research is based on the analysis of existing historical SMSF investment data, ensuring researcher independence. Thirdly, concepts will be operationalised. In this regard SMSF asset weightings, investment decisions and other concepts are defined such that they can be measured quantitatively. Finally, generalisations will be made. That is, findings and conclusions are based on an analysis of a sample of SMSFs, allowing for generalisations of the wider SMSF sector. Some components of the study however, will be more suited to an inductive approach, as outlined by Egan (2002). For example, in assessing the impact of the 2008 financial crisis on the asset allocation decisions of SMSFs, the research begins with observations regarding the change in asset allocations, progresses to the detection of specific patterns in SMSF allocation decisions, formulates one or more tentative hypotheses which can be explored and culminates in drawing general conclusions or hypotheses regarding the impact of the 2008 financial crisis on SMSF asset allocation decisions.

In regards to the type of research undertaken, this study is most closely identified as being explanatory research, where causal relationships between a number of the different variables under consideration are explored (Saunders, Lewis & Thornhill 2009). The research strategy is primarily one of archival research, based on the historical data of a sample of SMSFs, utilising quantitative analysis techniques. An important feature of this study is that it is longitudinal in nature. Previous research into the SMSF sector has largely been cross-sectional in nature, focusing on the sector at a point in time, be it the current regulatory regime or current SMSF microstructure or industry macrostructure. In comparison, this study outlines

changes in the composition of a sample of SMSFs and the changing investment decisions of the funds over a period of time. This will allow for a discussion of the various factors which influence individual SMSFs and the industry as a whole under differing market and economic conditions.

3.4 SMSF Sample Data

The study is based on the quantitative analysis of a sample of Australian SMSFs. The sample consists of two primary data sets: the investment transactions of a number of SMSFs over the period 1 January 2005 to 31 December 2011, and the asset allocation of the same SMSFs as at the end of each quarter over the same time period. One of the advantages of using the SMSF sample data is that it is primary data and is thus not susceptible to some of the disadvantages of using secondary data, such as reliability, validity and measurement bias (Saunders, Lewis & Thornhill 2009). The discrepancies that can arise when using multiple secondary data sources were also outlined by Deininger and Squire (1996) and Atkinson and Brandolini (2001). The accuracy of the primary data which forms the SMSF sample data is important, however it can be expected that such data is accurate, being that it forms the basis of SMSF tax reporting obligations.

The SMSF sample data was provided by a number of financial services firms involved in the administration and management of SMSFs, with around 180 individual SMSFs initially included in the sample. The financial services firms were based in Queensland and New South Wales. A number of other organisations and institutions were approached regarding participation in the study, however time and resources constraints and perceived privacy concerns were cited as reasons for precluding their participation in the study. Due to the inability of other organisations to participate, the sample cannot be said to be random. The sample data will likely have a bias to the geographical location of the participating financial services firms, in addition to a socio-economic bias to the typical type of client serviced by each firm. Due to the nature of the subject matter, a truly random representative sample would not be possible without access to the investment transaction and asset allocation data relating to all SMSFs over the period 2005 to 2011. Such access would not be possible due to the nature of the SMSF industry, specifically the

absence of a centralised data repository. This issue is discussed in further detail below.

The sample is drawn from a wider population of approximately 278,244 SMSFs as at June 2004 (Australian Taxation Office 2009). While the size of the proposed sample is relatively small when compared to the size of the general population of SMSFs, the sample will be large enough to draw generalisations as to the characteristics and nature of the general population of SMSFs. Taking into account the size of the general population of SMSFs, the number of funds needed to provide a more representative sample can be calculated using the formula published by the American National Education Association (Krejcie & Morgan 1970). This formula can be used where the population size is known, as is the case with the SMSF sector in 2004-05. The formula is outlined below:

$$s = X^2NP(1 - P) \div d^2(N - 1) + X^2P(1 - P)$$

Where:

s = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level

N = the population size

P = the population proportion (assumed to be .50)

d = the degree of accuracy expressed as a proportion (.05)

Based on a population size of 278,244 SMSFs in 2004 and a chi-square value of 3.841 (representing a 95% confidence level), the ideal sample size can be calculated as 384 SMSFs. This is a larger sample size than that used in this study. While a larger sample would be preferable, working with an overly large sample of SMSFs would be impractical as SMSF data is held across multiple information technology systems across multiple organisations, without consistent or mandated record-keeping systems, making data aggregation for many funds unfeasible given the time and resource constraints of the study. The only current source of aggregated data regarding SMSFs is the information reported to the Australian Taxation Office by SMSF trustees on an annual basis as part of their annual taxation obligations.

However, this information would not include transaction data and access to the data is restricted. Furthermore, each individual SMSF may potentially generate hundreds of individual transactions per year and each transaction must be tracked and taken into account in analysing asset allocation or selection. An analysis of a large sample of SMSFs in this manner would likely require a time commitment beyond the scope of this study. As a result of these factors the study makes use of convenience sampling, which entails selection of the most easily available data, in this case the data provided by those firms which agreed to participate in the study. Such an approach involves less time, cost and resources than other sampling techniques, however it is likely that the data resulting from such a sample will be less robust than that provided by other approaches such as surveys or random sampling techniques (Marshall 1996).

3.4.1 The SMSF Sample in Detail

The initial SMSF sample contained the details of 180 SMSFs which had been in existence over the period 2005 to 2011. The data was made available in spreadsheet format, with each SMSF assigned a unique fund identifier. The data relevant to each fund was contained within 29 individual spreadsheets. Sheet 1 contained a list of all the investment transactions for a specific fund from 1 January 2005 to 31 December 2011. Sheets 2 to 29 contained quarterly ‘snapshots’ of the contents of each fund as at the end of each quarter beginning 1 January 2005. This included the contents of each fund as at 1 January 2005, which marked the starting asset allocations for each fund. The funds differed in size, with the smallest fund holding assets worth \$8,217 as at 1 January 2005, while the largest fund at the same time held total assets of \$2,124,200. The data was held on a number of commercially available portfolio administration software packages which allowed for the recording of investment transactions and bank account movements within each fund. The investment transactions and quarterly contents of each fund from 2005 to 2011 was the only data made available for the study.

The fund data was anonymous and did not disclose any fund-specific data beyond the investment transactions and allocations. Data regarding each fund which was not made available included the name of the fund; its domicile; any demographic

details regarding the fund trustees or members; the fund's investment strategy; the risk profile of the fund trustees and the age of the fund or the extent to which the fund's investment decisions were the result of third-party advice. The issue of the scope or use of third-party advice by the sample SMSFs is particularly relevant given the primary focus of the study into the investment decisions of SMSFs. The financial services firms which provided the data indicated that financial advice was provided to fund trustees where requested, however in all cases the fund trustees were at liberty to accept or reject any such advice, and all final investment decisions rested solely with the fund trustees.

While it is reasonable to conclude that some of the investment decisions made by fund trustees and subsequently included in the study were the result of advice provided by third-parties such as stockbrokers or financial advisors, this does not necessarily render any such data unusable with respect to the study. SMSF trustees likely base their investment decisions on information provided by a number of different sources, be they professional advisers or brokers, newsletters and the internet or other forms of media. The investment transactions of each SMSF are ultimately the sole responsibility of the fund trustees, regardless of how these investment decisions are reached by the fund trustees. As the study seeks to assess the investment decisions of fund trustees over time, the source or sources of such decisions do not detract from any conclusions drawn from the analysis.

3.4.1.1 Sample transaction data in detail

The SMSF transaction data was initially drawn from 180 individual SMSFs. Of this dataset a number funds were excluded as they were either opened or closed during the period under investigation, therefore failing to meet a key criterion for inclusion in the study. This left 93 SMSFs which had existed for the full period from 1 January 2005 to 31 December 2011. The total number of investment transactions carried out by these SMSFs amounted to 24,651 transactions; however a number of these transactions were conducted prior to 1 January 2005 or after the period 31 December 2011. After these transactions were excluded, the total number of SMSF transactions amounted to 22,570 and comprised of nine distinct transaction types. The nine different types of transactions carried out by the sample SMSFs included

asset sales and purchases, investment conversions, capital returns and interest reinvestment. The total number of each transaction type is shown in Table 3.1.

Table 3.1 List of investment transaction types in SMSF sample data

Transaction type	Number of transactions
Call for payment	135
Capital return	8,250
Conversion purchase	758
Conversion sale	638
Dormant sale	33
Purchase	7,754
Purchase (DRP)	872
Restructure of units	70
Sale	4,060
Total transactions	22,570

Of the total investment transactions contained within the SMSF sample data, the most frequent transaction type was an investment purchase. ‘Call for payment’ was a specific transaction type where the SMSF trustee had purchased an investment where a subsequent payment at a later date was required to effect full ownership. A ‘capital return’ describes a transaction where a payment to an investor includes a capital component, thus reducing the investment purchase price by the amount of the capital return. ‘Conversion purchase’ and ‘conversion sale’ related to the acquisition or sale of investments due to corporate activity. For example, a share issue consolidation would result in the ‘conversion sale’ of the original investment and the ‘conversion purchase’ of the new number of securities in the holding undergoing the share consolidation. A ‘dormant sale’ was the effective sale of a holding where it was deemed that the securities held no economic value, usually in the case of bankruptcy of a listed company. ‘Purchase (DRP)’ signified the acquisition of an investment through a dividend reinvestment process. ‘Restructure of units’ described the process where additional units were issued to security-holders, usually through the use of bonus share issues or similar.

Of the nine investment transaction types, capital returns, conversion purchases and conversion sales were excluded from further analysis as these transaction types only affected the cost base or the number of units held by the

SMSF. Dormant sales were also excluded, as this type of transaction was not a willing sale of an investment by the SMSF trustee, but merely reflected the bankruptcy and eventual delisting of an investment. Any transaction types identified as restructuring of units were also excluded, as this transaction also simply resulted in a change to the number of units held in a specific investment by the SMSF. Any investment transactions which resulted in cash being transferred or utilised to invest in other cash investments were also excluded from the analysis. For example, the transfer of cash from an at-call savings account to a higher-yielding bank account would be excluded from the analysis. The reason for this distinction is that the study investigates whether SMSF trustees were making aggressive or defensive investment choices at the appropriate time and transferring cash from one account to another is essentially a shift from one defensive asset to another and would not have any bearing on the overall risk profile of the portfolio. Once the excluded transactions were removed from the SMSF sample data, 10,459 eligible transactions were included in the analysis. This is shown in Table 3.2. Of the 10,459 eligible investment transactions, 3,485, or 33.32% of the transactions involved the sale of an investment, with 6,974 or 66.68% of the transactions involving the purchase of an investment.

Table 3.2 Eligible SMSF investment transactions within the sample data

Transaction type	Action	Number of transactions
Call for payment	Purchase	111
Purchase	Purchase	6121
Purchase (DRP)	Purchase	742
Sale	Sale	3485
Total transactions		10,459

The 10,459 investment transactions covered 484 discrete investments. These included cash, listed equities, listed corporate bonds and hybrid securities, managed funds and instalment warrants. Each investment type was designated as either ‘aggressive’ or ‘defensive’ in nature. For example, listed equities are aggressive investments, in that purchasing equities with cash leads to a relative increase in risk; while selling equities for cash would lead to a corresponding relative reduction in risk. Corporate bonds however are classified as defensive investments, as investing in bonds is seen as a reduction in the risk of capital loss. In the context of the study

risk is defined as the risk of loss of the invested capital. In this regard, listed equities present a greater risk of loss than cash or corporate bonds for example. While this distinction ignores other types of risk, such as credit risk, interest rate risk, price volatility or liquidity risk, such a definition of risk is sufficient for the purposes of the study. Classifying each investment as either aggressive or defensive makes it possible to track the flow of money into or out of each investment type, thereby illustrating the investment decision-making outcomes of SMSF trustees. The breakdown between transactions involving defensive or aggressive assets is summarised in Table 3.3.

Table 3.3 Summary of eligible transaction types

Transaction type	Number of transactions
Aggressive (AGG) transactions	7,248
Defensive (DEF) transactions	3,211
Total	10,459
Transaction type	Dollar value (\$)
Total dollar value of AGG transactions	71,251,315.01
Total dollar value of DEF transactions	84,856,891.46
Total	156,108,206.47

As shown in Table 3.3, transactions involving aggressive investments outweighed those involving defensive assets by a substantial margin. Note that this does not mean that SMSFs were taking on risk in the same proportions, as it is the direction of the transaction which is important. In terms of the dollar value of the transactions, more funds were allocated to defensive transactions, though again it is the direction of the flow funds which matters, not simply the overall total.

3.4.1.2 Sample fund contents data in detail

The data relating to the contents of each SMSF consisted of a list of the investments held by each fund at quarterly intervals over the period 1 January 2005 to 31 December 2011. As with the investment transaction data, the quarterly investment holdings of 93 SMSFs were included in the analysis. The first quarterly period was 31 March 2005 and the final quarterly period was 31 December 2011, covering 28 end-of-period listings of each SMSF. Across the sample of SMSF holdings there were 509 individual assets, ranging from cash to listed equities and

direct residential and commercial property. This differs from the 484 investments identified in the SMSF transaction data as the funds already held existing assets at the start of the time period under investigation. To facilitate the analysis each individual asset was classified into one of five primary asset classes. The number of investments held within each asset class is shown in Table 3.4.

Table 3.4 Asset classes within quarterly SMSF contents data

Asset class	Number of investments
Equity	256
Fixed interest	209
Property	38
Cash	5
Other	1
Total	509

As shown in Table 3.4, the most common asset type held within the SMSF sample was equities, with fixed interest investments being slightly less popular. Property investments made up less than 8% of the total number of assets and comprised both listed and unlisted property assets. Five different assets were identified which qualified as cash – this included savings accounts, cash management accounts and online-only accounts. The ‘Other’ asset class was an investment in a gold exchange traded fund. Within the SMSF sample, total assets at the end of the first quarter in 2005 (31 March 2005) amounted to \$41,703,856. Total assets peaked in the third quarter of 2007 (30 September 2007) at \$73,350,860 while the lowest level of total assets was also 31 March 2005. The level of assets within the sample at the end of each quarter is shown in Table 3.5.

Table 3.5 Total SMSF sample assets at the end of each quarter

Quarter-ending	Total assets within SMSF sample (\$)
31 Mar 2005	41,703,856
30 Jun 2005	44,450,479
30 Sep 2005	49,027,276
31 Dec 2005	50,869,819
31 Mar 2006	52,985,569
30 Jun 2006	53,855,852
30 Sep 2006	56,592,984
31 Dec 2006	61,561,394
31 Mar 2007	63,277,827
30 Jun 2007	71,436,868
30 Sep 2007	73,350,860
31 Dec 2007	70,000,081
31 Mar 2008	63,058,152
30 Jun 2008	61,477,946
30 Sep 2008	60,665,541
31 Dec 2008	54,112,071
31 Mar 2009	54,131,895
30 Jun 2009	56,824,644
30 Sep 2009	63,869,604
31 Dec 2009	66,582,567
31 Mar 2010	66,183,786
30 Jun 2010	62,723,400
30 Sep 2010	65,124,607
31 Dec 2010	66,186,359
31 Mar 2011	66,597,415
30 Jun 2011	65,708,981
30 Sep 2011	62,322,550
31 Dec 2011	63,586,536

While the change in the level of assets within the SMSF sample can be expected to reflect changes in market values and the values of other investments held within the sample, superannuation contributions and withdrawals by fund members would also have had an impact on the level of assets at the end of each quarter. These withdrawals and contributions are included in the data in Table 3.5, however it is likely that any such transactions within the SMSF sample would comprise only a relatively minor portion of any change in the total assets within the sample and would be outweighed by market movements and investment transactions over each

quarter. The quarterly totals for the primary asset classes of cash, equities, property and fixed interest within the SMSF sample are shown in Table 3.6.

Table 3.6 Quarterly totals of individual asset classes within the SMSF data

Year	Qtr.	Cash (\$)	Equity (\$)	Property (\$)	Fixed interest (\$)
2005	1	2,715,852	22,484,898	3,593,243	12,903,848
2005	2	3,609,860	24,146,284	3,786,362	12,921,790
2005	3	4,865,129	27,861,653	3,222,359	13,089,078
2005	4	4,762,731	29,005,510	3,214,201	13,852,374
2006	1	3,757,538	31,162,563	3,506,699	14,597,876
2006	2	3,810,518	31,463,149	3,632,134	14,951,222
2006	3	4,843,981	33,039,041	3,953,076	14,778,689
2006	4	4,293,704	36,415,850	4,219,400	16,601,520
2007	1	4,191,428	38,287,462	4,473,095	16,335,796
2007	2	7,543,999	40,516,786	6,156,959	17,228,865
2007	3	5,368,785	42,486,631	6,303,783	19,209,981
2007	4	4,031,295	41,077,277	6,923,053	18,039,718
2008	1	3,598,319	35,634,869	6,778,590	17,066,003
2008	2	5,287,808	34,015,918	6,690,105	15,468,301
2008	3	5,023,424	33,053,427	6,738,809	15,852,506
2008	4	8,120,194	28,531,326	6,039,243	11,423,121
2009	1	7,930,474	29,020,846	5,771,084	11,318,666
2009	2	7,248,608	31,010,663	5,748,724	12,722,762
2009	3	6,340,170	37,315,647	5,754,968	14,200,017
2009	4	5,675,402	39,851,356	5,963,831	15,058,161
2010	1	5,162,936	39,959,366	5,940,869	14,985,556
2010	2	5,084,886	36,499,163	6,238,102	14,790,525
2010	3	6,211,889	37,966,869	6,293,173	14,541,972
2010	4	6,108,977	39,167,564	6,425,400	14,387,288
2011	1	6,966,016	38,029,889	6,543,060	14,942,571
2011	2	6,515,401	38,746,663	5,465,330	14,358,119
2011	3	5,758,776	35,335,693	5,484,227	15,150,333
2011	4	5,683,028	36,470,072	5,427,975	15,978,223

Information regarding the contents of each SMSF at quarterly intervals makes it possible to identify and track changes in the asset allocations of the funds within the sample. While this provides similar information to the SMSF transaction data, the fund contents data presents a more complete picture of the exposure of funds within the sample at specific points in time. On the other hand the SMSF investment transaction data allows us to investigate the decision-making of SMSF trustees over a

specific time period, which subsequently has an impact on the contents of the funds within the sample at specific points in time. Taken together the two data sources present a complete picture of the trading behaviour of SMSF trustees over the time period under consideration, and how this trading behaviour was both related to and impacted on the asset allocations of funds within the SMSF sample.

3.5 Preparation of the Data

The first step in the preparation of the SMSF sample data was to remove any data which related to SMSFs that had not been in existence for the full period from 1 January 2005 to 31 December 2011. Following this, the various investments and transaction types were identified as being either ‘aggressive’ or ‘defensive’, as outlined in section 3.4.1.2. Cash, fixed-interest and property investments were classified as defensive investments, with equity investments classified as aggressive investments (and any associated transactions). In order to allow for analysis of the data a number of variables were identified. These variables form the basis of the statistical analysis component of the study and relate to the number and type of transactions carried out by SMSFs in the sample. The variables were defined as per Table 3.7.

Table 3.7 Definition of variables used in the analysis

Variable	Definition
COUNT	The number of investment transactions in a given time period
COUNT_AGGBUYS	The number of times an ‘aggressive’ investment purchase was made in a given time period
COUNT_AGGSALES	The number of times an ‘aggressive’ investment was sold in a given time period
VALUE_AGGBUYS	The dollar value of ‘aggressive’ investments purchased in a given time period
VALUE_AGGSALES	The dollar value of ‘aggressive’ investments sold in a given time period
COUNT_DEFBUYS	The number of times a ‘defensive’ investment purchase was made in a given time period
COUNT_DEFSALES	The number of times a ‘defensive’ investment was sold in a given time period
VALUE_DEFBUYS	The dollar value of ‘defensive’ investments purchased in a given time period
VALUE_DEFSALES	The dollar value of ‘defensive’ investments sold in a given time period
NET_FLOWDEF	The dollar value of shares sold in a given time period, less the dollar value of shares purchased in a given time period. In effect $NETFLOW_DEF = VALUE_AGGSALES - VALUE_AGGBUYS$
TRADE_VALUE	The total dollar value of all investment types purchased or sold in a given time period

With the exception of NETFLOW_DEF, the variables are numerical measures of the number or dollar value of different investment transactions carried out by the fund trustees over a specified time period. NETFLOW_DEF differs in that it allows us to determine the net flow of funds into defensive assets for a given time period. By subtracting the dollar value of shares purchased from the dollar value of shares sold for a given period of time, we are able to determine whether or not that

time period represented a shift into defensive or aggressive assets. If NETFLOW_DEF is a positive value, then on an overall basis money was moved from aggressive assets to defensive assets for that given time period and vice versa when NETFLOW_DEF is a negative value. For the purposes of the study it is assumed that a share sale represents a shift into defensive assets, while a share purchase represents a shift into risky assets. By observing the changes in the net flow into defensive assets it is possible to conclude whether or not SMSFs were increasing defensive exposure in the period leading up to the financial crisis; the investment response of SMSF trustees during the actual financial crisis; and whether or not there was any change in trustee investment decisions after the financial crisis.

The variables listed in Table 3.7 were calculated according to four different criteria. This was done firstly on a monthly basis over the period January 2005 to December 2011. For each month the number and dollar value of aggressive and defensive investment transactions was determined and allocated to each variable accordingly. The period 1 January 2005 to 31 December 2011 was also split into three distinct periods in order to allow for an analysis of transactions prior to, during and after the global financial crisis. Period 1 was from 1 January 2005 to 30 June 2008 and is considered to represent that period of time *prior to* the financial crisis. Period 2 covers from 1 July 2008 to 30 June 2009 and represents the time period *during* the financial crisis, while Period 3 runs from 1 July 2009 to 31 December 2011 and represents the period *after* the financial crisis. The variables were also calculated according to fund size and asset allocation. With regards to fund size, each fund in the sample was grouped as being small (less than \$350,000 in assets), average (more than \$350,000 in assets but less than \$750,000 in assets) or large (greater than \$750,000 in assets) as at 1 January 2005. This grouping is based on information provided by the Australian Taxation Office which showed that the average SMSF size in 2005 was \$560,519 (Australian Taxation Office 2009). Any fund in the sample which was within a range of \$200,000 more or less than the actual average fund size of \$560,519 was included in the 'average' group. The average size of the 24 funds within this group was \$501,690, which closely matched the actual reported average fund size. One hundred and ten funds were included in this data as any comparative analysis would be done on an annual basis which meant that funds

which opened or closed during the course of the year could still be included. The grouping of funds within the sample by size is shown in Table 3.8.

