THE INFLUENCE OF HOUSEHOLD SAVING MOTIVES ON THE PROPENSITY TO SAVE AND PORTFOLIO ALLOCATION DECISIONS

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ABSTRACT

The objective of this study is to examine the *motives* that drive the propensity of households to save and households' portfolio allocation decisions. This interest has been spurred by the issue of low personal saving rates that has been observed across the globe over the past two decades. In addition, the perplexities concerning portfolio allocation choices despite rapid innovations of financial products warrants the need for further investigation on household's asset allocation decisions.

Motivated by the above phenomena, this study was conducted with three main objectives. First, the study sought to identify the factors that are instrumental to the formation of household's saving motives, by examining households' socio-demographic and behavioural factors that influence their motivations to save. Second, the study aimed to determine the factors that influence the household's propensity to save. Third, the study targeted to evaluate the factors that impact the choice of assets that households save in, by examining their preferences in regards to low-risk assets, risky assets, and life insurance.

The 2004 U.S. Survey of Consumer Finances (SCF), which a government sponsored triennial cross-section survey on the financial situation of American families, was chosen as an empirical basis to address the three research objectives mentioned above. Various econometric tools were used to analyze the relationships under investigation.

Results indicate that all categories of saving motives, namely the *life-cycle, precautionary*, *bequest* and *profit* motives are significant determinants of the propensity to save. This suggests that *planned* saving are relevant in the household's saving decisions. Nonetheless, results also show that *unplanned* saving, stemming from the household's capabilities and opportunities to save, is a stronger determinant of household saving. Saving motivations are also found to be related to portfolio allocation choice. In particular, *life-cycle* and *profit* motives significantly impinged on the decision to own *risky assets*, while *life-cycle* and *bequest* motives strongly influenced the probability of owning *life insurance*. Meanwhile, results indicate that *age* and *income* are salient factors influencing the household's formation of saving motives, their propensity to save, and portfolio allocation choices.

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INTRODUCTION

1.1 RESEARCH BACKGROUND

Household saving

Personal saving rates across nations have experienced a downward trend for more than two decades, since the 1980s until the beginning of the new millennium. In the United States of America (U.S.), for example, personal saving rate fell from approximately 9 percent in the 1980s to around 5 percent in the 1990s, and further decreasing to almost zero in the first years of the new century (Guidolin & La Jeunesse, 2007, p.491). Likewise, personal saving in the United Kingdom (U.K.) dropped from 12 percent in the early 1990s, to approximately 5 percent in 2007 (Sentance, 2007). Similar trends have been noted in other countries as well, such as Italy, Canada and Australia, where rates have been observed falling to levels below those of historical standards (De Serres & Pelgrin, 2003). Even Japan, who once boasted of having the highest personal saving rate worldwide, has not been spared of this predicament. This is reflected in the narrowing of the gap in private saving rates between Japan and U.S., from more than 8 percentage points in 1990, to less than 2 percentage points in 2002 (Braun, Ikeda & Joines, 2005).

From a macroeconomic stance, such trends are a cause for concern because they imply dangerously low levels of capital accumulation (Gale & Sabenhaus, 1999, p.181) and that a nation's source of investment is at stake. Declining levels of national personal saving rate may result in high dependence of the economy on savings derived from foreign individuals and firms, in the form of current account deficits. In addition, changes in international savings will likely have an impact on the domestic capital inflows of open economies. Meanwhile, from a microeconomic perspective, these trends are viewed perturbing since they reflect a spendthrift nation (Peach & Steindel, 2000). Such patterns imply that

households are inadequately prepared for the future and may lack the necessary funds to maintain their desired standards of living during retirement. In addition, households are also exposed to the risk of unexpected disruptions to income that may occur over the life-cycle. possibly due to health or employment uncertainties.

Research conducted at the household level substantiates the observed incidence of low personal savings. In a survey called the *State of the Nation's Savings* conducted by the Association of British Insurers (2007). it was found that more than half of all the currently working individuals in the U.K. were not saving at all, or not saving enough, for their future retirement. The results of this survey imply that working individuals in the UK will have difficulties sustaining their future standards of living and may need to rely on alternative funding such as social security benefits and/or monetary assistance from family.

At the other end of the spectrum, other parts of the world such as East Asia have experienced remarkably high domestic saving rates. In the Southeast Asian region, for example, private saving increased from 15 percent to 25 percent of GDP between the years 1970 to 1995 (Dayal-Gulati & Thiman, 1997). Meanwhile, China has recorded impressive levels of household saving ratios, despite the reductions in private saving ratio in other parts of the world. China's personal saving rate was estimated reaching a high of approximately 34 percent in 1994, resembling the high household saving rates Japan experienced in the 1960s. Currently, China's saving rates still stand as one of the highest in the world, and in 2008, the rate was estimated at 39.7 percent of household disposable income (China Daily, 2009).