Table 3.8 Sample funds grouped according to size as at 1 Jan 2005

Group	No. of funds	Average Size (\$)	Total assets (\$)
Large	17	1,174,910	19,973,474
Average	24	501,690	12,040,555
Small	69	144,904	9,998,378
Total	110	1,821,504	42,012,407

The funds within the sample were also grouped according to their asset allocation. For the purposes of grouping funds by asset allocation, three categories of funds were identified. These were ‘aggressive’ (where equities comprised greater than 60% of assets), ‘moderate’ (where equities comprised less than 60% of assets but greater than 50%) and ‘defensive’ (where equities comprised less than 50% of assets). These groupings were based on the asset allocations of each SMSF within the sample as at 1 January 2005. This categorisation system was designed to ensure sufficient fund representation in all risk profile groups.

It is worth noting that no definitive risk categorisation system exists, with various fund managers, superannuation funds and research organisations each having their own set of categorisation criteria. For example, research company Morningstar classifies defensive funds as holding less than 50% equities; moderate funds as holding 50% to 70% in equities and aggressive funds as holding 70% to 90% in equities (Morningstar 2014). This quite closely matches the categorisation system utilised in this study. On this basis the risk profile categorisation system developed for the study is considered to be sufficient for the purposes of categorising SMSFs based on their tolerance for risk. As the initial asset allocation of each fund was used to determine its risk profile, only SMSFs which were in existence at 1 January 2005 were included in the grouping, which numbered 93 funds. Details of the grouping of the funds by asset allocation are shown in Table 3.9.

Table 3.9 Sample funds grouped according to asset allocation as at 1 Jan 2005

Group	Percentage of assets in equities	Average equities allocation (%)	Average value of SMSF (\$)	No. of funds
Aggressive funds	> 60%	74.93	447,578	33
Moderate funds	≤ 60% ≥ 50%	55.27	465,408	30
Defensive funds	< 50%	34.79	454,720	30
Total				93

The variables outlined in Table 3.7 were not amended in order to account for the impact of inflation or market movements (i.e. changes in the values of market-linked investments due to stock market falls or rises). This decision was made for two reasons. Firstly, to strip out the impact of both inflation and market movements for each asset held within every fund within the sample would require accurately determining the effect of inflation and market movements on each asset, a very difficult and time-consuming task, and one beyond the time and resource constraints imposed on the project. Secondly, the inclusion of variables which are based on the frequency of investment transactions, as opposed to the dollar value of transactions, to a certain extent removes the impact of inflation and market movements.

Using SAS 9.2 for Windows statistical software, the variables were tested for significant differences between each year from 2005 to 2011 and between the three defined time periods which cover the periods prior to, during and after the financial crisis. Firstly ANOVA was performed for each variable and based on the results of that analysis tests for significant differences within each variable were conducted using Fisher's Least Significant Difference (LSD) test. Fisher's LSD test is known to minimise Type II errors, but with a corresponding potential increase in the number of Type I errors (Williams & Abdi 2010). Fisher's LSD test can be considered to be less conservative than other statistical approaches, however the accuracy of the test is considered sufficient for the purposes of the study. The tests of significance allow the

study to address the five hypotheses which form the basis of the study as outlined in section 3.2. The results of the analysis of the data are presented in Chapters 4, 5, and 6.

3.6 Ethical Considerations

The ethical considerations of research cover a range of issues which must be taken into account in all stages of the research process. These stages include the planning, execution and reporting of the research (Spata 2003). As part of this process responsibility falls on the researcher to ensure that the outcomes from the research are not intentionally misleading; that the welfare of any participants in the research process is protected; that any relevant local, state or federal laws are complied with; that data used in the research is correctly reported and that any relevant institutions have given their approval for the research to proceed.

One of the key ethical issues in research is that of consent (Fouka & Mantzourou 2011). As this study entails the use of anonymous data, informed consent of the trustees or members included in the study was not required. That is, the SMSF sample data was provided in electronic format with no means to identify the geographical location or names and contact details of the SMSF trustees and members. In addition, no other demographic information relating to the SMSFs was included within the data made available for the study, such as the age of the members and trustees, their marital status, their employment status or any other identifying information. As issues such as consent, privacy and confidentiality were not relevant to the study, key ethical considerations for the study focused on ensuring the accurate presentation of the data and results of the research.

3.6 Summary

This chapter described and discussed the research methodology used in this study and outlined the research question and hypotheses to be addressed by the study. The SMSF sample data was described and the key features of the data were summarised. While the sample size is acknowledged as being smaller than the ideal sample size based on work by Krejcie and Morgan (1970), the nature of the SMSF industry means that working with a larger sample size was not feasible. Any

conclusions drawn by the study will therefore need to be made with regard to limitations of the sample size. A number of variables relating to the investment actions of SMSF trustees were also defined. These variables form the basis of the quantitative analysis component of the study and provide the ability to quantitatively measure changes in the trading behaviour of SMSFs within the sample over the identified time period. This gives rise to an important characteristic of the study, which is the longitudinal nature of the study. Key ethical considerations relating to the study were also discussed, although the nature of the study means that key concerns focus largely on the accurate presentation and analysis of the data.

The next chapter, Chapter 4, presents the results of the analysis of the SMSF sample data across the period 2005 to 2011.

CHAPTER 4

RESULTS: TRADING BEHAVIOUR 2005 TO 2011

4.1 Introduction

The previous chapter outlined the research methodology adopted by this study and the research questions and hypotheses to be addressed through this study. The chapter also described the data which forms the analysis component of this study. This chapter presents the results of the analysis of the data, focusing on the trading behaviour of SMSFs over the period 2005 to 2011, which addresses the question of whether or not SMSF trustees changed their investing behaviour over the period prior to, during and after the global financial crisis. The results of the analysis of SMSF transaction data on the basis of fund size and risk profile over the same period are presented in Chapters 5 and 6 respectively. Chapter 7 discusses the results of the analysis with regards to addressing the research questions outlined in Chapter 3.

The variables analysed in this portion of the study cover the frequency and value of SMSF trading activities, the actions of SMSF trustees to increase or decrease aggressive or defensive investment exposure respectively, and the net flow of funds into defensive assets for SMSFs within the sample. The intention is to present a complete picture of SMSF trading activity over the period 2005 to 2011, both on an annual basis and on a 'per period' basis. Generally only those cases where statistically significant differences in SMSF trading behaviour were found will be discussed within the text, although the full table of results for each variable are presented for sake of completeness.

4.2 SMSF Trustee Trading Behaviour from 2005 to 2011

In order to determine whether or not SMSF trustees made ideal investment decisions over the period 2005 to 2011, analysis of variance was used to determine

whether the type of trading behaviour exhibited a statistically significant difference from one period to the next. This was done initially on an annual basis, and then by reference to the three identified time periods, being prior to, during and after the global financial crisis.

4.2.1 Statistical Differences in SMSF Trading Behaviour on an Annual Basis

To address the research question of whether or not SMSF trustees were making the correct investment decisions over the period 2005 to 2011, the trading behaviour of SMSF trustees was assessed for each year from 2005 to 2011. This was done within the context of the variables which were defined in Table 3.7. Each variable was calculated on a monthly basis and the mean of each variable for each year is presented in Table 4.1.

Table 4.1 Monthly means of variables for each year from 2005 to 2011

Variable	2005	2006	2007	2008	2009	2010	2011
COUNT	143	145	152	113	114	107	98
COUNT_AGGBUYS	75	78	69	47	64	46	32
COUNT_AGGSALES	32	31	45	18	11	27	29
VALUE_AGGBUYS	\$465,902	\$712,755	\$798,580	\$376,309	\$427,381	\$408,052	\$416,652
VALUE_AGGSALES	\$331,148	\$391,179	\$514,924	\$204,385	\$119,808	\$303,855	\$466,682
COUNT_DEFBUYS	28	25	25	25	27	20	19
COUNT_DEFSALES	8	10	13	23	12	15	18
VALUE_DEFBUYS	\$491,860	\$473,669	\$655,666	\$409,529	\$403,905	\$653,847	\$882,533
VALUE_DEFSALES	\$176,336	\$242,898	\$365,694	\$503,756	\$309,094	\$709,273	\$793,349
NET_FLOWDEF	-\$134,754	-\$321,576	-\$283,656	-\$171,924	-\$307,573	-\$104,197	\$50,030
TRADE_VALUE	\$1,465,245	\$1,820,500	\$2,334,864	\$1,493,978	\$1,260,188	\$2,075,026	\$2,559,216

The data shows the changes in the level of trading activity by SMSFs across the period, with the number of average monthly trades by SMSFs (COUNT) falling from 143 in 2005 to just 98 in 2011. Changes in COUNT_AGGBUYS, which represents the average number of times per month that money was committed to an ‘aggressive’ investment, provides information relating to research question 2. This considers whether SMSFs have become more conservative in their investment approach since the global financial crisis. SMSFs within the sample were investing

money in aggressive investments on average 78 times per month prior to the financial crisis (in 2006), but by 2011 this level of aggressive trading behaviour had fallen to an average of just 32 such trades per month. This is matched by falls in the number of transactions involving the sale of shares (COUNT_AGGSALES) which declined from a high of 45 in 2007, to low of 11 in 2009. Differences can also be observed in the value of share sales and purchases across the period. That is, the average monthly dollar value of shares purchased (VALUE_AGGBUYS) fell from \$465,902 in 2005 to \$376,309 in 2008, before recovering somewhat to \$416,652 in 2011. Correspondingly, the average monthly dollar value of share sales (VALUE_AGGSALES) rose from 2005 (\$331,148) to 2011 (\$466,682).

The average number of times per month that SMSFs were buying defensive investments (COUNT_DEFBUYS) also fell across the period, with the highest number of transactions occurring in 2005 (28) and falling to 19 in 2011. On the other hand, COUNT_DEFSALES, which represents the average number of times that SMSFs sold defensive investments, experienced an increase in occurrence over the period, from 8 such transactions per month in 2005 to 18 transactions per month in 2011. Related to the changes in the number and dollar value of defensive investment transactions, NET_FLOWDEF, which tracks the net amount of money invested in defensive assets, was negative for all years from 2005 to 2010 and only turned positive in 2011 (\$50,030). The data also indicates that the overall average monthly trade value has increased from the periods prior to the financial crisis, with the exception of 2008 and 2009, where overall average monthly trade value fell sharply, with a low of \$1,260,188 in average monthly trades in 2009.

4.2.1.1 Analysis of the variable COUNT on an annual basis

While Table 4.1 does illustrate changes in the trading behaviour of SMSFs over the period 2005 to 2011, it does not identify whether or not any such changes, if present, were statistically significant. A multivariate analysis of variance test was required to identify those changes in behaviour which were statistically different. The variables in Table 4.1 were tested for significant differences across each year using Fisher's Least Significant Difference (LSD) test, based on a significance level

of 0.05. The results of the tests with regards to the average number of investment transactions are shown in Table 4.2.

Table 4.2 Test for statistical differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	152	2007
B	A	145	2006
B	A	143	2005
B	A	114	2009
B	A	113	2008
B	A	107	2010
B		98	2011

The only significant difference in the number of trades carried out during the period 2005 to 2011 was between 2007 and 2011, with monthly averages of 152 and 98 trades respectively.

4.2.1.2 Analysis of the variable COUNT_AGGBUYS on an annual basis

Table 4.3 shows the results for the monthly average number of aggressive investment purchases made between the years 2005 to 2011.

Table 4.3 Test for statistical differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 ($p = 0.05$)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	78	2006
B	A	75	2005
B	A	69	2007
B	A	64	2009
B	C	47	2008
B	C	46	2010
	C	32	2011

The results show that significant differences existed in the number of aggressive purchase transactions. The year 2006 (78) saw a significantly greater number of such transactions as compared to 2008 (47), 2010 (46) and 2011 (32). The year 2011 was also significantly lower than 2005 (75), 2007 (69) and 2009 (64).

4.2.1.3 Analysis of the variable COUNT_AGGSALES on an annual basis

Table 4.4 shows the results of the analysis of the monthly average number of aggressive sales transactions (COUNT_AGGSALES).

Table 4.4 Test for statistical differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		45	2007
B	A		32	2005
B	A		31	2006
B	A	C	29	2011
B	A	C	27	2010
B		C	18	2008
		C	11	2009

The level of sales of aggressive investments showed significant differences between 2007 and 2009, 2007 and 2008, and 2005/06 and 2009 with the number of such transactions being significantly higher in the earlier years of 2005 (32), 2006 (31) and 2007 (45).

4.2.1.4 Analysis of the variable VALUE_AGGBUYS on an annual basis

The results of the analysis of the variable VALUE_AGGBUYS, which relates to the monthly average dollar value of purchases of aggressive investments, are shown in Table 4.5.

Table 4.5 Test for statistical differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$798,580	2007
B	A	\$712,755	2006
B	A	\$465,902	2005
B		\$427,381	2009
B		\$416,652	2011
B		\$408,052	2010
B		\$376,309	2008

The only significant difference in the average monthly dollar value of aggressive purchase transactions was between 2007 (\$798,580) and the years from 2008 to 2011 (ranging from \$376,309 to \$427,381), with the value in 2007 being significantly greater than the values recorded in 2008 to 2011.

4.2.1.5 Analysis of the variable VALUE_AGGSALES on an annual basis

In contrast to the level of aggressive investment purchases, significant differences in the monthly average dollar value of aggressive investment sales are outlined in Table 4.6.

Table 4.6 Test for statistical differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		\$514,924	2007
	A		\$466,682	2011
B	A		\$391,179	2006
B	A	C	\$331,148	2005
B	A	C	\$303,855	2010
B		C	\$204,385	2008
		C	\$119,808	2009

The monthly average dollar value of aggressive sales transactions in 2009 (\$119,808) was significantly lower than the same transaction types in 2006 (\$391,179), 2007 (\$514,924) and 2011 (\$466,682). The year 2008 (\$304,385) also saw significantly fewer aggressive sales transactions than 2007 and 2011.

4.2.1.6 Analysis of the variable COUNT_DEFBUYS on an annual basis

The monthly average number of defensive investment purchase transactions is shown in Table 4.7.

Table 4.7 Test for statistical differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 ($p = 0.05$)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	28	2005
A	27	2009
A	25	2006
A	25	2007
A	25	2008
A	20	2010
A	19	2011

There were no statistically significant differences in the monthly average number of defensive investment purchases. While the years following the crisis (2010 and 2011) did see a lower level of such transactions, this decline was not significant at a significance level of 0.05.

4.2.1.7 Analysis of the variable COUNT_DEFSALES on an annual basis

The results of the same analysis with regards to the monthly average number of defensive sales transaction is shown in Table 4.8.

Table 4.8 Test for statistical differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 ($p = 0.05$)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	23	2008
B	A	18	2011
B	A	15	2010
B	A	13	2007
B	A	12	2009
B		10	2006
B		8	2005

Significant differences in the monthly average number of defensive sales transactions only existed between the year 2008 (23) and 2005 and 2006 (8 and 10 respectively), with a significantly larger number of such transactions occurring in 2008.

4.2.1.8 Analysis of the variable VALUE_DEFBUYS on an annual basis

With regards to the monthly average dollar value of defensive investment purchases, the results of the analysis are detailed in Table 4.9.

Table 4.9 Test for statistical differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$882,533	2011
B	A	\$655,666	2007
B	A	\$653,847	2010
B		\$491,860	2005
B		\$473,669	2006
B		\$409,529	2008
B		\$403,905	2009

The only significant difference in the monthly average dollar value of defensive purchase transactions was between 2011 (\$882,533) and the years 2005 (\$491,860), 2006 (\$473,669), 2008 (\$409,529) and 2009 (\$403,905), with 2011 recording a significantly greater monthly average dollar value of defensive purchase transactions.

4.2.1.9 Analysis of the variable VALUE_DEFSALES on an annual basis

The statistical analysis with regards to the average monthly dollar value of defensive sales transactions is shown in Table 4.10.

Table 4.10 Test for statistical differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$793,349	2011
	A	\$709,273	2010
B	A	\$503,756	2008
B	C	\$365,694	2007
B	C	\$309,094	2009
B	C	\$242,898	2006
	C	\$176,336	2005

The results of the analysis indicate that significant differences exist with regards to transactions involving the sale of defensive investments in the years following the crisis (2011 (\$793,349) and 2010 (\$709,273)) as compared to the years prior to and during the crisis (2005 (\$176,336), 2006 (\$242,898), 2009 (\$309,094) and 2007 (\$365,694)) which were significantly lower. The year 2008 (\$503,756) was also significantly greater than 2005.

4.2.1.10 Analysis of the variable NET_FLOWDEF on an annual basis

Results of the analysis of the variable NET_FLOWDEF, which indicates the net flow of funds into defensive assets, are outlined in Table 4.11.

Table 4.11 Test for statistical differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$50,030	2011
B	A	-\$104,197	2010
B	A	-\$134,754	2005
B	A	-\$171,924	2008
B	A	-\$283,656	2007
B		-\$307,573	2009
B		-\$321,576	2006

There was a significantly higher monthly average net flow of funds into defensive assets in 2011 (\$50,030), as compared to both 2006 (-\$321,576) and 2009 (-\$307,573). The year 2010 (-\$104,197) also saw a high monthly average net flow of funds into defensive assets, but this was not significantly different to the level of such transactions in other years over the period 2005 to 2011.

4.2.1.11 Analysis of the variable *TRADE_VALUE* on an annual basis

Table 4.12 outlines the results of the comparison in the monthly average total trade value of all investment transactions.

Table 4.12 Test for statistical differences in the monthly average total trade value of all investment transactions (*TRADE_VALUE*) from 2005 to 2011 ($p = 0.05$)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		\$2,559,216	2011
	A		\$2,334,864	2007
B	A		\$2,075,026	2010
B	A	C	\$1,820,500	2006
B		C	\$1,493,978	2008
B		C	\$1,465,245	2005
		C	\$1,260,188	2009

Significant differences were found in the monthly average total trade value between 2009 and 2007, 2010 and 2011, with the latter three years all exhibiting a significantly greater number of monthly average total trade values than 2009. The years 2007 and 2011 were also significantly greater than 2005 and 2008.

4.2.2 Statistical Differences in SMSF Trading Behaviour on a Per-Period Basis

The tests for significant differences between the variables covered in Tables 4.2 through 4.12 were based on the monthly averages of SMSF investment transactions on an annual basis. The next stage of the study was based on the monthly averages on a 'per period' basis. Three distinct time periods were identified:

Period 1: 1 January 2005 to 30 June 2008

Period 2: 1 July 2008 to 30 June 2009

Period 3: 1 July 2009 to 31 December 2011

The periods were defined in this manner so as to differentiate between the time period prior to the onset of the global financial crisis (Period 1), the period during the crisis (Period 2) and the period following the crisis (Period 3). Table 4.13 shows the monthly means for each variable on a per period basis.

Table 4.13 Monthly means of variables for each period from 2005 to 2011

Variable	Period 1	Period 2	Period 3
COUNT	145	108	102
COUNT_AGGBUYS	72	53	43
COUNT_AGGSALES	35	14	23
VALUE_AGGBUYS	\$634,890	\$313,958	\$427,823
VALUE_AGGSALES	\$397,355	\$125,247	\$326,396
COUNT_DEFBUYS	27	25	20
COUNT_DEFSALES	12	17	16
VALUE_DEFBUYS	\$530,129	\$383,423	\$692,854
VALUE_DEFSALES	\$281,422	\$454,592	\$664,332
NET_FLOWDEF	-\$237,534	-\$188,711	-\$101,427
TRADE_VALUE	\$1,843,796	\$1,277,220	\$2,111,404

The monthly average number of all transactions by SMSFs (COUNT) within the sample declined from Period 1 (145) to Periods 2 (108) and 3 (102). This is consistent with results from Table 4.1, which also show a decline in the overall level of trading activity by SMSFs from year to year. COUNT_AGGBUYS, which represents the monthly average of aggressive investment purchases, also declined from 72 such transactions in Period 1, to 53 and 43 transactions in Periods 1 and 2 respectively. The level of sales of aggressive investments, COUNT_AGGSALES, fell from Period 1 (35) to Period 2 (14), but then increased in Period 3. With regards to the dollar value of trades, the monthly average dollar value of aggressive investment purchases (VALUE_AGGBUYS) was highest in Period 1 (\$634,890), falling to \$313,958 in Period 2, before increasing to \$427,823 in Period 3. The same relationship applies with regards to the monthly average dollar value of aggressive investment sales (VALUE_AGGSALES); a high of \$397,355 in Period 1, falling to \$125,247 in Period 2, and subsequently increasing to \$326,396 in Period 3.

The monthly average dollar value and number of defensive transactions show slightly different patterns as compared to the aggressive transactions. COUNT_DEFBUYS, which represents the average monthly number of defensive investment purchases, decreased slightly from Period 1 (27) to Period 2 (25), followed by a larger decline in Period 3 (20). When considering the average monthly dollar value of defensive investment sales (COUNT_DEFSALES) however, this increased from 12 such transactions in Period 1, to 17 and 16 transactions in Periods 2 and 3 respectively. The average monthly dollar value of defensive investment purchases, VALUE_DEFBUYS, which indicates the extent to which SMSF trustees were committing funds to defensive investments, fell from \$530,129 in Period 1 to \$383,423 in Period 2, before increasing to \$692,854 in Period 3. The average monthly dollar value of defensive investment sales increased across the three time periods, from \$281,422 in Period 1, to \$454,592 in Period 2, and to \$664,332 in Period 3. NET_FLOWDEF, which measures the level of net flow of funds into defensive investments, remained negative in each period, however the flow of funds into defensive investments did increase between periods. Period 1 showed NET_FLOWDEF of -\$237,534, increasing to -\$188,711 in Period 2, and increasing again to -\$101,427 in Period 3. NET_TRADEVALUE, which shows the total average monthly dollar value of all transaction per period, fell from Period 1 (\$1,843,796) to Period 2 (\$1,277,220), but increased in Period 3 (\$2,111,404).