The two opposite patterns in regards to personal saving have generated a large body of research investigating the determinants of household saving. The literature offers numerous explanations on the issue from an economic perspective, such as capital gains from corporate equities (Juster, Lupton. Smith & Stafford, 2005; Lusardi, Skinner & Venti, 2001), improvements in credit markets (Carroll, 1997), social security and other government-sponsored benefits (Huggett & Ventura, 2000). increasing annuitization of

retirement income (Gokhale, Kotlikoff, Sabelhaus, Bosworth & Haveman, 1996), and shifts in demographic structure of the population (Lusardi *et al.*, 2001). While these studies provide useful insights to explain the empirical findings in regards to saving, they fail to provide a complete picture because the underlying determinants of households' saving behaviour are not captured in such studies. Hence, research that focus on fundamental household saving behaviour may prove to be beneficial in attempts to understand macro-level statistics. The importance of comprehending household saving behaviour is affirmed by Wärneyrd (1999, p.344) who commented that "it is necessary to know something about behaviour at the micro level, i.e. individual and household behaviour" to help understand "the effects of economic policy measures and other factors on saving."

Besides the wide differences in household saving rates across nations, another key factor stirring the interest on household saving is the recurring divergences that have been observed between theoretical propositions and empirical evidence. One of the main theories in regards to saving behaviour is the Life-cycle Hypothesis (LCH) (Modigliani & Brumberg, 1954), which posits that individuals tend to distribute their resources throughout their lifespan in order to keep the marginal utility of consumption constant over the lifetime. When income levels are high, individuals will set aside a portion of their income as savings, but during low periods of income such as pre-employment and retirement, individuals will borrow (or dissave) in order to maintain an approximately same level of living standards. Empirically, however, the evidence is difficult to reconcile with standard explanations regarding saving *behaviour*. Two puzzling facts are evident – first, data across nations suggest that households are saving inadequately for retirement (Association of British Insurers, 2007) and second, it appears that retired households *continue* to save, rather than to dissave (Japelli & Modigliani, 2002).

Household Portfolios

Another related subject matter that has attracted much research interest is the issue of households' portfolio allocation choices. Significant theoretical

developments in this area began since the 1950s (Markowitz, 1952; Tobin, 1958) and have typically focused on the choice between risk-free and risky assets. Modern portfolio theory emphasizes that risk and return are the main factors influencing portfolio decisions. According to Eeckhoudt, Gollier and Schlesinger (2005), given a choice between a risky and a risk-free asset, investors will prefer holding the risky asset only if they are compensated by excess returns over the risk-free asset. Given that the excess returns are positive, the proportion held between the risky and risk-free asset will then depend on the risk aversion level of the investor. It is also suggested in theory that diversification of assets is the key to the reduction of riskiness of a portfolio. However, there appears to be many empirical inconsistencies manifested in the literature. Households' portfolios are poorly diversified[1] and are highly concentrated in few assets, usually low-risk types[2]. Most individuals tend not to hold any risky financial assets, while others invest in such assets exclusively (Curcuru, Heaton, Lucas & Moore, 2005). The literature also reveals that household portfolios are usually kept simple whereby less than five types of assets are maintained (McCarthy, 2004).

The Behavioural Portfolio Theory (BPT) developed by Shefrin and Statman (2000) serves to provide an alternative explanation to the divergences observed in the data on portfolio allocation. The theory suggests that apart from risk-return considerations, behavioural factors affect the types of portfolio investors choose and the types of assets they find attractive. In particular, Shefrin and Statman (2000) suggest that the emotions of *hope*, *fear* and *aspirations,* are important in the portfolio allocation decision. The rationale behind this proposition is that emotions affect risk tolerance, which in turn influences portfolio decisions. According to the BPT, *hope* relates to the positive anticipation for the achievement of financial success, while *fear* relates to the apprehension of falling into low levels of wealth. *Hope* and *fear* operate in conjunction with

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[1] See Friend and Blume (1975), Kelly (1995), Polkovnichenko (2005), Goetzmann and Kumar (2008) for further details.

[2] See Hochguertel et al. (1997) and Guiso et al. (2002) for more details.

aspirations which reflect the goals that investors aim for, and all three variables are posited to have an impact on the choice of asset holding.

Motivation of the study

The concerns regarding declining levels of household saving and the puzzles surrounding portfolio allocation choices are the key factors that motivated the conduct of this study. Nonetheless, studies on saving *behaviour* and portfolio allocation choice have usually been conducted in separate domains – the former in the broad domain of economics, and the latter in the realm of finance. It is acknowledged that this can pose a major challenge to the study in hand as the current study tries to bring together these two aspects of household finance (saving *behaviour* and portfolio allocation) into a single framework. This attempt is viewed crucial in order to provide a comprehensive understanding regarding the reasons (*why*) households save and the vehicles (*where*) they save in. In doing so, this study will explore the underlying determinants of saving behaviour, by focusing on the influence of *saving motives* on the household's propensity to save and their portfolio allocation decisions. The current study will not examine exogenous macroeconomic factors but will instead concentrate on micro-level behavioural factors. These include variables such as expectations, risk tolerance, and motives for savings. Examining motives (in particular) is imperative in providing a more complete understanding of certain phenomena, since they explain the reasons behind the conduct of a particular behaviour. As Wärneryd (1999, p.264) defines, motives are "forces influencing behaviour; they can become drives that push behaviour in a certain direction." Thus, in order to understand saving behaviour and the decisions made in relation to saving, it is perceived worthwhile to explore the origin or roots of these actions.

Saving Motives

The literature reveals that households save for a variety of reasons. John Maynard Keynes (1936) was one of the first to draw out a list of saving motives, published in his book entitled *The General Theory of*

Employment, Interest and Money. As will be later discussed in Chapter Two, Keynes (1936) listed eight categories of saving motives, which have been widely adopted and adapted in subsequent publications. Reviews of more recent literature (e.g. Wärneryd, 1999) suggest broader categorizations of these motives, where four main groups of saving motives have been identified: (i) life-cycle motives (ii) precautionary motives, (iii) bequest motives, and (iv) profit motives. Life-cycle saving motives suggest that individuals wish to save to smooth out temporary imbalances between income and expenses over their lifetime. This may occur due to uneven income levels or certain life-cycle events that require additional funding, such as education, marriage, or purchasing a home. Precautionary saving motives are the result of preparing for uncertainties in life which may adversely affect income, such as illness or sudden unemployment. Bequest motives reflect the intention of leaving behind an inheritance for surviving family members in the event of demise of the household head. Finally, profit motives reflect the desire of realizing interest or rewards from the act of saving. Households that have any of these saving motives are perceived to have *planned saving*; however, there are other factors that may impede or encourage the performance of saving that are an indication of *unplanned saving*. More on the concepts of planned saving (saving motives) and unplanned saving will be discussed further in Chapter Two (Section 2.4).

Although numerous research have been conducted on saving motives (e.g. Hubbard, Skinner & Zeldes, 1994; Dynan, Skinner & Zeldes, 2002; Furnham, 1985; Alessie & Lusardi, 1997), the results show many inconsistencies in relation to the importance of each motive. Two examples illustrate this point. Firstly, data on life-cycle saving suggest that the saving behaviour of households does not seem to correspond to the predictions of the Life-cycle Hypothesis. As mentioned earlier, empirical findings generally show that individuals are inadequately saving for their retirement. At the same time, elderly individuals are not dissaving as hypothesized, but are in fact continuing to save beyond retirement. Secondly, according to Dynan *et al.* (2002), there have been debates in the literature regarding the important of each motives – Kotlikoff & Summers

(1981) contended that a sizeable portion of the U.S. capital stock was due to intergenerational transfers, but this was disputed by Modigliani (1988) who asserted that life-cycle saving was the main source of capital accumulation. Meanwhile, Dynan *et al.* (2002) propose that precautionary and bequest motives simultaneously exist and overlap each other over the life-cycle. Other studies have found conflicting results in regards to the significance of saving motives, such as those who find strong evidence of precautionary motives (e.g. Carroll, Dynan & Krane, 2003; Lusardi, 2000; Kennickell & Lusardi, 2001), and others find weak evidence (e.g. Starr-McCluer, 1996). Although these contradictions could plausibly be due to differences in empirical estimates, measurements and data, it is clear that the motives for saving continue to warrant further investigation.

Apart from the above inconsistencies in empirical findings, the literature reveals that each saving motive has usually been examined in separate contextual frameworks. This is due to the complexity in providing a single theoretical framework to incorporate the various motives for saving (Harris *et al.*, 2002). However, it has been argued that saving motives are not mutually exclusive but may concurrently interact (Dynan *et al.*, 2002; Wärneryd, 1999). For example, an individual may have a precautionary saving motive to prepare for future uncertainties, and also a bequest motive to ensure that surviving family members are financially protected in the event of the breadwinner's demise. As such, incorporation of the various motives for saving in a single research framework may prove to be advantageous in order to ascertain the relative importance of each motive.

Having identified the theoretical and empirical issues surrounding household saving behaviour, the following sections will proceed by stating the objectives of this thesis, followed by the research questions, research framework and methodology.

1.2 RESEARCH OBJECTIVES

The fundamental objective of this thesis is to undertake a comprehensive study on the saving behaviour of households. Specifically, the aims of this study are:

1) To explore the underlying determinants of saving behaviour by focusing on the role of saving motives.

2) To identify the observable and unobservable households' characteristics that shape saving motives, prior to determining the impact of these motives on saving behaviour.

3) To bridge the gap in the literature by simultaneously examining the influence of the various saving motives on saving behaviour, and to examine the relative significance of each motive on saving decisions.

4) To provide a comprehensive framework to address the issues of household saving and portfolio decisions, by including saving motives as a common underlying explanatory variable.

1.3 RESEARCH QUESTIONS

In relation to the abovementioned research objectives, this study attempts to answer the general research question: *What motivates saving behaviour?* This leads to the formulation of three specific research questions:

RQ1) What is the relationship between the posited antecedents of saving and the household's saving motives?

RQ2) What is the relationship between saving antecedents and motives, and the household's propensity to save?

RQ3) What is the relationship between the saving antecedents and motives, and the household's portfolio allocation choice?

The research questions can be illustrated in the following diagram (Fig. 1.1), which outlines the relationships under investigation. The dotted box

on the far left encompasses the antecedents of saving. These include demographic and behavioural characteristics of the household. The arrow labelled RQ1 represents the first research question and aims to establish the factors that shape the household's saving motives. The second research question is represented by two arrows, RQ2a and RQ2b. The former investigates the role of saving motives on the household's propensity to save and reflects *planned saving*; the latter examines the non-motivated role of household characteristics in the determination of saving and denotes *unplanned saving*. Finally, the third research question is depicted by arrows RQ3a and RQ3b. The role of saving motives and its effect on the portfolio allocation choice is shown by arrow RQ3a. Meanwhile, RQ3b represents the postulated relationship between household characteristics and the portfolio allocation decision. The dotted arrow connecting "propensity to save" and "portfolio allocation choice" suggests that there is a connection between the two financial decisions of the household. A more detailed explanation of this conceptualisation will be presented in Chapter Three.