4.2.2.1 Analysis of the variable COUNT on a per-period basis

As with the variables on an annual basis, the variables in Table 4.13 were analysed to determine whether or not any differences between the time periods (if they existed) were statistically significant. Table 4.14 shows the results for the variable COUNT over the three time periods.

Table 4.14 Test for statistical differences in the monthly average number of investment transactions (COUNT) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
1 – 2	37	
1 – 3	43	***
2 – 1	-37	
2 – 3	6	
3 – 1	-43	***
3 – 2	-6	

A statistically significant difference in the average number of monthly transactions between Periods 1 and 3 was found, with a higher average number of monthly transactions in Period 1 (145) compared to Period 3 (102).

4.2.2.2 Analysis of the variable COUNT_AGGBUYS on a per-period basis

Table 4.15 outlines the results of the analysis of the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS).

Table 4.15 Test for statistical differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
1 - 2	19	
1 - 3	29	***
2 - 1	-19	
2 - 3	10	
3 - 1	-29	***
3 - 2	-10	

A statistically significant difference was found in the average monthly number of aggressive purchase transactions between Period 1 (72) and Period 3 (43), with Period 1 recording a significantly greater number of transactions.

4.2.2.3 Analysis of the variable COUNT_AGGSALES on a per-period basis

Table 4.16 shows the results of the analysis of the monthly average number of aggressive sales transactions between the three time periods (COUNT_AGGSALES).

Table 4.16 Test for statistical differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
1 - 3	12	***
1 - 2	20	***
3 - 1	-12	***
3 - 2	9	
2 - 1	-20	***
2 - 3	-9	

Statistically significant differences were found in the monthly average number of aggressive sales transactions between both Period 1 and Period 2, and Period 2 and Period 3 (with a difference between the means of 12 and 20 respectively, indicating a significantly greater number of such transactions in Period 1). There was no significant difference in the monthly average number of sales transactions between Period 2 and Period 3.

4.2.2.4 Analysis of the variable VALUE_AGGBUYS on a per-period basis

Table 4.17 shows the results of the analysis of the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS).

Table 4.17 Test for statistical differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
1 - 3	\$207,067	***
1 - 2	\$320,932	***
3 - 1	-\$207,067	***
3 - 2	\$113,865	
2 - 1	-\$320,932	***
2 - 3	-\$113,865	

The monthly average dollar value of aggressive purchase transactions showed significant differences between Period 1 and both Period 2 and 3. Period 1 recorded a significantly higher level of such transactions per month; \$207,067 greater on average than Period 3 and \$320,932 greater on average than Period 2.

4.2.2.5 Analysis of the variable VALUE_AGGSALES on a per-period basis

The results of the analysis with regards to the monthly average dollar value of aggressive sales transactions are shown in Table 4.18.

Table 4.18 Test for statistical differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
1 - 3	\$70,960	
1 - 2	\$272,108	***
3 - 1	-\$70,960	
3 - 2	\$201,148	
2 - 1	-\$272,108	***
2 - 3	-\$201,148	

An indication of the extent to which SMSF trustees were reducing their exposure to riskier assets is the monthly average dollar value of aggressive sales transactions. The analysis of the variable VALUE_AGGSALES over the period 2005 to 2011 showed a significant difference in the level of such transactions between Period 1 (pre-crisis) and Period 2 (during the crisis). Period 1 exhibited a significantly higher monthly average dollar value of aggressive sales transactions as compared to Period 2, with a difference between means of \$272,108. No other significant differences in the monthly average dollar value of such transactions were found.

4.2.2.6 Analysis of the variable COUNT_DEFBUYS on a per-period basis

Table 4.19 shows the analysis of the monthly average number of defensive purchase transactions (COUNT_DEFBUYS).

Table 4.19 Test for statistical differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
1 - 2	2	
1 - 3	7	
2 - 1	-2	
2 - 3	4	
3 - 1	-7	
3 - 2	-4	

The monthly average number of defensive purchase transactions reflects the extent to which SMSF trustees were increasing their holdings of defensive investments. No significant differences were detected in the number of defensive purchase transactions between the three time periods.

4.2.2.7 Analysis of the variable COUNT_DEFSALES on a per-period basis

Table 4.20 shows the analysis of the monthly average number of defensive sales transactions.

Table 4.20 Test for statistical differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
2 - 3	1	
2 - 1	4	
3 - 2	-1	
3 - 1	4	
1 - 2	-4	
1 - 3	-4	

Similar to the monthly average number of defensive purchase transactions, no statistically significant differences were detected in the monthly average number of defensive sales transactions between the three time periods.

4.2.2.8 Analysis of the variable VALUE_DEFBUYS on a per-period basis

Table 4.21 shows the analysis of the monthly average dollar value of defensive purchase transactions between the three time periods.

Table 4.21 Test for statistical differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
3 - 1	\$162,725	
3 - 2	\$309,431	***
1 - 3	-\$162,725	
1 - 2	\$146,706	
2 - 3	-\$309,431	***
2 - 1	-\$146,706	

Period 3 exhibited a statistically significantly higher monthly average dollar of defensive purchase transactions as compared to Period 2, with a difference of \$309,431 between the mean values for each period.

4.2.2.9 Analysis of the variable VALUE_DEFSALES on a per-period basis

Table 4.22 outlines the results of the analysis with regards to the monthly average dollar value of defensive sales transactions between the three time periods.

Table 4.22 Test for statistical differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
3 - 2	\$209,739	
3 - 1	\$382,909	***
2 - 3	-\$209,739	
2 - 1	\$173,170	
1 - 3	-\$382,909	***
1 - 2	-\$173,170	

A statistically significant difference was found in the monthly average dollar value of defensive sales transactions between Period 1 and Period 3, with Period 3 exhibiting mean monthly dollar values of defensive sales transactions \$382,909 greater than Period 1.

4.2.2.10 Analysis of the variable NET_FLOWDEF on a per-period basis

Results of the analysis of the variable NET_FLOWDEF, which indicates the net flow of funds into defensive assets, are outlined in Table 4.23.

Table 4.23 Test for statistical differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) between Periods 1, 2 and 3 (p = 0.05)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
3 - 2	\$87,284	
3 - 1	\$136,107	
2 - 3	-\$87,284	
2 - 1	\$48,824	
1 - 3	-\$136,107	
1 - 2	-\$48,824	

Unlike the results of the analysis of NET_FLOWDEF on a yearly basis (Table 4.11), which showed a number of statistically significant differences in NET_FLOWDEF between the years from 2005 to 2011, no statistically significant differences were found between the three defined periods prior to, during and after the global financial crisis.

4.2.2.11 Analysis of the variable *TRADE_VALUE* on a per-period basis

The results of the analysis of the monthly average total trade value between the three defined time periods are shown in Table 4.24.

Table 4.24 Test for statistical differences in the monthly average total trade value of all investment transactions (*TRADE_VALUE*) between Periods 1, 2 and 3 ($p = 0.05$)

Comparisons significant at the 0.05 level are indicated by ***.		
Period Comparison	Difference Between Means	
3 - 1	\$267,607	
3 - 2	\$834,184	***
1 - 3	-\$267,607	
1 - 2	\$566,576	
2 - 3	-\$834,184	***
2 - 1	-\$566,576	

Period 3 exhibited a significantly greater monthly average total trade value than Period 2, with \$834,184 greater monthly average trade values than Period 2. This is consistent with the results in Table 4.12 which showed that 2009 (which forms part of Period 2) had a significantly lower monthly average total trade value than the other years from 2005 to 2011.

4.3 Conclusion

This chapter presented the results of the analysis of SMSFs within the sample on both an annual basis and on a 'per period' basis. The analysis on an annual basis allows for a more 'granular' view of SMSF trading activity over the period 2005 to 2011, while the 'per period' analysis makes greater allowance for generalisations regarding the trading behaviour of SMSFs prior to, during and following the 2008 financial crisis.

When considering SMSF trading behaviour on an annual basis, trading frequency decreased considerably over the period 2005 to 2011, while that period following the financial crisis (Period 3) saw significantly fewer average monthly trades than that period leading up to the financial crisis (Period 1). These findings appear to indicate that the financial crisis had a significant negative impact on SMSF trustee willingness to trade. In contrast however, the dollar value of average monthly trades by SMSF trustees did not exhibit the same pattern. Those years following the crisis generally saw greater monthly average trade values as compared to prior to or during the crisis, while Period 3, which followed the crisis, also exhibited greater monthly average trade value when compared to both prior to and during the crisis. SMSF trustees may have traded less following the crisis, but the dollar values they were willing to commit to each trade was larger in the period following the financial crisis. Investment transactions which increased SMSF exposure to riskier assets are those transactions which involved the purchase of aggressive investments or the sale of defensive investments. The results indicate that SMSFs were, in general, increasing their exposure to riskier assets immediately prior to the financial crisis. Conversely, those transactions which involve increasing exposure to defensive assets tend to indicate that SMSF trustees were more likely to increase defensive asset exposure in the period following the financial crisis. The variable which measures the net flow of funds into defensive assets, NET_FLOWDEF, appears to confirm this result, with a greater net flow of funds into defensive assets in 2010, 2011 and Period 3 (although it must be noted that the result for NET_FLOWDEF in Period 3 was not significantly greater than in Periods 1 and 2).

The results of the analysis provide an insight into SMSF trustees' appetite for risk. It has been shown that an individual's risk appetite is not fixed, but can vary over time (Gai & Vause 2005). In particular, it has been found that risk appetite tends to be stable during economic and market periods of relative calm, but can fluctuate considerably in response to external shocks. The action taken by SMSF trustees to increase their exposure to defensive investments in that period immediately following the 2008 crisis supports this conclusion. Interestingly however, at the peak of the 2008 financial crisis, during a period of significant falls on equity markets, there is little evidence that SMSF trustees acted to reduce their market risk exposure. It was only after the crisis had peaked that there was evidence

of a change in the risk appetite of SMSF trustees. This suggests that SMSF trustees may have been frozen in inaction during the worst of the crisis; concerned about severe investment losses but too fearful to make significant changes to their market risk exposure. It was only after the apparent passage of the worst of the crisis that trustees evidenced a significant change in their appetite for risk, increasing their exposure to defensive assets long after such a course of action would have been proven to be prudent. This may indicate the existence of the availability heuristic, where SMSF trustees overestimated the likelihood of another financial crisis, with the memory of the 2008 crisis fresh in their minds. This is similar to work by Frieder (2004), who found evidence of the availability heuristic in US investors. The results also point to the potential for cognitive dissonance within SMSF trustees during the crisis, which describes a mental tension which exists when an individual holds two beliefs which are psychologically incompatible (Olsen 2008). SMSF trustees may have believed that equity markets would continue to provide positive investment returns, even as markets fell sharply over 2008 and early 2009. SMSF trustees may have been unwilling to reduce their investment risk exposure even during a significant bear market, believing that equity markets could not fall further, even in the face of evidence to the contrary. This behaviour by SMSF trustees also suggests the presence of loss aversion in trustee trading behaviour. SMSF trustees may have been unwilling to sell higher risk investments as markets fell, for fear of realising significant losses on these market linked investments. This type of behaviour closely matches the description of loss aversion as outlined by Kahneman and Tversky (1979).

The lack of action by SMSF trustees to reduce their exposure to higher risk investments in the period leading up to the financial crisis is also a potential indication of representative bias by SMSF trustees. That is, on the eve of the 2008 financial crisis SMSF trustees acted in a manner which suggests that they expected the rise in equity markets prior to the crisis to continue in that manner indefinitely. Were this not the case, SMSF trustees would have been expected to undertake a significant level of transactions involving the sale of higher risk investments, without a corresponding number of transactions involving the purchase of higher risk investments. There is no evidence of this in the results of the analysis. It therefore appears that SMSF trustees considered the probability of a significant fall in the

market to be low, given the lengthy period of positive investment returns in that period leading up to the 2008 financial crisis, behaviour consistent with representativeness as outlined by Kahneman and Tversky (1972).

This chapter presented the results of the analysis of the trading behaviour of SMSFs within the sample for each year from 2005 to 2011 and across the three identified time periods over the same length of time. The results appear to indicate that SMSF trustees were not appropriately positioning their portfolios with a more defensive stance on the eve of the crisis, and that the financial crisis has had an impact on the willingness of SMSF trustees to increase market risk exposure. There is also evidence of the existence of a number of behavioural biases of SMSF trustees, including representativeness, loss aversion and the availability heuristic. This section of the study focused on the overall level of activity of funds within the sample. Chapters 5 and 6 which follow present the same analysis of the variables outlined in Table 4.1, but based on segmenting the funds by size and by risk profile respectively.

CHAPTER 5

RESULTS: TRADING BEHAVIOUR AND FUND SIZE

5.1 Introduction

The previous chapter presented the results of the analysis of SMSF investment transactions over the period 2005 to 2011. This was done on both an annual basis and by reference to the three time periods prior to, during and after the global financial crisis. This chapter presents the results of the analysis of the trading behaviour of SMSFs on the basis of fund size. This analysis seeks to address the question of whether or not funds of different sizes exhibited the same trading behaviour over the period 2005 to 2011.

The reasoning behind segmenting SMSFs within the sample based on fund size is to allow for conclusions to be drawn regarding the relevance of fund size as a predictor of trustee behaviour. For example, do trustees of larger funds exhibit different patterns of trading behaviour as compared to smaller funds? Are trustees of larger (or smaller) funds more likely to adopt an aggressive (or defensive) approach? As larger funds may be a proxy for overall trustee wealth and potentially investor sophistication, do such funds exhibit a more sophisticated investment approach than trustees of smaller funds? These are the types of questions which may be addressed through an analysis of trustee trading behaviour on the basis of fund size. In order to allow for a fair comparison, the trading behaviour of each fund size category was compared with the same funds over the period prior to, during and following the crisis. A direct comparison between funds of different sizes would not be useful as it would reasonably be expected, for example, that larger funds would have a higher dollar value investment turnover than smaller funds. Therefore the trading behaviour of funds within each identified fund size category are compared across the time period with one another, rather than being compared across size categories.

5.2 Statistical Differences in SMSF Trading Behaviour Based on Fund Size

The SMSFs within the sample data were segmented into three groups based on their size as 1 January 2005 and were tested for significant differences in each of the variables as defined in Table 3.7. The mean values for each of the variables for funds in group 1 are shown in Table 5.1. Group 1 funds are those funds with less than \$350,000 in assets.

Table 5.1 Monthly means of variables for group 1 funds (small funds) for each year from 2005 to 2011

Year	2005	2006	2007	2008	2009	2010	2011
COUNT	30	34	39	31	33	33	24
COUNT_AGGBUYS	14	17	19	12	18	15	8
COUNT_AGGSALES	9	8	11	5	3	7	6
VALUE_AGGBUYS	\$86,189	\$184,407	\$260,106	\$136,358	\$119,012	\$134,894	\$104,415
VALUE_AGGSALES	\$151,248	\$149,899	\$192,301	\$93,164	\$55,879	\$121,032	\$122,980
COUNT_DEFBUYS	5	6	6	8	9	7	5
COUNT_DEFSALES	2	3	3	6	4	5	5
VALUE_DEFBUYS	\$132,889	\$149,927	\$184,271	\$148,172	\$171,433	\$378,067	\$330,129
VALUE_DEFSALES	\$63,103	\$104,353	\$120,670	\$177,438	\$147,962	\$383,818	\$337,993
NET_FLOWDEF	\$65,059	-\$34,508	-\$67,805	-\$43,193	-\$63,133	-\$13,861	\$18,565
TRADE_VALUE	\$433,429	\$588,585	\$757,348	\$555,132	\$494,286	\$1,017,811	\$895,517

The data shows the frequency of trading activity by small funds was relatively consistent over the period 2005 to 2011. Those variables which measure the frequency of each type of trading activity, such as COUNT, COUNT_AGGBUYS, COUNT_AGGSALES, COUNT_DEFBUYS and COUNT_DEFSALES, show only minor deviation across the time period under consideration. Differences in the dollar value of each type of trading activity are more pronounced however, with VALUE_AGGBUYS peaking at an average of \$260,106 per month in 2007, before falling both during and after the onset of the financial crisis. A similar change is apparent with regards to VALUE_AGGSALES, which fell from a monthly average of \$192,301 of such trades in 2007 to \$55,879 in 2009. NET_FLOWDEF, which measures the net flow of funds into defensive assets was negative for the majority of the years preceding the financial crisis, as well as

during the financial crisis. In 2010 and 2011 however, there was a pronounced increase in the net flow of funds into defensive assets, with 2010 exhibiting a monthly mean value of just -\$13,861 before NET_FLOWDEF turned positive in 2011 with a monthly mean of \$18,565. This is consistent with the data in Table 4.1 in Chapter 4 which showed a similar change across all funds within the SMSF sample.

Table 5.2 shows the monthly means for each of the variables of group 2 funds, which are those funds with greater than \$350,000 but less than \$750,000 in assets as at 1 January 2005.

Table 5.2 Monthly means of variables for group 2 funds (medium funds) for each year from 2005 to 2011

Year	2005	2006	2007	2008	2009	2010	2011
COUNT	37	30	31	21	25	16	19
COUNT_AGGBUYS	17	15	11	8	14	7	5
COUNT_AGGSALES	12	7	11	2	2	2	6
VALUE_AGGBUYS	\$66,446	\$131,289	\$94,327	\$44,065	\$132,317	\$43,677	\$43,000
VALUE_AGGSALES	\$113,945	\$67,999	\$89,544	\$19,657	\$13,560	\$39,546	\$115,156
COUNT_DEFBUYS	7	5	5	5	6	4	4
COUNT_DEFSALES	2	2	3	6	4	3	4
VALUE_DEFBUYS	\$145,416	\$93,546	\$151,067	\$95,104	\$126,891	\$66,140	\$100,773
VALUE_DEFSALES	\$53,371	\$51,398	\$119,880	\$121,814	\$101,309	\$71,414	\$107,179
NET_FLOWDEF	\$47,499	-\$63,290	-\$4,783	-\$24,408	-\$118,758	-\$4,131	\$72,157
TRADE_VALUE	\$379,178	\$344,231	\$454,818	\$280,640	\$374,077	\$220,777	\$366,109

Unlike small funds, medium sized funds within the sample exhibit different trading activity patterns over the period 2005 to 2011, with those variables which measure trading frequency (COUNT, COUNT_AGGBUYS, COUNT_AGGSALES, COUNT_DEFBUYS and COUNT_DEFSALES) varying noticeably in the periods before, during and after the financial crisis. For example, the variable COUNT, which measures the average monthly number of investment trades for funds within the sample group, was above 30 in each of the years preceding the crisis, before falling to an average of 21 in 2008 and reaching a low of 16 in 2010. In addition to variations in the frequency of trades, the dollar value of trading activity also varied over the period 2005 to 2011. VALUE_AGGBUYS, which measures the dollar value of trades that are associated with the purchase of ‘aggressive’ investments, fell from \$94,327 in 2007 to \$44,065 in 2008 as the financial crisis developed, although the

variable did record an increase to \$132,217 in 2009. NET_FLOWDEF, which measures the net flow of funds into defensive assets, was negative in the years prior to the financial crisis, although it did increase from -\$63,290 in 2006 to -\$4,783 in 2007, which was immediately prior to the financial crisis.

The third sub-set of funds within the sample, large funds, were those funds which held total assets of greater than \$750,000 as at 1 January 2005. As with both 'small' and 'medium' funds, the transaction variables for these funds were calculated and are outlined in Table 5.3.

Table 5.3 Monthly means of variables for group 3 funds (large funds) for each year from 2005 to 2011

Year	2005	2006	2007	2008	2009	2010	2011
COUNT	52	57	56	43	36	41	41
COUNT_AGGBUYS	29	31	24	17	20	17	16
COUNT_AGGSALES	10	12	18	9	5	14	12
VALUE_AGGBUYS	\$141,592	\$227,723	\$231,930	\$134,304	\$113,991	\$163,270	\$192,006
VALUE_AGGSALES	\$58,696	\$85,033	\$123,725	\$68,323	\$34,333	\$108,661	\$145,788
COUNT_DEFBUYS	10	9	9	9	8	6	8
COUNT_DEFSALES	4	3	5	9	3	4	6
VALUE_DEFBUYS	\$131,937	\$132,927	\$180,566	\$101,843	\$68,173	\$109,640	\$125,445
VALUE_DEFSALES	\$57,157	\$52,647	\$94,426	\$127,213	\$43,712	\$100,052	\$121,833
NET_FLOWDEF	-\$82,897	-\$142,690	-\$108,205	-\$65,981	-\$79,658	-\$54,610	-\$46,218
TRADE_VALUE	\$389,382	\$498,329	\$630,646	\$431,683	\$260,208	\$481,623	\$585,071

As with medium-sized funds, large funds within the sample also exhibited differences in the level of transaction activity over the period 2005 to 2011. The average monthly number of trades (COUNT) peaked two years before the onset of the financial crisis, with an average of 57 trades per month in 2006. In 2009 the level of activity dropped to an average of just 36 transactions per month, a 37% reduction in trading activity. COUNT_AGGBUYS and VALUE_AGGBUYS, which measure the level of aggressive investment transactions for each period, also peaked prior to the crisis and declined in the years during and following the crisis. COUNT_AGGBUYS, which measures the monthly number of aggressive transactions, peaked the year before the onset of the crisis, with an average of 31 such transactions in 2006, as compared to an average of just 17 such transactions in 2006. NET_FLOWDEF, which measures the net flow of investment funds, remained

negative throughout the period 2005 to 2011, although it did increase from -\$142,690 in 2006 to -\$46,218 in 2011.

While the nominal values of each transaction variable outlined in Tables 5.1, 5.2 and 5.3 are informative, the data as presented does not indicate whether or not any of the changes, if present, were statistically significant or could be explained by normal variations in the data. Therefore the next step was to test the variables in Tables 5.1, 5.2 and 5.3 for significant differences across each year using Fisher's Least Significant Difference (LSD) test, based on a significance level of 0.05. The results of the tests are grouped based on each variable being tested. This begins with the results of the analysis of the variable COUNT for each of the three fund size groupings.

5.2.1 Analysis of the Variable COUNT Based on Fund Size

Tables 5.4, 5.5 and 5.6 present the results of the analysis of the variable COUNT for each of the three different fund size groupings, being small, medium and large funds respectively.

Table 5.4 Test for statistical differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	39	2007
B	A	34	2006
B	A	33	2009
B	A	33	2010
B	A	31	2008
B	A	30	2005
B		24	2011

For smaller SMSFs within the sample, there was a statistically significant greater difference in the average number of monthly transactions between the years 2007 and 2011, with respective monthly mean trades of 39 and 24.

Table 5.5 Test for statistical differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		37	2005
B	A		31	2007
B	A		30	2006
B	A	C	25	2009
B		C	21	2008
B		C	19	2011
		C	16	2010

Similar to smaller funds, medium-sized funds within the sample show significant differences in the level of trading activity across the period prior to, during and after the financial crisis. 2005 saw a significantly greater level of trading activity, with a monthly average of 37 transactions, as compared to 2008 (21), 2010 (16) and 2011 (19). The years 2006 (30) and 2007 (31) were also significantly greater than 2010.

Table 5.6 Test for statistical differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	57	2006
A	56	2007
A	52	2005
A	43	2008
A	41	2011
A	41	2010
A	36	2009

Unlike small funds and medium-sized funds, large SMSFs within the sample showed no significant differences in the overall level of trading activity across the period 2005 to 2011.

5.2.2 Analysis of the Variable COUNT_AGGBUYS Based on Fund Size

Tables 5.7, 5.8 and 5.9 outline whether the three different fund size groups showed evidence of significant changes in the monthly average number of aggressive investment purchase transactions (COUNT_AGGBUYS), which illustrates trustees acting to increase the level of market risk associated with the fund's investments.

Table 5.7 Test for statistical differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	19	2007
	A	18	2009
	A	17	2006
B	A	15	2010
B	A	14	2005
B	A	12	2008
B		8	2011

The results in Table 5.7 show that significant differences in the monthly average number of aggressive purchase transactions existed between 2011 and the years 2006, 2007 and 2009, with 2011 having a significantly lower average of only 8 such transactions per month.

Table 5.8 Test for statistical differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A		17 2005
	A		15 2006
B	A		14 2009
B	A	C	11 2007
B	D	C	8 2008
	D	C	7 2010
	D		5 2011

A number of significant differences in the monthly average aggressive investment purchase transactions were evident with regards to medium sized funds. The years following the crisis showed a number of differences, where 2011 and 2010

had a significantly lower number of aggressive investment purchase transactions than 2005, 2006, 2007 and 2009. The year 2008 also saw a statistically significant lower number of such transactions as compared to 2005 and 2006.

Table 5.9 Test for statistical differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	31	2006
B	A	29	2005
B	A	24	2007
B	A	20	2009
B		17	2008
B		17	2010
B		16	2011

For large SMSFs within the sample, a significant difference in the monthly average number of aggressive purchase transactions was found between 2006 and the years 2008, 2010 and 2011. The year 2006 registered a monthly average of 31 such transactions, compared to 16 in 2011, and 17 in both 2010 and 2008.

5.2.3 Analysis of the Variable COUNT_AGGSALES Based on Fund Size

Tables 5.10, 5.11 and 5.12 show the results of the analysis of the monthly average number of aggressive investment sales transactions (COUNT_AGGSALES) for small, medium and large funds respectively.

Table 5.10 Test for statistical differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 for group 1 funds (small funds) ($p = 0.05$)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		11	2007
B	A		9	2005
B	A	C	8	2006
B	A	C	7	2010
B	A	C	6	2011
B		C	5	2008
		C	3	2009

Table 5.10 shows that there were a significantly higher number of aggressive sales transactions in 2007 as compared to 2008 and 2009, with respective monthly means of 11, 5 and 3. The year 2005 (9) also saw a significantly higher number of such transactions as compared to 2009 (3).

Table 5.11 Test for statistical differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 for group 2 funds (medium funds) ($p = 0.05$)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	12	2005
	A	11	2007
B	A	7	2006
B	A	6	2011
B		2	2010
B		2	2008
B		2	2009

The results for medium-sized funds closely match those for small funds, with an increased level of aggressive sales transactions in the years preceding the financial

crisis. The years 2005 (12) and 2007 (11) saw a significantly greater number of aggressive sales transactions as compared to 2008 (2), 2009 (2) and 2010 (2).

Table 5.12 Test for statistical differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	18	2007
B	A	14	2010
B	A	12	2006
B	A	12	2011
B	A	10	2005
B	A	9	2008
B		5	2009

Large funds within the sample showed a significantly greater difference in the monthly average number of aggressive sales transactions between 2007 and 2009, with 2007 averaging 18 such trades per month, compared to just 5 in 2009.

5.2.4 Analysis of the Variable VALUE_AGGBUYS Based on Fund Size

Tables 5.13, 5.14 and 5.15 show the results of the analysis of the variable VALUE_AGGBUYS for the three different fund size groupings, which gives an indication of the variation of the magnitude of aggressive investment purchase decisions by SMSF trustees.

Table 5.13 Test for statistical differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$260,106	2007
B	A	\$184,407	2006
B		\$136,358	2008
B		\$134,894	2010
B		\$119,012	2009
B		\$104,415	2011
B		\$86,189	2005

Significant differences in the monthly average dollar value of aggressive purchase transactions of small funds were found between the years 2007 (\$260,106) and the years 2005 (\$86,189), 2008 (\$136,358), 2009 (\$119,012), 2010 (\$134,894) and 2011 (\$104,415), with 2007 recording a significantly higher value than the corresponding years.

Table 5.14 Test for statistical differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$132,317	2009
	A	\$131,289	2006
B	A	\$94,327	2007
B		\$66,446	2005
B		\$44,065	2008
B		\$43,677	2010
B		\$43,000	2011

The results for medium funds found that 2009 and 2006 exhibited a significantly greater level of investment transactions involving the purchase of aggressive investments as compared to 2005, 2008, 2010 and 2011. The monthly means for 2009 (\$132,317) and 2006 (\$131,289) were significantly in excess of the means for the other years, which ranged from \$66,446 in 2005 to \$43,000 in 2011.

Table 5.15 Test for statistical differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$231,930	2007
A	\$227,723	2006
A	\$192,006	2011
A	\$163,270	2010
A	\$141,592	2005
A	\$134,304	2008
A	\$113,991	2009

As shown in Table 5.15, there were no significant differences for large funds with regards to the level of aggressive purchase transactions across the years 2005 to 2011.

5.2.5 Analysis of the Variable VALUE_AGGSALES Based On Fund Size

In contrast to the average monthly dollar value of aggressive purchase transactions, VALUE_AGGSALES measures the monthly average dollar value of monthly aggressive sale transactions. These are investment transactions where SMSF trustees sold those investments categorised as ‘aggressive’. The results of the analysis for the 3 different fund sizes are shown in Tables 5.16, 5.17 and 5.18.

Table 5.16 Test for statistical differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$192,301	2007
B	A	\$151,248	2005
B	A	\$149,899	2006
B	A	\$122,980	2011
B	A	\$121,032	2010
B	A	\$93,164	2008
B		\$55,879	2009

The results of the analysis for significant differences for the variable VALUE_AGGSALES showed a significantly greater difference existed between the years 2007 and 2009, with monthly means of \$192,301 and \$55,879 respectively.

Table 5.17 Test for statistical differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$115,156	2011
	A	\$113,945	2005
B	A	\$89,544	2007
B	A	\$67,999	2006
B	A	\$39,546	2010
B		\$19,657	2008
B		\$13,560	2009

For medium-sized funds within the sample, there was a significantly greater difference in the level of aggressive investment sales transactions between the years

2011 and 2005 with 2008 and 2009, with respective monthly averages of \$115,156, \$113,945, \$19,657 and \$13,560.

Table 5.18 Test for statistical differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$145,788	2011
	A	\$123,725	2007
B	A	\$108,661	2010
B	A	\$85,033	2006
B	A	\$68,323	2008
B	A	\$58,696	2005
B		\$34,333	2009

Large funds showed significant differences in the level of aggressive investment sales transactions between 2011 and 2009, with 2011 showing a significantly greater number of such transactions (\$145,788 average monthly trade value in 2011 as compared to \$34,333 in 2009).

5.2.6 Analysis of the Variable COUNT_DEFBUYS Based on Fund Size

In addition to considering the frequency of aggressive investment transactions, the dollar value and frequency of defensive investment transactions were also analysed. The results of the analysis of COUNT_DEFBUYS, which measures the monthly average number of defensive asset purchase transactions, are shown in Tables 5.19, 5.20 and 5.21.

Table 5.19 Test for statistical differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	9	2009
A	8	2008
A	7	2010
A	6	2007
A	6	2006
A	5	2005
A	5	2011

Table 5.19 shows that no statistically significant differences were found in the monthly average number of defensive purchase transactions for small funds within the sample.

Table 5.20 Test for statistical differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	7	2005
A	6	2009
A	5	2007
A	5	2006
A	5	2008
A	4	2011
A	4	2010

As with small funds within the sample, no significant differences were found in the monthly average number of defensive purchase transactions for medium-sized funds.

Table 5.21 Test for statistical differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	10	2005
A	9	2006
A	9	2007
A	9	2008
A	8	2009
A	8	2011
A	6	2010

As with small funds and medium-sized funds, no statistically significant differences were detected in the monthly average number of defensive purchase transactions for large funds.

5.2.7 Analysis of the Variable COUNT_DEFSALES Based on Fund Size

In contrast to the measurement of defensive investment purchase transactions, COUNT_DEFSALES measures the average monthly frequency of defensive sales transactions. The results of the analysis of this variable for each of the fund sizes are shown in Tables 5.22, 5.23 and 5.24.

Table 5.22 Test for statistical differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	6	2008
B	A	5	2011
B	A	5	2010
B	A	4	2009
B	A	3	2007
B		3	2006
B		2	2005

For small funds within the sample, there were a significantly greater number of defensive sales transactions in 2008 (6) as compared to 2006 (3) and 2005 (2).

Table 5.23 Test for statistical differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	6	2008
A	4	2009
A	4	2011
A	3	2007
A	3	2010
A	2	2006
A	2	2005

Unlike small funds, medium-sized funds within the sample showed no significant differences in the monthly average number of defensive sales transactions.

Table 5.24 Test for statistical differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	9	2008
A	6	2011
A	5	2007
A	4	2010
A	4	2005
A	3	2006
A	3	2009

As with medium-sized funds, large funds also showed no significant differences in the monthly average number of defensive sales transactions between the years 2005 to 2011.

5.2.8 Analysis of the Variable VALUE_DEFBUYS Based on Fund Size

The next variable analysed was VALUE_DEFBUYS, which represents the average monthly dollar value of investment transactions which involved the purchase of a defensive investment. Tables 5.25, 5.26 and 5.27 show the results of the analysis of the variable VALUE_DEFBUYS for each of the fund size groupings within the sample.

Table 5.25 Test for statistical differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$378,067	2010
B	A	\$330,129	2011
B	A	\$184,271	2007
B	A	\$171,433	2009
B		\$149,927	2006
B		\$148,172	2008
B		\$132,889	2005

With regards to the level of purchases of defensive assets, 2010 (\$378,067) saw a significantly higher level of such activity as compared to 2005 (\$132,889), 2006 (\$149,927) and 2008 (\$148,172).

Table 5.26 Test for statistical differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping	Mean	Year	
A	\$151,067	2007	
A	\$145,416	2005	
A	\$126,891	2009	
A	\$100,773	2011	
A	\$95,104	2008	
A	\$93,546	2006	
A	\$66,140	2010	

With regards to medium-sized funds, no statistically significant differences in the monthly dollar average value of defensive purchase transactions between the years 2005 and 2011 were detected.

Table 5.27 Test for statistical differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$180,566	2007
B	A	\$132,927	2006
B	A	\$131,937	2005
B	A	\$125,445	2011
B	A	\$109,640	2010
B	A	\$101,843	2008
B		\$68,173	2009

Large funds within the sample showed a significant difference in the monthly average dollar value of defensive purchase transactions between 2007 and 2009, with 2007 averaging an additional \$112,393 per month in defensive purchase transactions, compared to the average of \$68,173 in 2009.

5.2.9 Analysis of the Variable VALUE_DEFSALES Based on Fund Size

The variable VALUE_DEFSALES, which measures the average monthly dollar value of sales of defensive investments, was also analysed for the three different fund size groupings. The results are illustrated in Tables 5.28, 5.29 and 5.30.

Table 5.28 Test for statistical differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$383,818	2010
B	A	\$337,993	2011
B	C	\$177,438	2008
	C	\$147,962	2009
	C	\$120,670	2007
	C	\$104,353	2006
	C	\$63,103	2005

Significant differences were found between 2010 (\$383,818) and the years 2005 to 2009 (ranging from \$63,103 in 2005 to \$147,962 in 2009), while 2011 (\$337,993) also saw a significantly greater number of defensive sales transactions than 2005, 2006, 2007 and 2009.

Table 5.29 Test for statistical differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$121,814	2008
A	\$119,880	2007
A	\$107,179	2011
A	\$101,309	2009
A	\$71,414	2010
A	\$53,371	2005
A	\$51,398	2006

Unlike small funds, medium-sized funds within the sample showed no significant differences in the dollar value of average monthly defensive sales transactions.

Table 5.30 Test for statistical differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$127,213	2008
A	\$121,833	2011
A	\$100,052	2010
A	\$94,426	2007
A	\$57,157	2005
A	\$52,647	2006
A	\$43,712	2009

As with medium-sized funds, large funds within the sample exhibited no significant differences in the monthly average dollar value of defensive sales transactions.

5.2.10 Analysis of the Variable NET_FLOWDEF Based on Fund Size

The results of the analysis of the variable NET_FLOWDEF, which indicates the net flow of funds into defensive assets, are outlined in Tables 5.31, 5.32 and 5.33.

Table 5.31 Test for statistical differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$65,059	2005
A	\$18,565	2011
A	-\$13,861	2010
A	-\$34,508	2006
A	-\$43,193	2008
A	-\$63,133	2009
A	-\$67,805	2007

The variable NET_FLOWDEF indicates the overall direction of flow of funds, with a positive value signifying a net flow of funds into defensive assets for that specific period. For small funds within the sample, no significant differences were found between the years leading up to, during and after the financial crisis.

Table 5.32 Test for statistical differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.				
Grouping		Mean	Year	
	A		\$72,157	2011
B	A		\$47,499	2005
B	A	C	-\$4,131	2010
B	A	C	-\$4,783	2007
B		C	-\$24,408	2008
	D	C	-\$63,290	2006
	D		-\$118,758	2009

With regards to medium-sized funds within the sample, a number of significant differences were found in the level of net flow into defensive assets. 2011 (\$72,157) and 2005 (\$47,499) saw a significantly greater level of net flow of funds,

as compared to 2006 (-\$63,290) and 2009 (-\$118,758). The year 2011 was also significantly greater than 2008 (-\$24,408), while the value for 2009 was significantly lower than all other years except for 2006.

Table 5.33 Test for statistical differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	-\$46,218	2011
A	-\$54,610	2010
A	-\$65,981	2008
A	-\$79,658	2009
A	-\$82,897	2005
A	-\$108,205	2007
A	-\$142,690	2006

As was found with small funds within the sample, large funds exhibited no significant differences in the level of net flow of funds into defensive assets across the period 2005 to 2011.

5.2.11 Analysis of the Variable TRADE_VALUE Based on Fund Size

The final variable analysed in this portion of the study was TRADE_VALUE, which is the monthly average dollar value of all trades over the period 2005 to 2011, regardless of the nature of each transaction. This variable measures the overall trading activity of the funds within the sample. The results of the analysis for the three fund size groupings are shown in Tables 5.34, 5.35 and 5.36.

Table 5.34 Test for statistical differences in the monthly average total trade value of all investment transactions (TRADE_VALUE) from 2005 to 2011 for group 1 funds (small funds) (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		\$1,017,811	2010
B	A		\$895,517	2011
B	A	C	\$757,348	2007
B		C	\$588,585	2006
B		C	\$555,132	2008
		C	\$494,286	2009
		C	\$433,429	2005

Significant differences were found in the overall level of trading activity for small funds within the sample, with 2010 (\$1,017,811) having a significantly greater level of trading activity (as measured by total trade values) than 2005 (\$433,429), 2006 (\$494,286), 2008 (\$555,132) and 2009 (\$494,286). The value for 2011 (\$895,517) was also significantly greater than 2005 and 2009.

Table 5.35 Test for statistical differences in the monthly average total trade value of all investment transactions (TRADE_VALUE) from 2005 to 2011 for group 2 funds (medium funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$454,818	2007
B	A	\$379,178	2005
B	A	\$374,077	2009
B	A	\$366,109	2011
B	A	\$344,231	2006
B	A	\$280,640	2008
B		\$220,777	2010

With regards to medium-sized funds within the sample, significant differences in the level of total trade value were only found between 2007 (\$454,818) and 2010 (\$220,777), with 2007 exhibiting a significantly larger average monthly total trade value than 2010.

Table 5.36 Test for statistical differences in the monthly average total trade value of all investment transactions (TRADE_VALUE) from 2005 to 2011 for group 3 funds (large funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$630,646	2007
	A	\$585,071	2011
B	A	\$498,329	2006
B	A	\$481,623	2010
B	A	\$431,683	2008
B	A	\$389,382	2005
B		\$260,208	2009

With regards to large funds within the sample, the average monthly total trade value was significantly greater in 2007 (\$630,656) and 2011 (\$585,071) as compared to 2009 (\$260,208). No other significant differences across the years 2005 to 2011 were found.

5.3 Conclusion

This chapter presented the results of the analysis of SMSFs within the sample based on segmentation of the funds according to their size (the total assets held within each fund as at 1 January 2005). The objective of the analysis was to determine whether or not fund size can be used as an indicator of trustee trading behaviour and whether or not trustees reacted differently prior to, during and following the financial crisis based on the total value of assets under trustee management.

Small funds within the sample tended to trade more frequently prior to the financial crisis when compared to those periods both during and following the crisis, although the monthly average total trade value was higher in those years following the crisis as compared to prior to and during the crisis. Smaller funds therefore appear to have reduced trading activity in response to the crisis, but the average dollar value of these trades were higher than prior to or during the crisis. Small funds were also engaged in significantly greater numbers (and dollar values) of aggressive investment purchase trades immediately prior to the financial crisis, although this was matched to some extent by a high level of aggressive investment sales transactions prior to the crisis. The results of the analysis do indicate however, that small funds within the sample were not significantly increasing defensive asset exposure on the eve of the crisis, but tended to increase their dollar value commitment to defensive investment purchase transactions following the financial crisis. While not statistically significant, changes in the variable NET_FLOWDEF tend to indicate that small funds within the sample increased defensive investment exposure in those years following the financial crisis and reduced the same exposure prior to the financial crisis. There was also some evidence of an increase in net aggressive investment exposure by small SMSFs during the financial crisis, but this was also not statistically significant.

Medium-sized funds within the sample exhibited significant differences in trading activity, generally reducing both trading frequency and trade value in the period following the financial crisis. Medium-sized funds also tended to increase aggressive investment exposure on the eve of the financial crisis, although trustees of medium-sized funds were also significantly increasing aggressive investment exposure in 2009, as markets began to recover following the crisis. Medium-sized funds tended to make no significant changes to their exposure to defensive assets over the period 2005 to 2011, although the variable NET_FLOWDEF does indicate that trustees of medium-sized funds were increasing net defensive investment exposure following the crisis, particularly when compared to 2009, which saw them significantly increase aggressive investment exposure.

Large funds within the sample made no significant changes to trade frequency over the period 2005 to 2011, although average monthly trade value

tended to be higher in both the period prior to and following the financial crisis. Large funds tended to make a greater number of trades involving the purchase of aggressive investments prior to the financial crisis, although the actual dollar value of these transactions was not significantly different across the time period under consideration. As with medium-sized funds, large funds tended to show no significant differences in the frequency or value of those investment transactions involving defensive assets. While the variable NET_FLOWDEF revealed that large funds tended to have greater net exposure to defensive investments in those years following the crisis, the level of change was not statistically significant when compared to both prior to and during the financial crisis.

The results of the analysis of fund trading behaviour within this chapter may have relevance to the concepts of relative and absolute risk aversion. It is generally assumed that investors exhibit constant relative risk aversion, which implies that the percentage of wealth that an investor is willing to risk remains unchanged as wealth increases (Chiappori & Paiella 2011). In a related manner, decreasing absolute risk aversion suggests that investors increase the absolute amount of wealth invested in higher risk assets as wealth increases (Kihlstrom, Romer & Williams 1981). In the context of this study, this implies that larger SMSFs within the sample would be expected to have the same investment risk exposure as smaller SMSFs within the sample on a percentage basis, although the absolute level of aggressive assets held by larger funds would be greater than smaller funds. Therefore over the period 2005 to 2011 any changes in investment risk exposure across different fund sizes should be consistent so as to adhere to both constant relative risk aversion and decreasing absolute risk aversion. This is not evident in the results of the analysis, which indicates that medium-sized funds were more likely to increase exposure to aggressive investments as markets bottomed in 2009, trading behaviour not shared by trustees of small or large funds. Smaller funds were more likely to increase aggressive investment exposure leading up to the financial crisis, behaviour which is again not evident in the trading decisions of trustees of larger SMSFs. The only change in trading activity common to funds of all sizes appears to be an increase in defensive investment exposure in the period following the financial crisis. Overall however, it does appear that the trading behaviour of SMSF trustees in this study does not conform to the general concepts of constant relative risk aversion and

decreasing absolute risk aversion. This suggests that further investigation into relative and absolute risk aversion of SMSF trustees may be warranted, although this matter is beyond the scope of this study.

This chapter presented the results of the analysis of SMSFs within the sample based on segmentation according to the size of the fund. The results tend to indicate that funds of all sizes increased exposure to defensive investments following the crisis and were not taking active steps to decrease exposure to aggressive investments prior to the crisis. Of the three fund-size categories, only medium-sized funds appeared to increase exposure to aggressive investment as markets bottomed during the financial crisis. The next chapter presents the results of the analysis of SMSFs within the sample on the basis of fund risk profile.

CHAPTER 6

RESULTS: TRADING BEHAVIOUR AND FUND RISK PROFILE

6.1 Introduction

The previous chapter presented the results of the analysis of SMSF investment transactions over the period 2005 to 2011 based on fund size. This was done on an annual basis and considered the trading activity of funds within the sample based on the dollar value of assets held within each fund. This chapter presents the results of the analysis of the trading behaviour of SMSFs on the basis of fund risk profile. This analysis seeks to address the question of whether or not funds with differing risk profiles exhibited the same trading behaviour over the period 2005 to 2011.