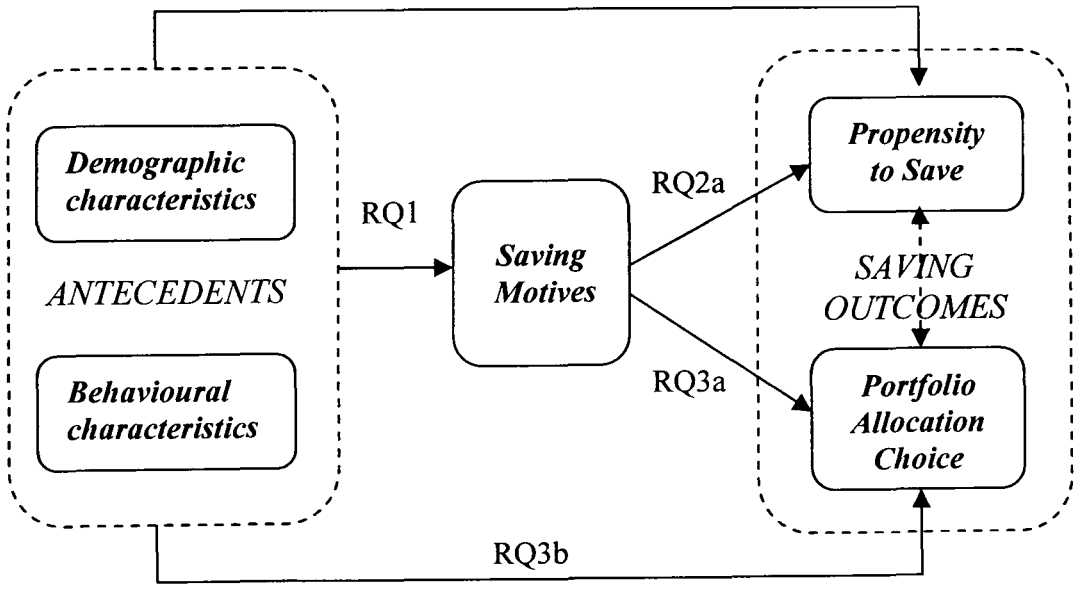


Figure 1: Brief conceptualisation of the research framework

1.4 RESEARCH METHODOLOGY

Efforts to answer the research questions were made by conducting empirical analyses of data from a national-level household financial survey. Two main criteria that were considered in the selection of an appropriate dataset were: (i) a dataset that incorporates a comprehensive list of saving motives, which include the life-cycle, precautionary, bequest and profit motives; and (ii) a dataset that contains detailed information on the households' holdings of financial assets. After reviewing related studies and examining the various datasets employed by other researchers, the U.S. Survey of Consumer Finances (SCF) was selected. Various econometric procedures were conducted in search of the answers to the research questions listed in section 1.3. Further details on the research methodology will be addressed in Chapter Four.

1.5 CONTRIBUTION OF THE STUDY

This study will contribute to the literature by bridging the theoretical gap between saving behaviour and portfolio allocation decisions. These two aspects have all the while been looked at distinctively, with the issue of saving *behaviour* being driven by economic theory and the subject of portfolio allocation choice being guided by finance theory. However, the decision to save is synonymously linked to the decision on the forms in which these savings will be held (the portfolio allocation choice); thus it is difficult to ignore the close relationship between the two aspects. Guiso *et al.* (2000, p.20) calls for research that relates these two issues, as reflected in the following excerpt:

> ...one important task for future empirical research is to study the joint behaviour of saving and portfolio decisions. While theorists have been working on such joint analysis at least since the seminal works of Merton (1969) and Samuelson (1969), empirical research on household savings and on portfolio choice has proceeded separately. It is time to rejoin the issues!

Research focusing on the relationship between saving motives and portfolio allocation choice is particularly scarce, with the exception of three related studies. The first is a study by Xiao and Anderson (1997) which examined the relationship between "financial needs" (rather than saving motives) and the household's shares of financial assets. The study explored the reasons and magnitudes of household's financial asset holdings, according to a framework based on Maslow's hierarchy of needs. The three groups of financial needs that were considered were *survival*, *security* and *growth*. The second study is an exploratory study by Gunnarsson & Wahlund (1997) which examined the patterns of financial asset and debts of Swedish households, using a cluster analysis to categorize savers into groups of similar patterns. Six groups of savers with similar financial strategies were found to exist: *residual savers, contractual savers; security savers, risk hedgers; prudent investors* and *divergent strategies.* Although these studies bear some resemblance to the present study whereby financial needs and strategies of households are explored in relation to the types of assets held, these variables are not exactly the saving motives that have been identified from the literature and used in this study. The third is a study by Shum and Faig (2006) that investigated the determinants of stock holdings, and included saving motives as explanatory variables. However, the study focused on stock holdings and did not consider allocations into other types of assets in the portfolio.