Segmenting the SMSFs within the sample based on risk profile should allow for generalisations to be drawn regarding the behaviour of fund trustees with differing risk profiles when confronted with the set of circumstances that existed over the period 2005 to 2011. For example, it would be reasonable to assume that trustees of those funds with a more aggressive risk profile would have taken advantage of falling asset prices during the financial crisis, while trustees with a more defensive risk profile would have been reducing aggressive investment exposure immediately prior to the financial crisis. The analysis of the variables outlined in Table 3.7 in Chapter 3 on the basis of fund risk profiles may allow for answers to be found to these and similar questions regarding SMSF trustee risk profiles and associated trading behaviour.

6.2 Statistical Differences in SMSF Trading Behaviour Based on Risk Profile

The SMSFs within the sample data were separated into three groups based on their risk profile as at 1 January 2005 and were tested for significant differences across each year for each of the variables as defined in Table 3.7. The mean values for each of the variables for funds in group A are shown in Table 6.1. Group A funds are those funds with an ‘aggressive’ risk profile (funds with an equities allocation of greater than 60% as at 1 January 2005).

Table 6.1 Monthly means of variables for group A funds (aggressive funds) for each year from 2005 to 2011

Year	2005	2006	2007	2008	2009	2010	2011
COUNT	37	42	41	37	36	36	25
COUNT_AGGBUYS	20	25	19	17	20	15	11
COUNT_AGGSALES	10	10	14	7	4	12	6
VALUE_AGGBUYS	\$87,456	\$173,276	\$197,106	\$174,072	\$115,396	\$157,211	\$138,912
VALUE_AGGSALES	\$109,950	\$112,225	\$178,226	\$110,474	\$34,182	\$127,374	\$82,905
COUNT_DEFBUYS	6	5	6	8	9	6	5
COUNT_DEFSALES	2	2	3	5	3	3	3
VALUE_DEFBUYS	\$115,714	\$76,602	\$129,876	\$118,171	\$88,000	\$139,375	\$182,452
VALUE_DEFSALES	\$47,829	\$40,336	\$89,208	\$123,157	\$65,145	\$141,309	\$149,187
NET_FLOWDEF	\$22,494	-\$61,052	-\$18,879	-\$63,598	-\$81,214	-\$29,838	-\$56,007
TRADE_VALUE	\$360,949	\$402,439	\$594,416	\$525,874	\$302,724	\$565,268	\$553,456

The data shows that the frequency of trading activity by aggressive funds, as measured by the variable COUNT, was relatively stable across the period 2005 to 2010, with only 2011 exhibiting a substantially lower average monthly number of trades. COUNT_AGGBUYS, which measures the average number of aggressive investment purchase transactions per month, appears to indicate a drop in the level of such transactions following the financial crisis, with only 15 and 11 such transactions in 2010 and 2011 respectively. This compares to 20 and 25 such transactions in 2005 and 2006 respectively. COUNT_AGGSALES, which measures the average monthly number of aggressive investment sales transactions, peaked at 14 such transactions in 2007, with a low point of just four in 2009. VALUE_AGGBUYS, which measures the average monthly dollar value of aggressive investment purchase transactions, was

relatively consistent across the period 2005 to 2011, although 2007 did represent the highest level of such transactions. VALUE_AGGSALES, representing the average monthly dollar value of aggressive sales transactions, reached a low of \$34,182 per month in 2009.

With regards to defensive investment transactions, COUNT_DEFBUYS, which measures the average monthly number of defensive investment purchase transactions, peaked in 2009 with an average of nine such transactions per month. COUNT_DEFSALES, which measures the average monthly number of defensive investment sales transactions, showed little variation over the seven year period, although 2008 saw the highest number of such transactions, averaging eight per month. VALUE_DEFBUYS, which measures the average monthly dollar value of defensive investment purchases, was higher in the years following the crisis. 2011 and 2010 saw monthly averages of this type of transaction of \$185,452 and \$139,375 respectively, which were the two highest recorded figures over the seven year period. VALUE_DEFSALES, which measures the monthly average dollar value of defensive investment sales transactions, tended to be higher in the years following the crisis, peaking in 2011 with an average monthly value of \$149,187 of such trades. NET_FLOWDEF, which measures the net flow of funds into defensive assets, reached an average monthly low of -\$81,214 in 2009. TRADE_VALUE, which is simply the average monthly dollar value of all investment decisions, showed some differences over the seven year period, with a low in 2009 of \$302,724 in average monthly trade value.

Table 6.2 shows the monthly mean for each of the variables for group M funds, which are moderate risk funds within the sample. These are funds with an equities allocation of greater than 50% but less than 60% as at 1 January 2005.

Table 6.2 Monthly means of variables for group M funds (moderate funds) for each year from 2005 to 2011

Year	2005	2006	2007	2008	2009	2010	2011
COUNT	46	44	53	30	28	29	29
COUNT_AGGBUYS	22	22	22	11	16	13	8
COUNT_AGGSALES	14	9	17	5	2	6	9
VALUE_AGGBUYS	\$102,226	\$206,877	\$254,612	\$86,372	\$111,812	\$113,166	\$102,656
VALUE_AGGSALES	\$126,218	\$99,546	\$147,455	\$45,994	\$40,730	\$82,362	\$180,962
COUNT_DEFBUYS	8	9	9	7	6	6	6
COUNT_DEFSALES	3	4	5	8	4	4	6
VALUE_DEFBUYS	\$158,584	\$200,367	\$240,449	\$114,506	\$91,126	\$135,366	\$119,937
VALUE_DEFSALES	\$54,127	\$122,852	\$144,024	\$167,855	\$84,483	\$131,956	\$139,765
NET_FLOWDEF	\$23,992	-\$107,331	-\$107,156	-\$40,379	-\$71,082	-\$30,804	\$78,307
TRADE_VALUE	\$441,155	\$629,643	\$786,540	\$414,728	\$328,152	\$462,849	\$543,321

With regards to the overall level of trading frequency, measured by the variable COUNT, moderate risk funds exhibit a similar pattern to funds with a more aggressive risk profile. That is, the years following the financial crisis tended to have a lower monthly average trade count when compared to the years leading up to the crisis. In this regard the monthly average trade count peaked at 53 trades in 2007, with only 28, 29 and 29 trades in 2009, 2010 and 2011 respectively. The variable COUNT_AGGBUYS shows a similar pattern, with an average of just eight such transactions per month in 2011, compared to 22 such transactions per month for the years 2005, 2006 and 2007. COUNT_AGGSALES, the measure of aggressive sales transactions, exhibits a different pattern, with an average of just two such transactions in 2009, compared to 17 in 2007. VALUE_AGGBUYS shows a similar pattern to COUNT_AGGBUYS, with a greater monthly average dollar value of aggressive purchase transactions in the years leading up to the financial crisis, peaking at a monthly average of \$254,612 in 2007. As would be expected, VALUE_AGGSALES shows a similar pattern to COUNT_AGGSALES, with the monthly average dollar value of aggressive investment sales reaching a low of \$40,730 in 2009.

With regards to defensive investment transactions, COUNT_DEFBUYS, which shows the average monthly number of defensive purchase transactions, peaked in 2006 and 2007, averaging nine such transactions per month. Overall however, there was little differentiation across the period 2005 to 2011, with the lowest

monthly average of such trades being 6 in 2009, 2010 and 2011. COUNT_DEFSALES, which measure the monthly average number of defensive investment sales transactions, also showed only slight variation across the period. The lowest monthly average number of this type of transaction occurred in 2005, with three per month, and the highest number of defensive sales transactions occurred in 2008, with an average of 8 transactions. VALUE_DEFBUYS, which measures the monthly average dollar value of defensive investment purchases, varied from an average of \$240,449 in 2007, to \$91,126 in 2009. VALUE_DEFSALES exhibits a similar pattern, although the average monthly dollar value of defensive investment sales transactions peaked in 2008, at \$167,855 per month. NET_FLOWDEF, which measures the net flow of funds into defensive assets, varied from \$78,307 in 2011, to -\$107,156 in 2007. TRADE_VALUE, the measurement of the overall dollar value of all trades, varied considerably across the period 2005 to 2011, peaking in 2007 with an average monthly trade value of \$786,540, and a low of \$328,152 in 2009.

Table 6.3 shows the monthly means for each of the variables for defensive funds within the sample, or group D funds. These are funds with an equities allocation of less than 50% as at 1 January 2005.

Table 6.3 Monthly means of variables for group D funds (defensive funds) for each year from 2005 to 2011

Year	2005	2006	2007	2008	2009	2010	2011
COUNT	33	31	29	26	28	22	27
COUNT_AGGBUYS	16	15	12	9	15	9	9
COUNT_AGGSALES	7	8	8	4	3	4	8
VALUE_AGGBUYS	\$75,047	\$140,364	\$116,752	\$48,820	\$130,029	\$67,368	\$86,693
VALUE_AGGSALES	\$87,721	\$90,232	\$72,598	\$23,365	\$21,802	\$55,287	\$114,002
COUNT_DEFBUYS	7	6	5	7	7	5	5
COUNT_DEFSALES	4	3	4	7	3	4	5
VALUE_DEFBUYS	\$120,177	\$92,311	\$122,705	\$110,520	\$182,033	\$248,143	\$236,607
VALUE_DEFSALES	\$71,676	\$45,209	\$97,576	\$133,666	\$142,501	\$252,161	\$249,373
NET_FLOWDEF	\$12,674	-\$50,132	-\$44,154	-\$25,455	-\$108,227	-\$12,080	\$27,309
TRADE_VALUE	\$354,620	\$368,115	\$409,631	\$316,371	\$476,366	\$622,960	\$686,675

The overall level of trading activity of defensive funds is measured by the variable COUNT. This variable, measuring the monthly average number of all

investment transactions, peaked in 2005 with 33 transactions, with a low of 22 transactions in 2010. COUNT_AGGBUYS, which measures the number of aggressive investment purchase transactions, shows a similar pattern, reaching a high of 16 transactions in 2005 and a low of 9 transactions in 2008, 2010 and 2011. COUNT_AGGSALES, the number of monthly aggressive investment sales transactions, reached a high of 8 in 2006, 2007 and 2011. VALUE_AGGBUYS, which measures the average monthly dollar value of aggressive investment purchase transactions, reached an average monthly high of \$140,364 in 2006. VALUE_AGGSALES, similar to COUNT_AGGSALES, recorded high levels in 2005, 2006 and 2007. The highest average monthly dollar of aggressive investment sales transactions however, was reached in 2011, with an average of \$114,002. COUNT_DEFBUYS, a measure of the average monthly number of defensive investment purchase transactions, shows little variation across the period 2005 to 2011, ranging from 5 transactions 2007, 2010 and 2011, to 7 transactions in 2005, 2008 and 2009. COUNT_DEFSALES, the measure of defensive investment sales transactions, shows some variation, from 3 transactions in 2006 and 2009, to 7 transactions in 2008. With regards to VALUE_DEFBUYS, 2010 and 2011 recorded average monthly defensive investment purchase of \$248,143 and \$236,607 respectively. This is higher than corresponding figures in 2006 and 2007 of \$92,311 and \$122,705 respectively. VALUE_DEFSALES shows a similar trend, with a monthly average of \$252,161 of defensive investment sales transactions in 2010, and just \$45,209 in 2006. NET_FLOWDEF, the measure of net flow of funds into defensive investments, recorded positive values in 2005 and 2011 and a low of -\$108,227 net flow into defensive investments in 2009. TRADE_VALUE, the measure of average monthly dollar trade value, shows an increase from the years preceding the crisis to the years following the crisis.

As with Chapter 4 and Chapter 5, the data as presented in Tables 6.1, 6.2 and 6.3 does not indicate whether or not any of the changes in the trading behaviour of fund trustees (as grouped by risk profile) was statistically significant or could be explained by normal variations in the data. Once again the next step was to test the variables in Tables 6.1, 6.2 and 6.3 for significant differences across each year using Fisher's Least Significant Difference (LSD) test based on a significance level of 0.05. The results of the statistical analysis are grouped based on each variable tested.

6.2.1 Analysis of the Variable COUNT Based on Fund Risk Profile

The results of the analysis of the variable COUNT for the three fund risk profile groupings are shown in Tables 6.4, 6.5 and 6.6.

Table 6.4 Test for statistically significant differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	42	2006
A	41	2007
A	37	2005
A	37	2008
A	36	2009
A	36	2010
A	25	2011

In terms of the average monthly number of all investment transactions for aggressive funds, no statistically significant differences were observed between the years 2005 and 2011.

Table 6.5 Test for statistically significant differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 for group M funds (moderate funds) ($p = 0.05$)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	53	2007
B	A	46	2005
B	A	44	2006
B		30	2008
B		29	2010
B		29	2011
B		28	2009

Statistically significant differences were found in the number of average monthly investment transactions for moderate risk funds, with 2007 having a significantly higher number of transactions than 2008, 2009, 2010 and 2011.

Table 6.6 Test for statistically significant differences in the monthly average number of investment transactions (COUNT) from 2005 to 2011 for group D funds (defensive funds) ($p = 0.05$)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	33	2005
A	31	2006
A	29	2007
A	28	2009
A	27	2011
A	26	2008
A	22	2010

As with aggressive funds, funds with a defensive risk profile exhibited no significant differences in the average monthly number of investment transactions across the period 2005 to 2011.

6.2.2 Analysis of the Variable COUNT_AGGBUYS Based on Fund Risk Profile

The results of the analysis of the variable COUNT_AGGBUYS for the three fund risk profile groupings are shown in Tables 6.7, 6.8 and 6.9.

Table 6.7 Test for statistically significant differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	25	2006
B	A	20	2009
B	A	20	2005
B	A	19	2007
B	A	17	2008
B	A	15	2010
B		11	2011

A statistically significant difference was found in the monthly average number of aggressive purchase transactions between 2006 and 2011, with an average of 25 such transactions in 2006, compared to just 11 in 2011.

Table 6.8 Test for statistically significant differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	22	2006
	A	22	2005
	A	22	2007
B	A	16	2009
B	A	13	2010
B		11	2008
B		8	2011

Similar to funds with more aggressive risk exposure, moderate risk funds exhibited a number of statistically significant differences in the monthly average number of aggressive purchase transactions, with the mean number of such transactions in 2005 (22), 2006 (22) and 2007 (22) being significantly greater than 2008 (11) and 2011 (8).

Table 6.9 Test for statistically significant differences in the monthly average number of aggressive purchase transactions (COUNT_AGGBUYS) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	16	2005
B	A	15	2006
B	A	15	2009
B	A	12	2007
B	A	9	2008
B		9	2010
B		9	2011

With regards to the average monthly number of aggressive purchase transactions by defensive funds, a significantly greater difference was found in the level of such transactions between 2005 and 2010 and 2011, with respective means of 16, 9 and 9.

6.2.3 Analysis of the Variable COUNT_AGGSALES Based on Fund Risk Profile

The results of the analysis of the variable COUNT_AGGSALES for the three fund risk profile groupings, which measures the average monthly number of sales transactions of aggressive investments, are shown in Tables 6.10, 6.11 and 6.12.

Table 6.10 Test for statistically significant differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	14	2007
B	A	12	2010
B	A	10	2006
B	A	10	2005
B	A	7	2008
B	A	6	2011
B		4	2009

With regards to the monthly average number of aggressive sales transactions of aggressive funds, the level of activity in 2007 (an average of 14 such transactions) was found to be significantly greater than in 2009 (an average of 4 such transactions).

Table 6.11 Test for statistically significant differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		17	2007
B	A		14	2005
B	A	C	9	2011
B	A	C	9	2006
B		C	6	2010
B		C	5	2008
		C	2	2009

For moderate risk funds, 2007 saw a significantly greater number of aggressive sales transactions (mean of 17) when compared to 2010 (6), 2008 (5) and 2009 (2). The mean number of transactions for 2009 was also significantly lower than in 2005, with just 2 such transactions in 2009 compared to 14 in 2005.

Table 6.12 Test for statistically significant differences in the monthly average number of aggressive sales transactions (COUNT_AGGSALES) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	8	2006
A	8	2011
A	8	2007
A	7	2005
A	4	2010
A	4	2008
A	3	2009

Unlike aggressive and moderate risk funds, no statistically significant differences were found in the monthly average number of aggressive sales transactions for defensive funds.

6.2.4 Analysis of the Variable VALUE_AGGBUYS Based on Fund Risk Profile

The results of the analysis of the variable VALUE_AGGBUYS, which measures the monthly average dollar value of aggressive investment purchase transactions, are shown in Tables 6.13, 6.14 and 6.15.

Table 6.13 Test for statistically significant differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$197,106	2007
A	\$174,072	2008
A	\$173,276	2006
A	\$157,211	2010
A	\$138,912	2011
A	\$115,396	2009
A	\$87,456	2005

No statistically significant differences in the monthly average dollar value of aggressive purchase transaction were found for aggressive funds within the sample.

Table 6.14 Test for statistically significant differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letters are not significantly different.			
Grouping		Mean	Year
	A	\$254,612	2007
B	A	\$206,877	2006
B		\$113,166	2010
B		\$111,812	2009
B		\$102,656	2011
B		\$102,226	2005
B		\$86,372	2008

Moderate risk funds within the sample showed a statistically significant difference in the monthly average dollar value of aggressive purchase transactions between the years 2007 and 2005, 2008, 2009, 2010 and 2011. The mean value of aggressive investment purchase transactions in 2007 of \$254,612 was more than double the values recorded for all other years, excluding 2006.

Table 6.15 Test for statistically significant differences in the monthly average dollar value of aggressive purchase transactions (VALUE_AGGBUYS) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$140,363	2006
	A	\$130,029	2009
B	A	\$116,752	2007
B	A	\$86,693	2011
B	A	\$75,047	2005
B	A	\$67,368	2010
B		\$48,820	2008

Defensive funds within the sample showed a significantly greater difference in the monthly average dollar value of aggressive purchase transactions between the years 2006 (\$140,363), 2009 (\$130,029) and the year 2008 (\$48,820).

6.2.5 Analysis of the Variable VALUE_AGGSALES Based on Fund Risk Profile

The results of the analysis of the variable VALUE_AGGSALES for the three fund risk profile groups, which measures the monthly average dollar value of aggressive investment sales transactions, are shown in Tables 6.16, 6.17 and 6.18.

Table 6.16 Test for statistically significant differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$178,226	2007
B	A	\$127,374	2010
B	A	\$112,225	2006
B	A	\$110,474	2008
B	A	\$109,950	2005
B	A	\$82,905	2011
B		\$34,182	2009

For aggressive funds, the monthly average dollar value of aggressive investment sales transactions was significantly greater in 2007 (\$178,226) as compared to 2009 (\$89,905).

Table 6.17 Test for statistically significant differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$180,962	2011
B	A	\$147,455	2007
B	A	\$126,218	2005
B	A	\$99,546	2006
B	A	\$82,362	2010
B		\$45,994	2008
B		\$40,730	2009

With regards to the variable VALUE_AGGSALES and moderate risk funds, the value recorded in 2011 (\$180,962) was significantly greater than 2008 (\$45,994) and 2009 (\$40,730).

Table 6.18 Test for statistically significant differences in the monthly average dollar value of aggressive sales transactions (VALUE_AGGSALES) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$114,002	2011
B	A	\$90,232	2006
B	A	\$87,721	2005
B	A	\$72,598	2007
B	A	\$55,287	2010
B		\$23,365	2008
B		\$21,802	2009

Defensive funds within the sample showed a significantly greater difference in the monthly average dollar value of aggressive sales transactions between 2011 (\$114,002) and the years 2008 (\$23,365) and 2009 (\$21,802).

6.2.6 Analysis of the Variable COUNT_DEFBUYS Based on Fund Risk Profile

The results of the analysis for the variable COUNT_DEFBUYS, which measures the monthly average number of defensive investment sales transactions for the three fund risk profile groupings, are shown in Tables 6.19, 6.20 and 6.21.

Table 6.19 Test for statistically significant differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	9	2009
A	8	2008
A	6	2005
A	6	2010
A	6	2007
A	5	2011
A	5	2006

With regards to the variable COUNT_DEFBUYS for aggressive funds, which represents the monthly average number of aggressive purchase transactions, no statistically significant differences were found between the years from 2005 to 2011.

Table 6.20 Test for statistically significant differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 for group M funds (moderate funds) ($p = 0.05$)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	9	2006
A	9	2007
A	8	2005
A	7	2008
A	6	2011
A	6	2009
A	6	2010

As with aggressive funds within the sample, no statistically significant differences were found in the monthly average number of aggressive purchase transactions for moderate funds between the years 2005 to 2011.

Table 6.21 Test for statistically significant differences in the monthly average number of defensive purchase transactions (COUNT_DEFBUYS) from 2005 to 2011 for group D funds (defensive funds) ($p = 0.05$)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	7	2009
A	7	2005
A	7	2008
A	6	2006
A	5	2007
A	5	2011
A	5	2010

As was the case with both aggressive and moderate funds within the sample, defensive funds also showed no statistically significant differences in the monthly average number of defensive purchase transactions between the years 2005 to 2011.

6.2.7 Analysis of the Variable COUNT_DEFSALES Based on Fund Risk Profile

The results of the analysis of the variable COUNT_DEFSALES, which measures the monthly average number of defensive sales transactions from 2005 to 2011 for the three fund risk profile groupings, are shown in Tables 6.22, 6.23 and 6.24.

Table 6.22 Test for statistically significant differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	5	2008
A	3	2009
A	3	2011
A	3	2010
A	3	2007
A	2	2006
A	2	2005

With regards to the monthly average number of defensive sales transactions for aggressive funds within the sample, no statistically significant differences were found across the period 2005 to 2011.

Table 6.23 Test for statistically significant differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	8	2008
B	A	6	2011
B	A	5	2007
B	A	4	2009
B	A	4	2006
B		4	2010
B		3	2005

Moderate funds within the sample showed a number of statistically significant differences in the monthly average number of defensive sales transactions, with 2008 (8) having a significantly higher monthly average than 2005 (3) and 2010 (4).