The current study builds on prior research by integrating the various saving motives into a single research framework and examining their influence on saving behaviour and portfolio decisions. The majority of studies which have explored saving motives usually examine each motive independently (see for example, Hochguertel, 2003; Carrol, Dynan & Krane, 2003; Lusardi, 2000; Horioka *et al.*, 2001; Walliser & Winter, 1998). As Dynan *et al.* (2002) and Wärneryd (1999) argue, household saving behaviour is typically driven by more than one saving motive concurrently. Hence, this study will investigate possible links (or overlap) between the different saving motives and will establish the relative dominance of a particular motive.

In terms of practical contribution, the results of this study will potentially benefit financial services providers and policy makers. By better understanding the reasons that compel households to save, financial services providers are able to understand the profile of savers and therefore more effectively target relevant financial instruments to the right markets. Financial planners are also able to develop more suited financial plans for their clients by understanding their saving motives and how these motives operate in the determination of asset selection. It is also hoped that the results of this study will benefit policy makers in the development of tax incentives, social security reforms and other pension programs. Consequently, the outcome of policy improvements will ideally be passed on to individuals, and through stimulation of household saving, aggregate savings at the national level will be increased.

1.6 THESIS STRUCTURE

This chapter provided a brief background of the present research, by highlighting the key issues and unresolved areas in the literature that motivated the conduct of this study. A description of the research objectives, research questions, conceptual model, research methodology and contribution of the study were also given. The remainder of this thesis will revolve around an additional seven chapters as summarized below.

Chapter Two: Household Saving Behaviour, Motives and Decisions

The second chapter which follows will review related literature governing the proposed research. Three main areas will be covered – the first part defines the meaning of *saving* and related terms, and reviews the literature in regards to household saving behaviour. The second part covers *motives* and will first define the term, review the general theories linking motives and behaviour, and then review the literature on *saving motives*. Four saving motives will be highlighted, namely the life-cycle, precautionary, bequest and profit motives. The third part of the chapter reviews the literature in regards to portfolio allocation choice. This section will

elucidate standard portfolio theory; discuss its limitations and present alternative views of the theory. Empirical evidence will also be presented in support of the theory, or otherwise.

Chapter Three: Research Model and Hypotheses

This chapter will present a more detailed conceptualisation of the research objectives. Postulated relationships between variables will be shown and justified from prior works in the literature. The research questions will again be presented, followed by a list of the hypotheses to be tested.

Chapter Four: Research Methodology

This chapter will describe and justify the methodology that was adopted to answer the research questions. The chapter will begin by discussing the philosophy and epistemology of research. Then, justification for using secondary data and the basis for the selection of the appropriate data source will be provided. The dataset chosen for analysis is the American 2004 Survey of Consumer Finances, which is a national household survey, sponsored by the Federal Reserve Bank of the U.S. The rationale for using this dataset will be explained. The chapter will then describe the dataset in more detail and discuss key methodological issues in regards to the use of this dataset. Descriptive statistics of the variables relevant to the study will also be included in the chapter.

Chapter Five: Motives for Saving

This chapter represents the first empirical chapter of this thesis and will focus on the first research question: *What is the relationship between the posited antecedents of savings and the household's saving motives?* First, a brief background on the investigated relationships will be given. Next, a brief conceptual model will be illustrated, followed by an explanation of how the dependent and independent variables were measured. This will be based on prior empirical measurement methods that have been conducted in relation to saving motives. Next, the postulated relationships under investigation will be discussed. The data analysis section follows and this

will include descriptive, univariate and multivariate analyses. Finally, the chapter concludes with a discussion of the results.

Chapter Six: The Propensity to Save

This chapter focuses on the second empirical question and aims to answer the second research question: *What is the relationship between saving antecedents and motives, and the household's propensity to save?* The chapter will begin by describing and summarizing the key issues pertaining to saving *behaviour*, followed by a brief conceptual model. The next section covers the measurement of the dependent variable and independent variables as well as postulated relationships with the independent variables. This is followed by a section on the data analysis, which includes descriptive, univariate and multivariate analyses. The multivariate analysis section will explain the choice of analysis undertaken. Finally, a discussion of the results will be provided.

Chapter Seven: Portfolio Allocation Choice

This chapter forms the third empirical chapter of this thesis and will be devoted toward answering the third research question: *What is the relationship between the saving antecedents and motives, and the household's portfolio allocation choice?* The chapter begins with a brief overview on the research issues, followed by a conceptualization of the research objective. This will be followed by a justification on the measurement of dependent variables and a section on the predicted signs of relationship between the dependent and independent variables. The next section focuses on data analysis and will include descriptive, univariate and multivariate analyses. The chapter closes with a discussion of the results.

Chapter Eight: Summary of Findings, Implications and Conclusion

Chapter Eight is the final chapter of the thesis and will provide a summary of the thesis, and also consolidate the findings from the three empirical chapters (Chapter Five, Six and Seven). A discussion that integrates the findings of the three research objectives will be provided, including

implications toward the savings industry. Theoretical contributions of the study will also be discussed. Finally, the chapter ends with a section on the limitations of the study and recommendations for future research.

1.7 CONCLUSION

This chapter provided a background to the research and highlighted salient observations in regards to household saving behaviour and portfolio allocation choice which motivated the conduct of this study. The issues that were highlighted were the various trends in saving behaviour across nations, divergences between saving theories and empirical data, and the puzzles surrounding portfolio allocation which remain to be understood. Having acknowledged the basic issues warranting further investigation, the chapter then proceeded by listing the research objectives, research questions and outlining the research framework. The chapter also highlighted the study's contribution toward the literature. The last segment of the chapter provided a brief structure of the thesis and what would be expected in the chapters that follow.