Table 6.24 Test for statistically significant differences in the monthly average number of defensive sales transactions (COUNT_DEFSALES) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping	Mean	Year	
A	7	2008	
A	5	2011	
A	4	2007	
A	4	2010	
A	4	2005	
A	3	2009	
A	3	2006	

As with aggressive funds within the sample, defensive funds showed no statistically significant differences in the monthly average number of defensive sales transactions from 2005 to 2011.

6.2.8 Analysis of the Variable VALUE_DEFBUYS Based On Fund Risk Profile

The results of the analysis of the variable VALUE_DEFBUYS for the three fund risk profile groupings, which measures the average monthly dollar value of investment transactions which involved the purchase of a defensive investment, are shown in Tables 6.25, 6.26 and 6.27.

Table 6.25 Test for statistically significant differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$182,452	2011
B	A	\$139,375	2010
B	A	\$129,876	2007
B	A	\$118,171	2008
B	A	\$115,714	2005
B	A	\$88,000	2009
B		\$76,602	2006

Aggressive funds within the sample showed a significantly greater difference in the monthly average dollar value of defensive purchase transactions between the years 2011 (\$182,452) and 2006 (\$76,602).

Table 6.26 Test for statistically significant differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$240,449	2007
B	A	\$200,367	2006
B	A	\$158,584	2005
B	A	\$135,366	2010
B		\$119,937	2011
B		\$114,506	2008
B		\$91,126	2009

Significantly greater differences in the monthly average dollar value of defensive purchase transactions for moderate risk funds were found between 2007 (\$240,449) and the years 2008, 2009 and 2011 (\$114,506, \$91,126 and \$119,937 respectively).

Table 6.27 Test for statistically significant differences in the monthly average dollar value of defensive purchase transactions (VALUE_DEFBUYS) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$248,143	2010
A	\$236,607	2011
A	\$182,033	2009
A	\$122,705	2007
A	\$120,177	2005
A	\$110,520	2008
A	\$92,311	2006

Unlike aggressive and moderate risk funds, no statistically significant differences were found in the monthly average dollar value of defensive purchase transactions over the period 2005 to 2011 for defensive funds.

6.2.9 Analysis of the Variable VALUE_DEFSALES Based on Fund Risk Profile

The results of the analysis of the variable VALUE_DEFSALES for the three fund risk profile groupings, which measures the monthly average dollar value of defensive investment sales transactions, are shown in Tables 6.28, 6.29 and 6.30.

Table 6.28 Test for statistically significant differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		\$149,187	2011
B	A		\$141,309	2010
B	A	C	\$123,157	2008
B	A	C	\$89,208	2007
B	A	C	\$65,145	2009
B		C	\$47,829	2005
		C	\$40,336	2006

For aggressive funds within the sample the year 2011 (\$149,187) was significantly greater than both 2005 (\$47,829) and 2006 (\$40,336), while 2010 (\$141,309) was significantly greater than 2006 (\$40,336).

Table 6.29 Test for statistically significant differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$167,855	2008
B	A	\$144,024	2007
B	A	\$139,765	2011
B	A	\$131,956	2010
B	A	\$122,852	2006
B	A	\$84,483	2009
B		\$54,127	2005

With regards to moderate risk funds within the sample there was a significantly greater difference in the monthly average dollar value of defensive sales transactions between 2008 and 2005, with 2008 recording an average of \$167,855 compared to \$54,127 in 2005.

Table 6.30 Test for statistically significant differences in the monthly average dollar value of defensive sales transactions (VALUE_DEFSALES) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$252,161	2010
	A	\$249,373	2011
B	A	\$142,501	2009
B	A	\$133,666	2008
B	A	\$97,576	2007
B		\$71,676	2005
B		\$45,209	2006

For defensive funds within the sample 2010 recorded a significantly greater monthly average dollar value of defensive sales transactions than 2005 and 2006,

with averages of \$252,161, \$71,676 and \$45,209 respectively. The year 2011 was also significantly greater than 2005 and 2006, with respective mean values of \$249,373, \$71,676 and \$45,209.

6.2.10 Analysis of the Variable NET_FLOWDEF Based on Fund Risk Profile

The results of the analysis of the variable NET_FLOWDEF for the three fund risk profile groupings, which measures the net flow of funds into defensive assets, are shown in Tables 6.31, 6.32 and 6.33.

Table 6.31 Test for statistically significant differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.		
Grouping	Mean	Year
A	\$22,494	2005
A	-\$18,879	2007
A	-\$29,838	2010
A	-\$56,007	2011
A	-\$61,052	2006
A	-\$63,598	2008
A	-\$81,214	2009

For aggressive funds within the sample no statistically significant differences in the monthly average net flow of money into defensive assets were found over the period 2005 to 2011.

Table 6.32 Test for statistically significant differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$78,307	2011
B	A	\$23,992	2005
B	A	-\$30,804	2010
B	A	-\$40,379	2008
B		-\$71,082	2009
B		-\$107,156	2007
B		-\$107,331	2006

For moderate risk funds within the sample there was a significantly greater difference in the variable NET_FLOWDEF between 2011 (\$78,307) and 2006 (-\$107,331), 2007 (-\$107,156) and 2009 (-\$71,802).

Table 6.33 Test for statistically significant differences in the monthly average net flow of money into defensive assets (NET_FLOWDEF) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$27,309	2011
	A	\$12,674	2005
B	A	-\$12,080	2010
B	A	-\$25,455	2008
B	A	-\$44,154	2007
B	A	-\$50,132	2006
B		-\$108,227	2009

For defensive funds within the sample there was a significantly greater difference in NET_FLOWDEF between the years 2011 (\$27,309) and 2005 (\$12,674) with 2009 (-\$108,227).

6.2.11 Analysis of the Variable TRADE_VALUE Based on Fund Risk Profile

The results of the analysis of the variable TRADE_VALUE, which measures the monthly average dollar value of all investment transactions for the three fund risk profile groupings, are shown in Tables 6.34, 6.35 and 6.36.

Table 6.34 Test for statistically significant differences in the monthly average total trade value of all investment transactions (TRADE_VALUE) from 2005 to 2011 for group A funds (aggressive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$594,416	2007
B	A	\$565,268	2010
B	A	\$553,456	2011
B	A	\$525,873	2008
B	A	\$402,439	2006
B	A	\$360,949	2005
B		\$302,724	2009

For aggressive funds within the sample 2007 recorded a significantly greater monthly average total trade value than 2009, with an average of \$594,416 compared to \$302,274.

Table 6.35 Test for statistically significant differences in the monthly average total trade value of all investment transactions (TRADE_VALUE) from 2005 to 2011 for group M funds (moderate funds) (p = 0.05)

Means with the same letter are not significantly different.				
Grouping			Mean	Year
	A		\$786,540	2007
B	A		\$629,643	2006
B	A	C	\$543,321	2011
B		C	\$462,849	2010
B		C	\$441,155	2005
B		C	\$414,728	2008
		C	\$328,152	2009

For moderate risk funds within the sample a number of statistically significant differences in the monthly average total trade value of all investment transactions were found. The monthly average of \$786,540 in 2007 was significantly greater than 2009 (\$328,152), 2008 (\$414,728), 2005 (\$441,155) and 2010 (\$543,321). 2006, with a monthly average of \$629,643, was also significantly greater than 2009 (\$328,152).

Table 6.36 Test for statistically significant differences in the monthly average total trade value of all investment transactions (TRADE_VALUE) from 2005 to 2011 for group D funds (defensive funds) (p = 0.05)

Means with the same letter are not significantly different.			
Grouping		Mean	Year
	A	\$686,675	2011
B	A	\$622,960	2010
B	A	\$476,366	2009
B	A	\$409,631	2007
B	A	\$368,115	2006
B		\$354,620	2005
B		\$316,371	2008

For defensive funds within the sample 2011 had a significantly greater monthly average total trade value than 2008 and 2005, with means of \$686,675 compared to \$316,371 and \$354,620 respectively.

6.3 Conclusion

This section of the study outlined the results of the analysis of funds within the sample based on the relative risk profile of each of the funds. The purpose of the analysis is to determine whether or not fund risk profile is a differentiating factor when considering the investment approach adopted by fund trustees.

SMSFs within the sample which were categorised as having an aggressive investment approach tended to show little difference in the frequency of trades over the period 2005 to 2011, although the average monthly dollar value of trades was significantly lower during the financial crisis (2009) when compared to immediately prior to the crisis (2007), suggesting that trustees of these SMSFs made only slight changes to the frequency and dollar value of their trading activity. Interestingly, trustees with an aggressive risk profile generally showed little willingness to significantly increase aggressive investment exposure in the middle of the financial crisis as asset markets reached their lows. Furthermore, the same trustees tended to increase defensive investment exposure after the financial crisis when compared to those periods prior to and during the crisis. This relatively conservative investment behaviour would appear to be somewhat at odds with an aggressive investment approach.

Those funds within the sample with a moderate risk profile tended to trade less frequently both during and following the financial crisis when compared to the period leading up to the financial crisis. Trading activity and the monthly average dollar trade value was particularly low during 2009, a period when equity markets reached their lows during the financial crisis. In general, moderate risk funds increased aggressive investment exposure immediately prior to the financial crisis, rather than the more appropriate strategy of reducing such exposure. There is also little evidence that trustees of moderate risk funds took advantage of low prices

during or following the financial crisis to increase exposure to aggressive investments.

Those SMSF within the sample with a defensive risk profile made no significant changes in trading frequency over the period 2005 to 2011, although those years following the crisis tended to exhibit a greater monthly average total trade value. Trustees of defensive funds generally increased exposure to aggressive investments in those years prior to the crisis, although not to a significant degree on the eve of the crisis in 2007. Interestingly in 2009, during which equity markets reached their lows, defensive-minded trustees significantly increased their exposure to aggressive investments, most likely taking advantage of low asset prices at that time. With regards to those transactions involving increasing exposure to defensive investments, there were no significant differences in the trading behaviour of defensive-minded trustees.

The analysis of SMSFs within the sample based on risk profile has implications for a number of the behavioural finance concepts previously discussed in this study. In particular, the fact that trustees of both aggressive and moderate risk funds did not take advantage of lower asset prices during the financial crisis suggests the existence of loss aversion among those trustees. Given their more aggressive risk profile, trustees of these funds may have incurred significant losses as markets fell at the onset of the financial crisis and were therefore unwilling to realise these losses in order to take advantage of low asset prices as the market bottomed and subsequently recovered. Trustees with a defensive investment approach however, who likely suffered lower unrealised losses as markets fell, were more willing to take advantage of low asset prices as the market bottomed. This is contrary to the expectation that aggressively-minded trustees would be quick to invest in higher risk assets as markets reached their lows in early 2009.

The behaviour of aggressive and moderate risk trustees also suggests the existence of regret avoidance, where trustees were unwilling to sell their losing investments in order to take advantage of lower prices for other assets. However this would need to be confirmed by a closer analysis of the individual transactions of each fund trustee in order to identify the exact investment holdings which were sold

by trustees. Such an analysis is beyond the scope of this study but potentially presents an opportunity for further research. Overall however, this trading behaviour again suggests that SMSF trustee risk profiles are not constant, but do change as circumstances change, confirming work by Gai and Vause (2005). This finding has implications for those who provide investment advice to SMSF trustees, principally financial advisers and accountants. Their reliance on risk profiling may not be sufficiently dynamic to take into account changing risk profiles of SMSF trustees under differing circumstances. The finding that SMSF trustees tended to increase their exposure to defensive assets after the financial crisis, regardless of trustee risk profile, again suggests that SMSF trustees exhibit the availability heuristic, as discussed in Chapter 3. This indicates that regardless of their appetite for risk, SMSF trustees tended to overestimate the likelihood of another investment bear market in the period following the financial crisis.

This chapter presented the results of the analysis of the trading behaviour of SMSFs according to the risk profile of each fund within the sample. In general, regardless of risk profile, fund trustees tended to increase aggressive investment exposure prior to the financial crisis. Only trustees with a defensive risk profile avoided increasing their aggressive investment exposure on the eve of the financial crisis. Again, only trustees with a defensive risk profile showed any evidence of being willing to take advantage of lower prices during the financial crisis to increase their exposure to aggressive investments and most likely benefit from the subsequent recovery in equity markets. The next section of the study, Chapter 7, discusses the results of the analysis that has been presented in Chapters 4, 5 and 6. This discussion is presented within the context of the research questions and hypotheses outlined in Chapter 3.

CHAPTER 7

DISCUSSION

7.1 Introduction

The previous three chapters presented the results of the analysis of SMSF investment transactions over the period 2005 to 2011. This was done on both an annual and per period basis and also considered the trading activity of funds within the sample based on the size of each fund and the level of aggressive or defensive assets held within each fund. This chapter discusses the results of the analyses which were outlined in Chapters 4, 5 and 6.

The discussion of the results of the analyses is framed with reference to addressing the research questions outlined in Chapter 3, which are:

1. Did SMSFs (correctly) increase their exposure to cash and other defensive investments in the period leading up to the global financial crisis?
2. Did SMSFs (correctly) increase their exposure to market risk assets as stock markets bottomed and recovered in 2009?
3. Have SMSFs become more conservative in their investment approach since the global financial crisis?
4. Did larger or less risk-averse SMSFs behave differently as compared to smaller or more conservative SMSFs over the course of the global financial crisis?

The discussion begins with an assessment of whether or not evidence exists that SMSF trustees were increasing their exposure to defensive investments on the eve of the financial crisis, which may indicate whether or not SMSF trustees were correctly positioning their investment portfolios prior to the significant equity market falls which occurred during the crisis.

7.2 Evidence that SMSF Trustees were Increasing Defensive Investment Exposure Prior to the Financial Crisis

SMSFs are viewed as having weathered the 2008 global financial crisis slightly better, or at least on par with professionally managed superannuation funds (Phillips, Baczynski & Teale 2009), with their significant holdings of cash prior to the crisis identified as one of the possible reasons for this performance. This high cash weighting may have come at a cost however, if SMSFs had held high levels of cash through the years 2005 to 2007. Ideally SMSFs would have been increasing their cash exposure on the eve of the financial crisis, a strategy which would have reduced investment losses during the crisis, yet allowed the SMSFs to benefit from rising markets prior to the crisis. When considered on an annual basis however, the results of this study show no significant evidence of a switch into defensive assets by SMSF trustees immediately prior to the financial crisis. There was no evidence of a significant increase in the purchase of defensive assets prior to the financial crisis and no significant decrease in the level of existing defensive assets over the same period. There was evidence of an increase in the level of aggressive asset sales immediately prior to the financial crisis, but this tended to be matched by a simultaneous increase in the level of aggressive investment purchases, which suggests that at that time fund trustees were trading in and out of aggressive assets, rather than actively selling aggressive investments and reinvesting the sale proceeds in defensive assets such as fixed-interest securities. When assessed on a 'per period' basis, the conclusion remains the same – that SMSF trustees were not actively increasing exposure to defensive assets prior to the financial crisis. These findings tend to support Hypothesis 1, that there were no significant differences in the cash allocations of SMSFs leading up to the financial crisis. This leads to the conclusion that high levels of SMSF exposure to cash and other defensive assets prior to the financial crisis were more as a result of fortune, rather than a deliberate strategy to increase defensive investment exposure as markets peaked prior to the financial crisis. This conclusion supports the suggestion by Phillips et al. (2009) that the relatively satisfactory performance of SMSFs during the bear market of 2007-08 was more due to luck than planning.

The implication of this finding is that SMSF trustees would most likely have missed out on the positive market returns enjoyed over the period leading up to the financial crisis. It may be that forgoing the high returns enjoyed by other superannuation funds over this period more than offset the relative outperformance of SMSFs during the financial crisis. This question could be resolved through a comparison of SMSF returns with other superannuation funds across a longer timeframe than that canvassed by this study.

The next section considers whether or not evidence exists to support the notion that SMSF trustees took advantage of lower prices for aggressive assets during the financial crisis by increasing their exposure to such assets as markets fell and subsequently bottomed in early 2009, a strategy which would have likely resulted in higher investment returns. This seeks to address Hypothesis 2, that there was no significant difference in the exposure to risk assets by SMSFs between those periods prior to and during the financial crisis.

7.3 Evidence that SMSF Trustees Increased their Exposure to Riskier Investments as Markets Recovered Following the Financial Crisis

The global financial crisis and associated falls in market indices in most countries resulted in steep losses for investors, but also presented an opportunity for astute investors to invest at or close to the market bottom in early 2009. Such a strategy would have likely resulted in significant capital growth as markets recovered in 2009 and 2010. For SMSFs, which typically held a greater allocation to cash than other superannuation funds, there existed an attractive opportunity to take advantage of cheap prices for most assets, including listed investments.

In terms of this study, the actions of SMSF trustees to take advantage of such an opportunity should be evident in the level of aggressive investment purchases made by trustees over 2008 and 2009. Evidence however, of a deliberate decision by SMSF trustees to invest at such an opportune time is not confirmed by the results of the analysis. On both an annual and 'per period' basis, there is no evidence of a

statistically significant increase in the level of exposure to aggressive investments by SMSF trustees over that period encompassing the market lows. This conclusion tends to support Hypothesis 2 that there is no evidence that SMSFs made significant changes to their exposure to riskier assets during the financial crisis. These findings support previous research regarding changes in the risk profile of Australian investors during the financial crisis (Bateman et al. 2010), where it was found that there was little difference in the risk attitudes of investors between ‘tranquil’ periods and the financial crisis of 2008. Work by Kallberg et al. (2012) however, found that Chinese investors tended to reduce risk during the financial crisis, with a reduction in the standard deviation of portfolios within the sample as compared to the market’s standard deviation. It may be that SMSF trustees, managing assets held exclusively for retirement, adopted a longer term perspective than the private investors analysed in the study by Kallberg et al. (2012) and were more willing to ‘ride out’ the market falls during the financial crisis. This suggests a further area of research, which could be to directly compare investment trading decisions of SMSF trustees with those of private Australian investors.

The results of the analysis of SMSF trading activity prior to and during the financial crisis would tend support Hypothesis 2, that there was no significant difference in the exposure to higher risk assets by SMSFs between those periods prior to and during the financial crisis. The next section seeks to address the third research question, which asks if the events of the financial crisis have resulted in fund trustees adopting a more conservative investment approach.

7.4 Evidence that SMSF Trustees have Become More Conservative in their Investment Approach Since the Global Financial Crisis

The third research question considers whether the investment approach of SMSF trustees has been impacted by the events and investment returns experienced through the financial crisis. That is, have the sharp falls associated with equity markets and other asset classes had a permanent impact on the investment strategy of SMSF trustees? Have SMSF trustees responded to the losses experienced through

2008 and 2009 by permanently altering their investment approach to a more conservative style, as compared to their approach prior to the global financial crisis? This question can be answered by comparing the results of the analysis of a number of the variables both before and after the financial crisis. If trustees have made significant changes to their investment approach in response to the financial crisis, one would expect to see statistically significant differences between the results prior to and following the crisis for those variables which outline increasing or decreasing defensive or aggressive investment exposure respectively.

In terms of the results of the analysis of this study, there is some evidence to suggest that SMSF trustees have become more conservative since the global financial crisis. While not overwhelming, a number of those variables which measure the rate of increasing or decreasing exposure to defensive or aggressive assets respectively, do tend to show a significant change in the investment approach of SMSFs. In general, fund trustees did not actively reduce their level of aggressive investment exposure (little or no significant differences in aggressive sales transactions) in the period following the crisis as compared to prior to the crisis, but there was a significantly lower level of aggressive investment purchase transactions. In those years following the crisis, 2010 and 2011, SMSF trustees did increase their dollar commitment to defensive investment purchases, although only 2011 was statistically significantly greater than those years prior to the crisis. Overall however, there is sufficient evidence to suggest that SMSF trustees have adopted a more conservative investment approach since the financial crisis, as compared to that period prior to the crisis. This result is similar to findings by Kallberg et al. (2012) who found that Chinese investors were more likely to reduce aggressive investment exposure within their portfolios following market falls, although in that instance the analysis compared the period during the market falls with the period following the market falls.

The change in investment approach by SMSF trustees across the period 2005 to 2011 is also evident in the trading frequency of the funds within the sample. In general it was found that fund trustees traded significantly more frequently prior to the crisis than following the crisis, however the average dollar value of each trade was highest in that period following the crisis. It was also found that the frequency

and dollar value committed per trade was lowest during the financial crisis, which may indicate reluctance by SMSF trustees to make any form of investment decisions during the crisis, be they aggressive or defensive in nature. The higher average dollar value per trade in that period following the crisis may simply reflect that SMSF trustee's assets under management had grown over the seven year period covered by the study. This propensity to reduce trading activity is not matched by 401(k) participants in the United States, where it was found that investors traded more frequently during the financial crisis, although the increase was not seen as significant (Tang et al. 2011).

The results of the analysis of SMSF defensive investment trading behaviour does not support Hypothesis 3, that there was no significant difference in the exposure to higher risk assets by SMSFs between the period prior to and following the financial crisis. There is a significant difference in the trading behaviour of SMSFs across those two periods, manifesting itself as a change to a more conservative investment approach following the crisis when compared to prior to the crisis. The next section discusses the results of the analysis of the trading behaviour of SMSFs within the sample based on fund size. This analysis was conducted in order to determine whether or not different sized SMSFs responded differently to the events occurring prior to, during and after the global financial crisis.

7.5 SMSF Trading Behaviour Based on Fund Size

The issue of SMSF size and how it relates to the trading behaviour of fund trustees raises a number of questions. It is reasonable to assume that in general, larger SMSFs (in terms of assets under the management of fund trustees) would belong to members with a greater overall wealth than members of SMSFs with a lower level of assets within the fund. Given that most individuals tend to accumulate wealth later in life, particularly with respect to superannuation, it may also be that larger SMSFs are managed by trustees who are older or more experienced than trustees of smaller funds. Analysing the trading behaviour of SMSF trustees on the basis of fund size may therefore act as a proxy for some of the demographic features of SMSF trustees, specifically trustee age and overall wealth. In order to determine whether or not the size of a SMSF is related to the investment decisions of the fund's

trustees, the funds within the sample were grouped by size and their investment transactions analysed according to the variables outlined in Table 3.7.

7.5.1 The Trading Behaviour of Small SMSFs

As with the SMSF sample as a whole, small funds within the sample exhibited a greater tendency to trade more frequently and more aggressively prior to the financial crisis. Small funds also tended to be more conservative in the period following the crisis, with a greater emphasis on the purchase of defensive investments in that period. There is little evidence that trustees of small SMSFs within the sample acted to take advantage of falling or lower asset prices during the financial crisis. Such behaviour may indicate the existence of behavioural traits such as herding and naivety.

7.5.2 The Trading Behaviour of Medium-Sized SMSFs

As with small funds, medium-sized funds within the sample also tended to be more aggressive in the period prior to the financial crisis, as compared to the years following the crisis. Interestingly however, there is evidence that medium-sized funds acted to increase their exposure to aggressive investments during the crisis. Such a strategy of increasing exposure to riskier assets close to or at the bottom of the bear market may have resulted in medium-sized funds within the sample earning a higher overall investment return. Medium-sized funds also tended to trade more frequently prior to the financial crisis.

7.5.3 The Trading Behaviour of Large SMSFs

Large funds within the sample tended to show the least variation in trading frequency over the period 2005 to 2011 when compared to small and medium-sized funds, however the nature of the activity did change. Trustees of large SMSFs made significantly greater average monthly dollar value purchases of defensive investments immediately prior to the financial crisis. Of the three fund size groupings within the SMSF sample, only trustees of larger funds appear to have been increasing defensive investment exposure prior to the crisis. This may be due to the possibility

that trustees of larger SMSFs are older and more experienced than trustees of smaller funds and may have more readily expected the stock market falls during 2008-09. However, the trading behaviour of large SMSFs differs from the behaviour of other ‘sophisticated’ investors during the financial crisis. Ben-David et al. (2011) showed that US based hedge funds, professional investors who generally employ complicated and sophisticated investment trading strategies, sold down nearly a third of their equity holdings during the early stages of the financial crisis (the first six months of 2008). This suggests that trustees of large SMSFs, while potentially more sophisticated than their counterparts at smaller funds, do not exhibit the same investment trading patterns as professional investors.

7.5.4 Summary of Fund Size and Trading Behaviour

The trading behaviour of SMSF trustees does appear to vary according to the size of the fund. In general, larger funds may have lessened the impact of the financial crisis by increasing allocations to defensive investments prior to the crisis, while medium-sized funds were more likely to act to take advantage of falling and lower stock market prices around 2008-09. Small SMSFs tended to exhibit little evidence of an appropriate investment strategy. It may be that trustees of such funds are either less experienced than their counterparts at larger funds, or that the trustees, potentially being younger and with a longer investment time horizon, may have been less concerned about the market volatility and kept to their existing investment strategy regardless of economic and market conditions. The issue of fund size is an important one, given that much attention has been focused on the optimum size of an SMSF, although this is usually within the context of fees, not investment returns or investment strategies. Given their relative inflexibility, it may be that smaller funds are more likely to have generated lower returns than compared to medium-sized or larger funds within the sample, which potentially presents an area of further research. This would add further information to the question of the optimal size of a SMSF.

This section discussed the results of the analysis of fund trading activity based on fund size. The next section discusses the analysis of the same variables based on fund risk profile. As outlined in Chapter 3, each fund within the sample was identified as having an ‘aggressive’, ‘moderate’ or ‘defensive’ approach and

segmented accordingly. Each risk profile grouping was then assessed as per the variables outlined in Chapter 3.

7.6 SMSF Trading Behaviour Based on Fund Risk Profile

The discussion of the analysis of funds within the sample based on fund risk profile addresses variations in the investment approach of funds with differing risk profiles. For example, did fund trustees with a lower risk tolerance correctly reduce market risk exposure prior to the financial crisis? Did fund trustees with higher risk tolerance levels react more quickly to take advantage of falling asset prices during the financial crisis, or was there no discernible difference in the behaviour of fund trustees, regardless of their risk tolerance levels? These are a number of the questions that may be answered through the analysis of the transaction data on the basis of fund risk profile.

7.6.1 The Trading Behaviour of Aggressive SMSF Trustees

Funds within the sample with an aggressive investment approach tended to display the same characteristics of the general SMSF sample. That is, they tended to invest aggressively immediately prior to the financial crisis, showed only minor evidence of taking advantage of lower prices for assets during the financial crisis, and tended to be more conservative following the crisis. Being classified as ‘aggressive’ investors, it is surprising that trustees of these SMSFs did not move to take advantage of falling or low prices for investment assets over the period 2008-09, particularly with regards to listed investments. This may indicate that even trustees with an aggressive investment approach were concerned by economic and financial events during the financial crisis. This may suggest that the risk profile of SMSF trustees is not fixed and can change depending on external factors. This is reinforced by the apparent increase in defensive investment exposure following the crisis by what are notionally ‘aggressive’ SMSF trustees. It may also be that those funds classified as ‘aggressive’ may have been fully invested at the onset of the financial crisis and did not possess the available cash required to invest in ‘cheap’ assets at the bottom of the bear market, or may have been unwilling to realise losses on existing holdings in order to invest at the market bottom. The finding that aggressive trustees

did not increase exposure to aggressive investment holdings during the financial crisis differs from work by Ho et al. (2010), who found that 401(k) investors in the United States with an aggressive investment profile tended to increase their exposure to aggressive assets as markets fell, particularly through the year 2008. The authors acknowledged however, that their study had low external validity, being based on the analysis of the 401(k) investment decisions of employees of one small company. Other studies have found similar conclusions relating to the trading behaviour of 401(k) participants (Mitchell et al. 2007; Yamaguchi 2006). It may be that the average participant in the study with a 401(k) plan was less engaged in the management of their retirement assets than trustees of Australian SMSFs, and were more likely to simply continue their pre-existing approach to investment allocation, regardless of economic or market circumstances. The substantial administrative and regulatory burden associated with acting as trustee of a SMSF may lead to a greater engagement by the trustees in the management of their assets, and therefore trustees may be more likely to make changes to their investment approach as economic and market circumstances change.

7.6.2 The Trading Behaviour of Moderate Risk SMSF Trustees

Moderate risk SMSFs within the sample tended to exhibit trading behaviour which was very similar to that of aggressive funds – little evidence of reducing investment risk exposure on the eve of the crisis; little evidence of acting to take advantage of low asset prices during the crisis and a more conservative approach following the crisis. One differentiating characteristic is that moderate risk SMSFs appeared to reduce their defensive investment exposure during the financial crisis, specifically during 2008. It may be however that trustees were simply taking action to increase cash holdings at the expense of other investments classified as ‘defensive’, such as corporate bonds or hybrid securities. Compared to SMSFs with an aggressive risk profile, there was a more significant fall in overall trading activity and trade value during the crisis however. It appears that SMSF trustees with a moderate risk profile were more sensitive to falling markets than more aggressive trustees, and tended to refrain from all types of trading activity during the crisis. This finding is not wholly unexpected given the differences in risk profile of the trustees.

7.6.3 The Trading Behaviour of Conservative SMSF Trustees

The trustees of SMSFs with a conservative risk profile exhibited the most surprising trading behaviour of the three different risk profile classifications. While conservative trustees did not act to reduce aggressive investment exposure on the eve of the financial crisis, they did significantly increase their exposure to aggressive investments during 2009, just as equity markets bottomed and began to recover from the financial crisis. This shift into aggressive investments during this period was more pronounced for conservative trustees than for aggressive or moderate risk trustees, which is an unexpected finding. It may be that conservative trustees, more so than the other trustees, had the ability to take advantage of low asset prices during this period due to larger cash (or other defensive investment) holdings than aggressive or moderate risk trustees. The ability to buy when prices are low usually requires the cash to do so, a situation which may have escaped those SMSF trustees with more aggressive risk profiles. This finding again differs from conclusions drawn by Ho et al. (2010), who found that 401(k) investors in the United States with a conservative investment profile tended to continue to increase their exposure to defensive assets as markets fell during the financial crisis. As outlined in section 7.6.1, it may be that SMSF trustees are more engaged in the management of their assets within the fund when compared to 401(k) investors, and therefore more likely to adjust their investment strategy as required. This fits with other conclusions drawn by Ho et al. (2010), that 401(k) participants rebalanced their investment infrequently and tended to leave the asset allocation of their monthly contributions to the plan in place, regardless of changes in the economy and stock market. Other characteristics of defensive SMSF trustees were as expected, including a more defensive investment approach in that period following the financial crisis (the willingness to increase risk during the financial crisis notwithstanding).

7.6.4 Summary of Fund Risk Profile and Trading Behaviour

The analysis of the relationship between fund risk profile and trading behaviour revealed a number of interesting insights. The most surprising finding was that conservative SMSF trustees were the group most likely to take advantage of low asset prices during the financial crisis. Trustees with an aggressive risk profile, whom would have been expected to be investing aggressively during the financial

crisis, showed little evidence of such an inclination. As discussed, it may simply be that significant losses on existing higher risk holdings left aggressive trustees in a position that did not allow them to fully benefit from low asset prices at the bottom of the bear market, or they had no available cash to take advantage of these opportunities. Given this finding, it is possible that the investment performance of conservative SMSF trustees since the financial crisis has been better than that of moderate or aggressive minded trustees. A comparison of investment returns between SMSFs with varying risk profiles across differing time periods is beyond the scope of this study but may be an area for further investigation.

In general however, there were few other significant differences between the trading behaviour of SMSF trustees with differing risk profiles. All trustees, regardless of risk profile, tended to increase their exposure to aggressive assets prior to the financial crisis, an inappropriate strategy given the steep falls in asset prices during the financial crisis. All trustees, again regardless of risk profile, tended to become more conservative in that period following the crisis, mimicking the findings of the analysis of the sample as a whole. Again, this differs from work by Bateman et al. (2010), who found only a slight decrease in investor risk profile in 2008. As mentioned earlier, it may be that SMSF trustee risk profiles are not static but can and do change according to current economic and market conditions. Hoffman et al. (2011) similarly found that risk tolerance fluctuates over periods of crisis when compared to non-crisis periods. Unfortunately the evidence suggests that, regardless of the perceived risk profile of SMSF trustees, SMSF trustees tended to be too aggressive during periods of rising markets, when investment caution may have been a more appropriate strategy. Furthermore, most SMSF trustees, with the exception of those with a conservative risk profile, also tended to be too conservative during those periods during and after bear markets, when an aggressive approach may have been a more appropriate strategy.

7.7 Conclusion

The analysis of the trading behaviour of SMSF trustees over the period prior to, during and after the financial crisis of 2008-09 provides a number of insights into the investment decision-making process of fund trustees. In general, SMSFs

exhibited little evidence of an increase in exposure to defensive assets leading up to the financial crisis, which suggests that the relative outperformance of SMSFs during the financial crisis, when compared to other superannuation funds, was more a result of good fortune rather than good planning. SMSFs on the whole also tended to miss the opportunity to take advantage of low prices for assets during the financial crisis, although those funds with a conservative risk profile did show some evidence of increasing their exposure to higher risk assets during the crisis, a strategy which may have resulted in higher investment returns than other SMSFs over the same period. There is also evidence that SMSFs have adopted a more conservative investment approach since the financial crisis, indicating that the risk profiles of SMSF trustees are sensitive to existing economic and market conditions. Unfortunately this shift to a more conservative approach may have resulted in SMSFs forgoing the positive investment returns enjoyed as asset prices recovered following the crisis.

SMSF size also was found to be an important determination in trading behaviour, with large and medium-sized funds making more significant changes to their investment approach when compared to small funds. There was some evidence that large funds were correctly increasing defensive investment exposure prior to the financial crisis, while medium-sized funds were more likely to take advantage of low prices for assets during the crisis. Small SMSFs appeared to lack any of the optimal changes to investment strategy which may have resulted in improved investment returns over the period 2005 to 2011. Overall the analysis suggests that larger-sized SMSFs with a conservative investment approach were more likely to adopt the most appropriate investment strategy given the set of economic and market circumstances encountered over the time period under consideration.

The next and final chapter, Chapter 8, concludes this study with a summary of the main findings, interpretations and insights gained from the study, in addition to suggestions for further research to improve awareness of the investment trading behaviour of SMSFs.

CHAPTER 8

CONCLUSION

8.1 Introduction

Over a third of all Australian superannuation assets are now managed through SMSFs, yet comparatively little empirical research has been undertaken to determine whether or not SMSFs are meeting the needs and objectives of their members, policy-makers and the public in general. In particular, knowledge of the investment decision-making and trading behaviour of SMSF trustees is limited, with only a relatively small number of investigations into the theoretical and practical investment approaches adopted by SMSF trustees (Phillips 2007; Phillips, Baczynski & Teale 2009a, 2009b; Phillips, Cathcart & Teale 2007). With this background, this study set out to investigate the investment trading behaviour of SMSF trustees over the period 2005 to 2011. This is the first study to consider the investment decisions of SMSF trustees over a period of time, as compared to a specific point in time. The time period under investigation includes events occurring prior to, during and after the 2008 global financial crisis. This presents an opportunity to assess the investment decision-making of SMSF trustees in periods of both relative financial calm and significant stress.

The study sought to answer a number of questions regarding the investment decision-making of SMSF trustees:

1. Did SMSFs increase their exposure to cash and other defensive investments in the period leading up to the global financial crisis?
2. Did SMSFs increase their exposure to market risk assets as stock markets bottomed and recovered in 2009?
3. Have SMSFs become more conservative in their investment approach since the global financial crisis?

4. Did larger or less risk-averse SMSFs behave differently as compared to smaller or more conservative SMSFs over the course of the global financial crisis?

The research questions were structured in order to allow for an assessment of the correctness or otherwise of SMSF trustee investment decision-making. There is anecdotal evidence that SMSFs out-performed other superannuation alternatives during the 2008 global financial crisis, largely attributed to their significant holdings of cash. If SMSF trustees acted to increase their cash holdings in the period leading up to the financial crisis, this may indicate the existence of a sophisticated or appropriate investment strategy by SMSFs. If the large cash holdings on the eve of the financial crisis were simply due to good fortune however, with little or no evidence of deliberate decisions by trustees, this raises questions over the investment strategy of SMSFs and the potential outcomes in the event of another significant bear market.

The next section of this chapter outlines the empirical findings from the study, followed by a discussion of the theoretical and policy implications of the results of the study. Recommendations for future research are then discussed and the chapter concludes with a final comment regarding the study.

8.2 Empirical Findings

The main empirical findings were summarised in each of the chapters which presented the results of the analysis, being Chapters 4, 5 and 6. This section will summarise the results within the context of the research questions outlined in Chapter 3 and listed in Section 8.1 of this chapter.

1. Did SMSFs increase their exposure to cash and other defensive investments in the period leading up to the global financial crisis?

There is no conclusive evidence that SMSFs increased their exposure to cash and other defensive assets prior to the global financial crisis. SMSFs tended hold large cash balances during those years prior to the financial crisis, but there was little indication of a deliberate strategy to increase those balances as stock markets rose in those years preceding the crisis. This indicates that the relative out-performance of

SMSFs during the 2008 global financial crisis when compared to alternative superannuation approaches was more a result of good fortune than careful planning. This supports Hypothesis 1, which was that there were no significant differences in the cash balances of SMSFs in the period leading to the 2008 global financial crisis.

2. Did SMSFs increase their exposure to market risk assets as stock markets bottomed and recovered in 2009?

There is no conclusive evidence that SMSFs acted to take advantage of lower priced assets during the 2008-09 bear market by increasing their exposure to higher risk assets. This supports Hypothesis 2, that there was no significant difference in SMSF exposure to higher risk assets in that period prior to and during the financial crisis. It appears that SMSFs missed an opportunity to generate higher investment returns by investing at or close to the market low in early 2009.

3. Have SMSFs become more conservative in their investment approach since the global financial crisis?

There is evidence that, in response to the 2008 global financial crisis, SMSF trustees have adopted a more conservative investment approach. SMSF trustees were less likely to increase their investment exposure to higher risk assets in that period following the crisis, when compared to the period prior to the crisis. These findings do not support Hypothesis 3, that there is no significant difference in the exposure of SMSFs to riskier assets between the periods prior to and following the crisis. SMSF trustees have responded to the events of the global financial crisis by adopting a more conservative investment approach. This conservative investment approach has persisted in the years following the financial crisis which are covered by this study.

4. Did larger or less risk-averse SMSFs behave differently as compared to smaller or more conservative SMSFs over the course of the global financial crisis?

Larger SMSFs were more likely to increase allocations to defensive investments prior to the financial crisis, thereby potentially limiting investment losses during the crisis. Medium-sized funds were more likely to take advantage of low asset prices during the bear market, potentially increasing their investment returns as markets recovered. Small funds did not act to change their investment exposure either prior to or during the financial crisis, potentially indicating the lack

of an appropriate investment strategy. These findings do not support Hypothesis 4, that there were no significant differences in the trading behaviour between funds based on fund size. The evidence suggests that a relationship exists between SMSF size (as measured by assets under management) and the investment approach adopted by the fund's trustees. The results also suggest that smaller SMSFs tend to exhibit the least desirable investment behaviour, with little or no change in investment patterns regardless of changes in economic and market conditions.

A number of minor differences were found in the investment strategies between funds of differing risk profiles. More aggressive funds tended to be the least responsive, in terms of their trading behaviour, to changes in market and economic conditions. Conservative-minded fund trustees were more likely to take advantage of cheaper asset prices during the 2008 bear market, though this may have simply been due to these types of funds having available cash at hand to invest at that point in the market cycle. All SMSFs within the sample, regardless of risk profile, adopted a more conservative investment approach following the financial crisis. Although not conclusive, these findings tend not to support Hypothesis 5, that there were no significant differences in the trading behaviour between funds based on fund risk profile. The evidence suggests that a weak relationship exists between SMSF risk (as measured by exposure to higher risk assets) and the investment approach adopted by the fund's trustees.

The results of the analyses suggest that, in general, SMSFs did not adopt the ideal investment strategies in the period prior to, during and following the 2008 global financial crisis. SMSFs within the sample also exhibited a number of behavioural biases in their investment approach. SMSF trustees appeared unwilling to realise losses on their investments, an indication of the existence of loss aversion. SMSF trustees within the sample did not however conform to general expectations of constant relative risk aversion and decreasing absolute risk aversion. Their expectations of consistently increasing investment returns prior to the crisis suggest the presence of representativeness, while their switch to a defensive investment strategy after the financial crisis potentially indicates the existence of the availability heuristic. The apparent inaction on the part of SMSF trustees as asset prices fell during the crisis further suggests the presence of cognitive dissonance. Faced with

evidence to the contrary, trustees within the sample appeared reluctant to make significant changes to their investment holdings as asset prices fell, perhaps in the belief that any falls were only temporary.

The study's findings, which have shown that SMSF trustees within the sample did not in general make ideal investment decisions prior to, during and following the global financial crisis, coupled with the existence of a number of behavioural biases, has both theoretical and policy implications. These are outlined in section 8.3.

8.3 Theoretical and Policy Implications

The theoretical implications of this study primarily relate to evidence that SMSF trustees exhibit a number of investment biases which have already been identified in other groups of investors. SMSF trustees appear to closely match Kahneman and Tversky's (1979) concept of loss aversion, apparently unwilling to realise losses in order to take advantage of lower asset prices during the global financial crisis. SMSF trustees also exhibit the existence of another of Kahneman and Tversky's (1972) behavioural traits, that of representativeness. Based on their trading behaviour prior to the financial crisis and during that period following the crisis, SMFS investors expected future investment outcomes to be the same as past investment outcomes. This behaviour also confirms the existence of both the availability heuristic and recency bias – SMSF trustees placed too much weight on the likelihood of recent events to re-occur in the future.

With regards to risk aversion, the behaviour of SMSF trustees does not generally support notions of constant relative risk aversion and decreasing absolute risk aversion. SMSF trustees within the sample did not make consistent changes in investment risk exposure regardless of SMSF size, indicating the lack of constant relative risk aversion and decreasing relative risk aversion. This may be explained by the possibility of the existence (or otherwise) of significant investment assets held outside of superannuation. When taking all SMSF trustee investment assets into account, not just those held within superannuation, it may be that trustee investment

choices conform to expectations of constant relative risk aversion and decreasing absolute risk aversion.

The results of the study present a number of implications for policy relating to the SMSF sector and Australian retirement planning more broadly. Firstly, the finding that SMSF trustees tended not to exhibit desirable investment trading patterns over the periods prior to, during and following the financial crisis, suggests that many SMSF trustees have not developed or implemented appropriate investment strategies. Current legislation requires SMSF trustees to develop and review their investment strategy on an annual basis, though this requirement is largely a compliance matter and does not necessarily have a bearing on the resulting investment decisions of SMSF trustees.

Secondly, the apparent lack of appropriate SMSF investment strategies raises the question of SMSF trustee education, training or support. It may be that the appointment of a SMSF trustee should include a mandatory education component, specifically focusing on the investment decision-making process. Current legislative and regulatory guidance tends to concentrate on assisting SMSF trustees in meeting their compliance related objectives, with the investment aspect of managing a SMSF left almost entirely to the trustee's own discretion. It may be that a minimum education requirement for SMSF trustees, specifically in the area of investment decision-making, will lead to more appropriate investment decisions by SMSF trustees. The findings also suggest that the current regulatory emphasis on compliance related matters is insufficient and should be expanded to include oversight of the investment decision-making of SMSF trustees. Indeed, it may be appropriate that, contrary to the very name 'self-managed', trustees are required to enlist some form of professional assistance in the development and oversight of their investment strategy. This requirement could take a form similar to the existing audit requirement for SMSFs, where an annual review and approval of the SMSF investment strategy and decision-making would be required. Such a requirement would increase the ongoing cost of managing a SMSF, although it would not be expected to be prohibitively expensive, particularly given the size of the average SMSF in terms of funds under management.

This leads to a further policy implication regarding the ideal size of a SMSF. The findings in this study suggest that smaller SMSFs tend to be more likely to lack evidence of appropriate investment decision-making. This lends itself to the existing debate over the minimum size of a SMSF and whether there should be regulatory guidance regarding the allowable minimum fund size. Although this debate is usually framed in terms of the cost of running a SMSF, which can be significantly higher for smaller SMSFs on a percentage of funds under management basis, the potential for inappropriate investor behaviour by trustees of smaller funds may also need to be taken into account. It may be that SMSF size (in terms of assets under management) is an accurate proxy for trustee wealth, education and investing experience, which leads back to the issues raised earlier in terms of improving SMSF trustee investing knowledge or the requirement for professional assistance. In the absence of such initiatives, it may be that a minimum SMSF size is required in order to reduce the likelihood of the erosion of the retirement savings of those trustees responsible for managing relatively smaller SMSFs.