The next chapter will review the main body of literature with the objectives of providing an overview of the fundamental ideas governing this research and identifying the gaps in the literature.

Chapter Two

HOUSEHOLD SAVING BEHAVIOUR, MOTIVES AND DECISIONS

2.1 INTRODUCTION

The phenomenon of household saving trends and behaviour continues to be an unresolved research area. As mentioned in the introduction of this thesis, the divergences in household saving across nations and the contradictions between theory and practice have sparked the conduct of vast research investigating these puzzles. Two broad approaches have typically been taken, one from an aggregate macroeconomic angle, and another from a more microeconomic perspective focusing on household level determinants. This study considers behaviour at the household level, and seeks to investigate micro-level determinants of household saving and decisions. Driven by this objective, this thesis proceeds by reviewing the relevant literature to identify key issues pertaining to saving behaviour, saving motives, and portfolio decisions.

The rest of the chapter revolves around the three key areas of the literature mentioned above, and is organized in the following manner. Section 2.2 focuses on household saving behaviour and begins by defining *saving* and related terms that are relevant to the context of this study. It will then proceed by reviewing prior studies on household saving. Section 2.3 provides an overview of motives in general and theories of motives, while Section 2.4 reviews the literature on saving motives. The chapter continues with Section 2.5, which deals with the issues pertaining to portfolio allocation choice. The gaps in the literature will be highlighted in Section 2.6, and finally, Section 2.7 concludes the chapter.

2.2 THE ACT OF SAVING

2.2.1 Definitions

Saving refers to the act of refraining from consumption and deferring it to a future period. Formally, it is defined as "the excess of income over expenditure on consumption in a period" (Keynes, 1936), or alternatively, "the difference in net worth at the end of a period and net worth at the beginning of the period" (Wärneryd, 1999, p.47). The former definition is a *flow* measure and therefore is separate from households' existing total savings, while the latter definition reflects a measure of *stock* equivalent to net wealth for a certain period, which requires detailed information on assets and liabilities.

In Browning and Lusardi's (1996) commendable review on the theories and facts of household saving, the following equations are used to define savings. The budget condition for financial assets is given as $A_{t+1} = (1+r)A_t + Y_t - C_t$, where A, r, Y and C are financial assets, the real interest rate, earnings, and consumption, respectively. Saving is thus equivalent to $(A_{t+1} - A_t)$, which reflects the second saving definition - the first difference of assets between two periods. Meanwhile, based on the first definition (excess of income over consumption), saving is equivalently given as $(rA_t + Y_t - C_t)$ where $(rA_t + Y_t)$ equals the earned plus capital income (Browning and Lusardi, 1996, p.1812).

The above definitions of saving imply that saving is a passive behaviour since it is treated as a default outcome of the residuals of income over consumption, rather than a primary activity. However, it can be argued that the conduct of saving, which is a purposeful act of refraining oneself from consumption in the current period and deferring consumption to a future period, is actually an active process which requires a certain extent of willpower and self-control. The fact that saving requires such sheer determination and self-discipline implies that saving itself brings no utility to an individual; it is the consumption to be enjoyed in the future that brings satisfaction. This is reflected in a statement by Fisher (1930, p.5):

"Money is of no use to us until it is spent." Thus, the advantages of saving are usually not materialized until it is spent at some time in the future.

Distinguishing between *saving* and *savings* is essential. *Saving* refers to the activity or process of saving, and reflects the flow of unconsumed after-tax income (Poole, 2007). *Savings*, on the other hand, is "the outcome of saving activities and saving processes" (Wärneryd, 1999, p.49) and reflects the accumulated stock of wealth of the household. In studying *saving behaviour*, importance is placed not only on the demographic differences amongst savers, but also on understanding the behavioural aspects of savers such as attitudes, motives, habits, and actual saving conduct. Meanwhile, Borsch-Supan (2000) differentiates between *discretionary saving* and *mandatory saving*. Households have control over the amounts to be saved and portfolio allocations under *discretionary saving* (since it is their own choice how much to save if they want to save at all), but do not have control over *mandatory saving* since the amounts allocated are usually prescribed (either as a fixed absolute sum or a fixed percentage of gross income). Examples of discretionary saving are deposits into saving accounts; purchase of bonds, stocks, mutual funds, or whole life insurance; and voluntary contributions to retirement accounts or pension funds; while an example of mandatory saving is contribution to various occupational pension plans.

2.2.2 Patterns in Household Saving

The phenomenon of declining saving rates highlighted in the introduction of this thesis has spurred the conduct of numerous studies examining saving behaviour at the household level. Studies on private saving have in the past focused on using aggregate time series data, mainly due to lack of reliable household-level data on saving (Harris, Loundes & Webster, 2002). Results of these studies have typically found household disposable income to be the most significant determinant of aggregate saving (Harris *et al.*, 2002). However, more recent developments in the literature have

shifted to using micro-level household data – made possible due to the availability of reliable national-level household surveys such as the British Household Panel Survey, the U.S. Survey of Consumer Finances, the Dutch CentER-panel data and the U.S. Panel Study of Income Dynamics, amongst other datasets.

One of the key research interests on household saving using household-level data is the examination of differences in saving propensities across demographic groups of the population. The availability of data on demographic factors is the main advantage of these micro-level datasets, since it is such demographic information that can potentially explain the variations in saving at the household level (Banks & Tanner, 1996). Household structure has been identified as being one of the determinants of saving, where married couples are more likely to have higher savings (Alessie, Lusardi & Kapteyn, 1999; Lusardi, 2000). However, the presence of children in the household results in a negative impact on saving, as reported in a number of studies (e.g. Alessie & Lusardi, 1997; Browning & Lusardi, 1996; Harris *et al.*, 2002; Lusardi, 2000). This can perhaps be explained by higher expenditure incurred by families with children, leaving smaller amounts of residual income to be saved.

Studies have found education to be positively related to saving (Avery & Kennickell, 1991; Douglas, Berhneim & Scholz, 1993; Lusardi, 2000). According to Browning and Lusardi (1996), the distribution of saving across education groups show that saving rates are higher amongst groups of individuals who have attained higher levels of education. However, these results are not surprising since education and income are highly correlated.

The relationship between age and saving is less clear as there appears to be contradictions between theoretical propositions and empirical evidence. As will later be discussed in Sub-section 2.4.1, one of the most prominent theories of saving, which is the life-cycle hypothesis (LCH) by Modigliani and Brumberg (1954), suggests that saving is non-linearly related to age; saving increases over the life-cycle until it reaches a maximum point and

then decreases during retirement. However, in contrast to the predictions of the life-cycle hypothesis, there is evidence to suggest that many households do not save during their working lives and that households do not deplete their accumulated wealth during retirement. According to Samwick (2006), researchers have come to a conclusion that the standard life-cycle model needs to be enriched to provide a better explanation on how households finance their retirement.

Evidence suggests that income and saving are positively related. Avery and Kennickell (1991) claim that the top income decile of households in the U.S. contributes the largest proportion of total saving, while Dilnot (1990) reports that the top decile of the population contribute to more than half of the total Australian wealth. In an investigation of wealthy households, Dynan, Skinner and Zeldes (2004, p.400) document that "the rich do save more... [and that] saving rates increase across the entire income distribution." Meanwhile, there is evidence indicating that households in the lower income group have negative saving (Bosworth, Burtless & Sabelhaus, 1991). According to Hubbard, Skinner and Zeldes (1995), a possible reason for the low saving rates amongst low income households is their receiving of social insurance. To be eligible for these social welfare benefits, household's wealth levels are required to be below a certain amount; hence to be able to qualify for these benefits, poor households may intentionally choose not to save and accumulate more wealth.

The evaluation of differences in saving behaviour between households of high income and of low income has indeed been a topic of interest amongst theorists and empiricists for decades (Dynan, Skinner & Zeldes, 2004). A classic theory that much research has been based on is the Permanent Income Hypothesis (PIH) by Milton Friedman (1957), which establishes the relationship between consumption and income. According to the theory, individuals strive to keep their expenditure levels fairly constant even though income may vary over time. Temporary changes in income (transitory income) have little effect on the household's consumption because households tend to spend according to what they consider their

usual (permanent) level of income, rather than their current income. According to the PIH, individuals with high permanent income consume (hence, save) the same fraction of permanent income as individuals with low permanent income. This notion, however, has received partial support from empirical findings. According to Dynan *et al.* (2004), Mayers (1972) contested Friedman's "proportionality" hypothesis and provided empirical evidence that the proportion of changes in consumption was significantly different than the proportion of changes to permanent income.

In relation to the above debate, Dynan *et al.* (2004) investigated the saving behaviour of rich households using three datasets from the U.S. – The Consumer Expenditure Survey (CEX), The Survey of Consumer Finances (SCF), and the Panel Study of Income Dynamics (PSID). The purpose of using three different data sources was to allow for different measurements of saving and also to provide better interpretations of the results. The samples were divided into five quintiles, with a cut-off point at a minimum income of $1,000. Results clearly revealed positive relationships between income and saving rates: from the CEX, the median saving rates for the lowest income quintile was -23% and for the highest quintile the rate was 45%. From the SCF, the saving rate ranged from 1% for households in the lowest quintile, to 24% for households in the top quintile. For the top 5% of the income distribution, the saving rate was 37% and for the top 1% income distribution, the saving rate was 51%. Lastly, results from the PSID showed similar patterns of incremental saving rates across income quintiles. The estimated saving rate for the highest income quintile was lower compared to the results from the CEX and SCF, at 19%.

Samwick (2006) suggests that variations to the life-cycle model are attributed to heterogeneity, arising from three facets of the "economic problem of savings." The *first* element that gives rise to the variations are budget constraints faced by households, as a result of differences in initial endowment bestowed upon individuals from parents, in addition to their own educational backgrounds. This is also affected by the earning and investing opportunities of the household along the life-cycle. The *second*

factor for the saving heterogeneity is the motives that compel households to save, which may vary over the life-time. Research has shown that apart from life-cycle reasons, other saving motives are also of importance to the household, such as precautionary and bequest motives. The *third* aspect contributing to the variations in saving is the preferences of the household, including time preferences and discount rate. The latter refers to the rate at which the household will sacrifice the present day's utility for future utility. This rate is also the interest rate gained on saving. Samwick (2006) asserts that to understand national saving, there is a need to understand the heterogeneity that arises due to the three dimensions mentioned above.