The potential existence of a number of investor biases within the SMSF sample, coupled with a general lack of appropriate investor decision-making or investment strategies, suggests that greater emphasis should be placed on assisting SMSF trustees with the investment related aspects of their role. This may include minimum education requirements, professional assistance or stricter criteria for the appointment of an SMSF trustee. It also suggests that the current regulatory focus on compliance and administration related matters is too narrow and should be expanded to include the investment related matters of SMSF management. The next section of this chapter outlines a number of potential areas for future research, based on the findings of this study.

8.4 Recommendations for Future Research

Given the general conclusion in this study, that SMSFs within the sample tended to lack evidence of ideal investment decision-making, the most appropriate area for further research relating to SMSFs would be in the area of investor behaviour. In particular, a more detailed analysis of the individual investment transactions carried out by SMSF trustees would allow for confirmation (or

otherwise) of the existence of a number of behavioural traits, such as regret aversion and loss avoidance. This would require information regarding the details of each investment transaction carried by SMSF trustees, including the gain or loss on any investment sale and the length of ownership. It would also be of interest to compare the investment decision-making of SMSF trustees with those of other Australian investors. This could be achieved through a comparison of the investment transactions of private or institutional investors with those of SMSF trustees, preferably across a period of time which allows for a meaningful comparison. This type of study would provide evidence of the relative capability of SMSF trustees to manage their retirement savings appropriately.

A further area of research would be to consider the investment decisions of SMSF trustees in relation to trustee demographics. While this study did segment SMSFs (and therefore each fund's trustees) both by risk profile and funds under management, awareness of the demographic nature of fund trustees would provide insight into the background of the trustees of SMSFs and how this influences their investment decisions. Information such as household income, postcodes, age, education levels and occupation would allow for greater segmentation of fund trustees and may provide deeper insights into the 'ideal' SMSF trustee and how this relates to current policy settings regarding SMSF trustee education and experience. Given the relative paucity of research concerning the SMSF sector, any additional work which deepens our understanding of the sector and the behaviour of fund trustees is likely to be of value.

8.5 Conclusion

This study set out to investigate whether or not SMSF trustees made the ideal investment decisions over the period 2005 to 2011, a period which included the volatile market and economic conditions associated with the 2008-09 global financial crisis. The evidence suggests that, with the benefit of hindsight, SMSF trustees did not make the correct investment decisions, given the set of financial and economic circumstances prevailing at the time. The findings of this study suggests that anecdotal evidence of out-performance by SMSFs when compared to alternative

superannuation arrangements, may be more a result of good fortune than good planning.

Given the importance of the SMSF sector within the context of the Australian retirement system, where more than a third of superannuation assets are managed through SMSFs, these findings suggest that under current legislative and regulatory arrangements, mismanagement of SMSF assets potentially poses a risk to member retirement assets and perhaps the broader retirement system. While wholesale changes to the SMSF sector are not necessarily required, a greater emphasis on SMSF trustee education, training or expert assistance may reduce the likelihood of SMSF trustees making inappropriate investment choices during the next period of severe financial stress.

8.6 References

- Anand, A, Puckett, A, Irvine, PJ & Venkataraman, K 2011, 'Market Crashes and Institutional Trading', <<http://ssrn.com/abstract=1524845>>.
- Anand, AI 2009, 'Rules v. Principles as Approaches to Financial Market Regulation', *Harvard International Law Journal*, vol. 47, pp. 111-5.
- Arrow, K 1965, 'The Theory of Risk Aversion', in *Aspects of the Theory of Risk Bearing*, Yrjo Jahnssonin Saatio, Helsinki.
- Atkinson, AB & Brandolini, A 2001, 'Promise and Pitfalls in the Use of "Secondary" Data-Sets: Income Inequality in OECD Countries as a Case Study', *Journal of Economic Literature*, vol. 39, no. 3, pp. 771-99.
- Australian Taxation Office 2009, *Self-Managed Super Fund Statistical Report*, Commonwealth of Australia, viewed 20 August 2011, <<http://www.ato.gov.au/superfunds/content.aspx?menuid=49150&doc=/content/00214157.htm&page=6&H6>>.
- Australian Taxation Office 2012, *Self-Managed Super Fund Statistical Report* Commonwealth of Australia, viewed 13 January 2013, <<http://www.ato.gov.au/superfunds/content.aspx?menuid=0&doc=/content/00319627.htm&page=8&H8>>.
- Australian Taxation Office 2013, *Self-Managed Super Fund Statistical Report*, Commonwealth of Australia, viewed 8 March 2014, <<http://www.ato.gov.au/About-ATO/Research-and-statistics/In-detail/Super-statistics/SMSF/Self-managed-super-fund-statistical-report---June-2013/>>.
- Australian Treasury 2001, 'Towards higher retirement incomes for Australians: a history of the Australian retirement income system since Federation', *Economic Roundup*, Centenary 2001, pp. 65-92.
- Australian Treasury 2012, Stronger Super, The Treasury, viewed 3 April 2012, <<http://strongersuper.treasury.gov.au/content/Content.aspx?doc=reforms.htm>>.
- Barber, BM & Odean, T 2000, 'Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors', *The Journal of Finance*, vol. 55, no. 2, pp. 773-806.
- Barberis, N 2013, 'Thirty Years of Prospect Theory in Economics: A Review and Assessment', *Journal of Economic Perspectives*, vol. 27, no. 1, pp. 173-96.
- Barberis, N & Huang, M 2001, 'Mental Accounting, Loss Aversion, and Individual Stock Returns', *Journal of Finance*, vol. 56, no. 4, pp. 1247-92.
- Bateman, H 2002, 'Retirement Income Strategy in Australia', *Economic Analysis & Policy*, vol. 32, no. 1, pp. 49--70.

- Bateman, H 2003, 'Regulation of Australian Superannuation', *Australian Economic Review*, vol. 36, no. 1, pp. 118-27.
- Bateman, H, Louviere, JJ, Satchell, SE, Islam, T & Thorp, S 2010, 'Retirement Investor Risk Tolerance in Tranquil and Crisis Periods: Experimental Survey Evidence', <<http://ssrn.com/abstract=1665948>>.
- Bell, DE 1982, 'Regret in Decision Making under Uncertainty', *Operations Research*, vol. 30, no. 5, pp. 961.
- Ben-David, I, Franzoni, FA & Moussawi, R 2011, 'Hedge Fund Stock Trading in the Financial Crisis of 2007-2009', <<http://ssrn.com/paper=1550240>>.
- Benartzi, S & Thaler, RH 2001, 'Naive Diversification Strategies in Defined Contribution Saving Plans', *American Economic Review*, vol. 91, no. 1, pp. 79-98.
- Benston, GJ, Bromwich, M & Wagenhofer, A 2006, 'Principles- versus rules-based accounting standards: the FASB's standard setting strategy', *Abacus*, vol. 42, no. 2, pp. 165-88.
- Black, J 2008, 'Forms and paradoxes of principles-based regulation', *Capital Markets Law Journal*, vol. 3, no. 4, pp. 425-57.
- Black, J, Hopper, M & Band, C 2007, 'Making a success of Principles-based regulation', *Law and Financial Markets Review*, pp. 191-206.
- Bornholt, G 2013, 'The Failure of the Capital Asset Pricing Model (CAPM): An Update and Discussion', *Abacus*, vol. 49, pp. 36-43.
- Brown, P & Walter, T 2013, 'The CAPM: Theoretical Validity, Empirical Intractability and Practical Applications', *Abacus*, vol. 49, pp. 44-50.
- Carmichael, J & Plowman, K 1985, 'Income Provision in Old Age', *Australian Economic Review*, no. 71, pp. 130.
- Chiappori, P-A & Paiella, M 2011, 'Relative Risk Aversion is Constant: Evidence from Panel Data', *Journal of the European Economic Association*, vol. 9, no. 6, pp. 1021-52.
- Clare, R 2006, 'The Introduction of Choice of Superannuation Fund: Results to Date', *Australian Accounting Review*, vol. 16, no. 40, pp. 7-13.
- Clark-Murphy, M & Gerrans, P 2001, 'Choices and retirement savings: some preliminary results on superannuation fund member decisions', *Economic Papers: A journal of applied economics and policy*, vol. 20, no. 3, pp. 29-42.
- 2004, 'Apparently contradictory superannuation choices among younger fund members: a misunderstanding of risk?', *Economic Papers: A journal of applied economics and policy*, vol. 23, no. 2, pp. 101-13.

Clark-Murphy, M, Kristofferson, I & Gerrans, P 2002, 'What makes superannuation decisions difficult?', *International Journal of Business Studies*, vol. 10, no. 1, pp. 73.

Cooper Review – see – Review into the governance, efficiency, structure and operation of Australia's superannuation system (2010).

Corporations Amendment (Future of Financial Advice) Act, 2012.

Cremers, KJM & Petajisto, A 2009, 'How Active Is Your Fund Manager? A New Measure That Predicts Performance', *Review of Financial Studies*, vol. 22, no. 9, pp. 3329-65.

Curtis, G 2004, 'Modern Portfolio Theory and Behavioral Finance', *Journal of Wealth Management*, vol. 7, no. 2, pp. 16-22.

Davies, GB & de Servigny, A 2012, 'Updating Modern Portfolio Theory for Investor Behavior', *AII Journal*, vol. 34, no. 4, pp. 21-5.

Danielsson, J 2003, 'On the Feasibility of Risk Based Regulation', London School of Economics, <<http://www.riskresearch.org/files/JD-02-9-13-1031919709-13.pdf>>.

DellaVigna, S 2009, 'Psychology and Economics: Evidence from the Field', *Journal of Economic Literature*, vol. 47, no. 2, pp. 315-72.

Deiningner, K & Squire, L 1996, 'A New Data Set Measuring Income Inequality', *The World Bank Economic Review*, vol. 10, no. 3, pp. 565-91.

Dempsey, M 2013, 'The Capital Asset Pricing Model (CAPM): The History of a Failed Revolutionary Idea in Finance?', *Abacus*, vol. 49, pp. 7-23.

Drew, M & Stanford, J 2001, 'Asset Selection and Superannuation Fund Performance: A Note for Trustees', *Economic Papers*, pp. 57-66.

Drew, M, Stanford, J & Taranenko, P 2001, 'Hot Hands and Superannuation Fund Performance: A Second Note for Trustees', *Economic Papers*, pp. 18-25.

Drew, ME, Stanford, JD & Veeraraghavan, M 2002, 'Selecting Australian equity superannuation funds: A retail investor's perspective', *Journal of Financial Services*, vol. 7, no. 2, pp. 115-28.

Edwards, KD 1996, 'Prospect theory: A literature review', *International Review of Financial Analysis*, vol. 5, no. 1, pp. 19-38.

Egan, M 2002, 'Grounded Theory Research and Theory Building', *Advances in Developing Human Resources*, vol. 4, no. 3, pp. 277-95.

Elton, E & Gruber, M 1997, 'Modern Portfolio Theory, 1950 to date', *Journal of Banking and Finance*, vol. 21, pp. 1743-59.

Evanson Asset Management 2011, A Comparison of Active and Passive Investment Strategies, viewed 29 October 2011, <<http://www.evansonasset.com/index.cfm?Page=2>>.

Fama, EF 1970, 'Efficient Capital Markets: A Review of theory and Empirical Work', *Journal of Finance*, vol. 25, no. 2, pp. 383-417.

---- 1991, 'Efficient Capital Markets: II', *Journal of Finance*, vol. 46, no. 5, pp. 1575-617.

Fama, EF & French, R 1992, 'The cross-section of expected stock returns', *Journal of Financial Economics*, vol. 33, pp. 3-56.

---- 1993, 'Common risk factors in the returns on stocks and bonds', *Journal of Finance*, vol. 47, pp. 427-465.

Fouka, G & Mantzorou, M 2011, 'What are the Major Ethical Issues in Conducting Research? Is there a Conflict between the Research Ethics and the Nature of Nursing?', *Health Science Journal*, vol. 5, no. 1, pp. 3-14.

Freebairn, J 1998, 'Compulsory Superannuation and Labour Market Responses', *Australian Economic Papers*, vol. 37, no. 1, pp. 58.

---- 2004, 'Some Long-Run Labour Market Effects of the Superannuation Guarantee', *Australian Economic Review*, vol. 37, no. 2, pp. 191-7.

French, KR 2008, 'Presidential Address: The Cost of Active Investing', *The Journal of Finance*, vol. 63, no. 4, pp. 1537-73.

Frieder, L 2004, 'Evidence on Behavioral Biases in Trading Activity', *EFA 2004 Maastricht Meetings Paper No. 5085*, European Finance Association.

Fry, T, Heaney, R & McKeown, W 2007, 'Will investors change their superannuation fund given the choice?', *Accounting & Finance*, vol. 47, no. 2, pp. 267-83.

Gai, P & Vause, N 2005, 'Measuring investors' risk appetite', *Bank of England Quarterly Bulletin*, vol. 45, no. 4.

Glaser, M & Weber, M 2007, 'Overconfidence and trading volume', *The GENEVA Risk and Insurance Review*, vol. 32, no. 1, pp. 1-36.

Grauer, RR, Hakansson, NH & Shen, FC 1990, 'Industry rotation in the U.S. stock market: 1934–1986 returns on passive, semi-passive, and active strategies', *Journal of Banking and Finance*, vol. 14, no. 2-3, pp. 513-38.

National Superannuation Committee of Enquiry 1976 (Hancock Report), 'Final Report, Part One, A National Superannuation Scheme for Australia', AGPS, Canberra.

- Hau, H & Lai, S 2012, 'The Role of Equity Funds in the Financial Crisis Propagation', <<http://ssrn.com/abstract=1742065>>.
- Ho, R, Kehoe, WJ & Whitten, LK 2010, 'How does a financial crisis affect 401(k) participants' investment behavior? An exploratory study', *ASBBS E Journal*, vol. 6, no. 1, pp. 62-70.
- Hoffmann, AOI, Post, T & Pennings, JM 2011, 'Individual Investors and the Financial Crisis: How Perceptions Change, Drive Behavior, and Impact Performance', <<http://ssrn.com/paper=1816455>>.
- Hong, H, Kubik, JD & Stein, JC 2005, 'Thy Neighbor's Portfolio: Word-of-Mouth Effects in the Holdings and Trades of Money Managers', *Journal of Finance*, vol. 60, no. 6, pp. 2801-24.
- Ibbotson, RG & Kaplan, PD 2000, 'Does Asset Allocation Policy Explain 40, 90, or 100 Percent of Performance?', *Financial Analysts Journal*, vol. 56, no. 1, pp. 26-33.
- Kahneman, D & Tversky, A 1972, 'Subjective probability: A judgment of representativeness', *Cognitive Psychology*, vol. 3, no. 3, pp. 430-54.
- 1979, 'Prospect Theory: An Analysis of Decision under Risk', *Econometrica*, vol. 47, no. 2, pp. 263-91.
- 1992, 'Advances in Prospect Theory: Cumulative Representation of Uncertainty', *Journal of Risk and Uncertainty*, vol. 5, no. 4, pp. 297-323.
- Kallberg, JG, Liu, CH & Wang, N 2012, 'Individual Investors and the Financial Crisis', <<http://ssrn.com/paper=1567943>>.
- Kihlstrom, RE, Romer, D & Williams, S 1981, 'Risk Aversion with Random Initial Wealth', *Econometrica*, vol. 49, no. 4, pp. 911-20.
- KPMG and the Australian Centre for Financial Studies 2011, *Superannuation trends and implications*, Sydney.
- Krejcie, RV & Morgan, DW 1970, 'Determining Sample Size for Research Activities', *Educational and Psychological Measurement*, vol. 30, pp. 607-10.
- Malkiel, BG 2003a, 'The Efficient Market Hypothesis and Its Critics', *Journal of Economic Perspectives*, vol. 17, no. 1, pp. 59-82.
- 2003b, 'Passive Investment Strategies and Efficient Markets', *European Financial Management*, vol. 9, no. 1, pp. 1-10.
- 2005, 'Reflections on the Efficient Market Hypothesis: 30 Years Later', *Financial Review*, vol. 40, no. 1, pp. 1-9.
- Markowitz, H 1952, 'Portfolio Selection', *The Journal of Finance*, vol. 7, no. 1, pp. 77-91.

Marshall, MN 1996, 'Sampling for qualitative research', *Family Practice*, vol. 13, no. 6, pp. 522-6.

Mitchell, OS, Mottola, GR, Utkus, SP & Yamaguchi, T 2007, 'The Inattentive Participant: Portfolio Trading Behavior in 401(k) Plans', University of Michigan Retirement Research Center, Working Paper 2006-05.

Morling, S & Subbaraman, R, *Superannuation and saving*, 1995, RBA.

Morningstar 2014, *Morningstar Category*, viewed 10 October 2014, <http://www.morningstar.com/InvGlossary/morningstar_category.aspx>

Odean, T 1998, 'Are Investors Reluctant to Realize Their Losses?', *Journal of Finance*, vol. 53, pp. 1775-98.

Olsen, RA 2008, 'Cognitive Dissonance: The Problem Facing Behavioral Finance', *Journal of Behavioral Finance*, vol. 9, no. 1, pp. 1-4.

Peterson, D & Fensling, S 2011, 'Risk-based regulation: good practice and lessons for the Victorian context', Victorian Competition and Efficiency Commission Regulatory Conference, Melbourne, pp. 1-33.

Phillips, PJ 2007, 'Self managed superannuation funds: theory and practice', *Journal of Law and Financial Management*, vol. 6, no. 1, pp. 8-22.

---- 2009, 'Are Larger Self-Managed Superannuation Funds Riskier?', *Asian Journal of Finance & Accounting*, vol. 1, no. 1, pp. 54-75.

---- 2011a, 'Will Self-Managed Superannuation Fund Investors Survive?', *Australian Economic Review*, vol. 44, no. 1, pp. 51-63.

---- 2011b, 'Sin stocks in self managed superannuation funds', *Australasian Accounting, Business and Finance Journal*, vol. 5, no. 2, pp. 39-51.

Phillips, PJ, Cathcart, A & Teale, J 2007, 'The diversification and performance of self managed superannuation funds', *Australian Economic Review*, vol. 40, no. 4, pp. 339-52.

Phillips, PJ, Baczynski, MP & Teale, J 2009a, 'Can Self Managed Superannuation Fund trustees earn the equity risk premium?', *Accounting Research Journal*, vol. 22, no. 1, pp. 27-45.

---- 2009b, 'Self managed superannuation funds and the bear market of 2007-2008', *Australasian Accounting, Business and Finance Journal*, vol. 3, no. 1, pp. 38-56

Pratt, JW 1964, 'Risk Aversion in the Small and in the Large', *Econometrica*, vol. 32, no. 1/2, pp. 122-36.

Resnik, BL 2010, 'Did Modern Portfolio Theory Fail Investors in the Credit Crisis?', *CPA Journal*, vol. 80, no. 10, pp. 10-2.

Review into the governance, efficiency, structure and operation of Australia's superannuation system 2010, Super System Review, (Jeremy Cooper, chairman), AGPS, Canberra.

Roll, R 1977, 'A critique of the asset pricing theory's tests Part I: On past and potential testability of the theory', *Journal of Financial Economics*, vol. 42, no. 2, pp. 129-176.

Roll, R & Ross, SA 1984, 'The Arbitrage Pricing Theory Approach to Strategic Portfolio Planning', *Financial Analysts Journal*, vol. 40, pp. 14-26

Ross, SA 1976, 'The arbitrage theory of capital asset pricing', *Journal of Economic Theory*, vol. 13, no. 3, pp. 341-60.

SAS 9.2 2008, computer software, North Carolina, United States.

Saunders, M, Lewis, P & Thornhill, A 2009, *Research methods for business students*, Fifth edn, Prentice Hall.

Sewell, M 2007, 'Behavioural Finance', University of Cambridge, <<http://www.behaviouralfinance.net/behavioural-finance.pdf>>.

Shanken, JAY 1982, 'The Arbitrage Pricing Theory: Is it Testable?', *Journal of Finance*, vol. 37, no. 5, pp. 1129-40.

Sharpe, WF 1964, 'Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk', *Journal of Finance*, vol. 19, no. 3, pp. 425-42.

Shefrin, H & Statman, M 1985, 'The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence', *Journal of Finance*, vol. 40, no. 3, pp. 777-90.

Spata, A 2003, 'Ethical Considerations in Research', in *Research Methods: Science and Diversity*, John Wiley and Sons Inc.

Superannuation Guarantee Administration Act 1992 (Cwlth).

Superannuation Guarantee (Administration) Amendment Act 2012 (Cwlth).

Superannuation Legislation Amendment Act (No.3) 1999 (Cwlth).

Superannuation Industry (Supervision) Act 1993 (Cwlth).

Tang, N, Olivia, S, Mitchell, O & Utkus, S 2011, 'Trading Behavior of 401(k) Pension Plan Participants in Times of Financial Turmoil', in R Maurer, O Mitchell & M Warshawsk (eds), *Retirement Security: Lessons from the Global Financial Crisis*, Oxford University Press.

Thaler, R 1980, 'Toward a positive theory of consumer choice', *Journal of Economic Behavior & Organization*, vol. 1, no. 1, pp. 39-60.

Thaler, RH & Johnson, EJ 1990, 'Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice', *Management Science*, vol. 36, no. 6, pp. 643-60.

Tversky, A & Kahneman, D 1974, 'Judgment under Uncertainty: Heuristics and Biases', *Science*, vol. 185, no. 4157, pp. 1124-31.

Valentine, T 2004, 'Regulation of DIY Superannuation Funds', *Australian Economic Review*, vol. 37, no. 2, pp. 215-21.

Valentine, R 2010, 'The Theory of Efficient Capital Markets: A Review of Literature', *Feature Edition*, vol. 2010, no. 3, pp. 116-34.

Vincent, S 2011, 'Is Portfolio Theory Harming Your Portfolio?', <<http://ssrn.com/paper=1840734>>.

Williams, L & Abdi, H 2010, 'Fisher's Least Significant Difference (LSD) test', in N Salkind (ed.), *Encyclopedia of Research Design*, Sage, Thousand Oaks.

Yamaguchi, T 2006, 'Understanding Trading Behavior in 401(K) Plans', University of Michigan Retirement Research Center, Working Paper. WP 2006-125.