Indeed, the literature on saving suggests that saving patterns vary significantly across households, even when other socio-demographic background of households is similar (Venti & Wise, 1998). According to Bernheim, Skinner and Weinberg (2001), the variations have been attributed, among others, to differences in preferences and attitudes, such as risk tolerance, time preferences, future uncertainties, occupational choices, and lifetime earnings. Prompted by the numerous divergences noted in regards to household saving, the current study attempts to determine the factors that influence saving, by investigating the factors that motivate household saving behaviour. In this regard, the following section reviews the literature in regards to motives in general, before exploring the issue of household saving motives.

2.3 MOTIVES AS AN ANTECEDENT OF BEHAVIOUR

Prior to focusing on motives in the context of saving behaviour per se, a discussion on motives in general is viewed pertinent. The subject of *motives* has long been of focal interest to theorists and researchers from a wide range of science and social science disciplines, in attempts to understand human behaviour. A number of factors have been proposed as antecedents of behaviour, such as attitudes and intentions (Fishbein & Ajzen, 1975; Ajzen, 1985), expectancy and value (Fishbein & Ajzen, 1975; Mitchell, 1974), and reasons (Westaby & Fishbein, 1996). Understanding

the factors that stimulate behaviour is crucial not only for the novelty it provides toward theoretical knowledge but also for the contribution it offers toward practice, since deeper understanding of behaviour can assist intervention programs by policymakers.

Motives as a predictor of behaviour have received considerable research interest since they are viewed as being able to provide deeper insight into the reasons why people act in certain ways. Several theories provide formal structures to explain the link between behaviour and its antecedents, including the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Planned Behaviour (Ajzen, 1985), Reasons Theory (Westaby & Fishbein, 1996) and Behavioural Reasoning Theory (Westaby, 2005). The rest of this section will provide a background on motives including its definition and its role in behavioural theories. Sub-section 2.3.1 will first define motives from a psychological perspective while Sub-section 2.3.2 will review several key theories of motives and behaviour.

2.3.1 Definition of Motives

What is the meaning of the term "motive"? Social psychologists refer to motives as the reason for conducting a particular behaviour, or simply, the "why" behind actions that people take (McClelland, 1985). Emmons (1989, p.32) present a more formal definition: the "disposition to be concerned with and to strive for a certain class of incentives of goals", while McClelland (1951, p.390) define the term as a construct that integrates and provides a common meaning to an extensive range of dissimilar responses or behaviour. Being reasons that underlie specific actions performed by individuals, motives are thus believed to reflect their conscious and unconscious wishes or desires.

According to Nuttin (1984), motives refer to the concrete manifestations of needs (which reflect basic behavioural drives), and involve the dynamic and directional aspects of concrete action. In addition, Nuttin (1984, p.15) explains that motive is the "very object or goal that motivates a subject"

and demonstrates how behaviour is "actively guided (motivated) by conscious goals and behavioural projects and plans, i.e., cognitively processed needs." Meanwhile, Geen (1995) describes motivation as the initiation, direction, intensity and persistence of human behaviour. In Eccles and Wigfield (2002, p.110), the root word of 'motivation' is referred to the action of "moving" in Latin, thus the analysis of motivation is perceived to be very much the study of action and closely associated with the concepts of beliefs, values, and goals.

From a philosophical perspective, the concept of motives has been discussed in relation to intentions, reasons and purposes to explain and describe human behaviour. Motives are believed to be physiological states of human action. Scheer (2001) claims that intentions, reasons, purposes and motives have distinct meanings; however, these terms all reflect goals or ends, aims or objectives, and are at times difficult to distinguish. A motive is a reason which helps to explain the actions that people take and facilitates in promoting a better understanding of behaviour by framing the context in which the actions took place. Similarly, Davidson (1963) argues that a reason explains or rationalizes an action. An individual who does something for a reason can be assumed to have a favourable attitude toward the actions that was performed.

According to social psychology researchers McClelland, Koestner and Weinberger (1989), there are two independent and separate systems that govern a person's motivational functioning – implicit and explicit or self-attributed motives. Implicit motives are shaped unconsciously by emotional experiences developed beginning from childhood via "affect-based socialization experiences" (Thrash & Elliot, 2002, p.730), while explicit or self-attributed motives are shaped consciously through cognitive process that characterizes a person's values and goals. The distinction between the two types of motives has been proposed since the 1950s by deCharms, Morrison, Reitman and McClelland (1955), and is emphasized in the following statement by McClelland *et al.* (1989, p.700): "There is evidence that implicit and self-attributed motives are acquired in different ways at

different times of life, respond generally to different types of incentives, function differently in guiding behaviour, and associated with different correlates."

In view of the different ways in which motives are acquired, researchers have generally agreed upon two distinct methodologies of assessment and measurement of motives. Implicit motives that tend to be vaguely represented and operate beyond a person's awareness are measured using picture-story tests analogous to the psychology-rooted Thematic Apperception Test (TAT) (Morgan & Murray, 1935). In the TAT, people are required to create stories based on a series of provocative and ambiguous pictures, which is supposed to uncover repressed and unconscious psychological facets of an individual. In contrast, explicit or self-attributed motives that reflect deliberate choices and conscious behaviour are generally assessed directly through self-report questionnaires.

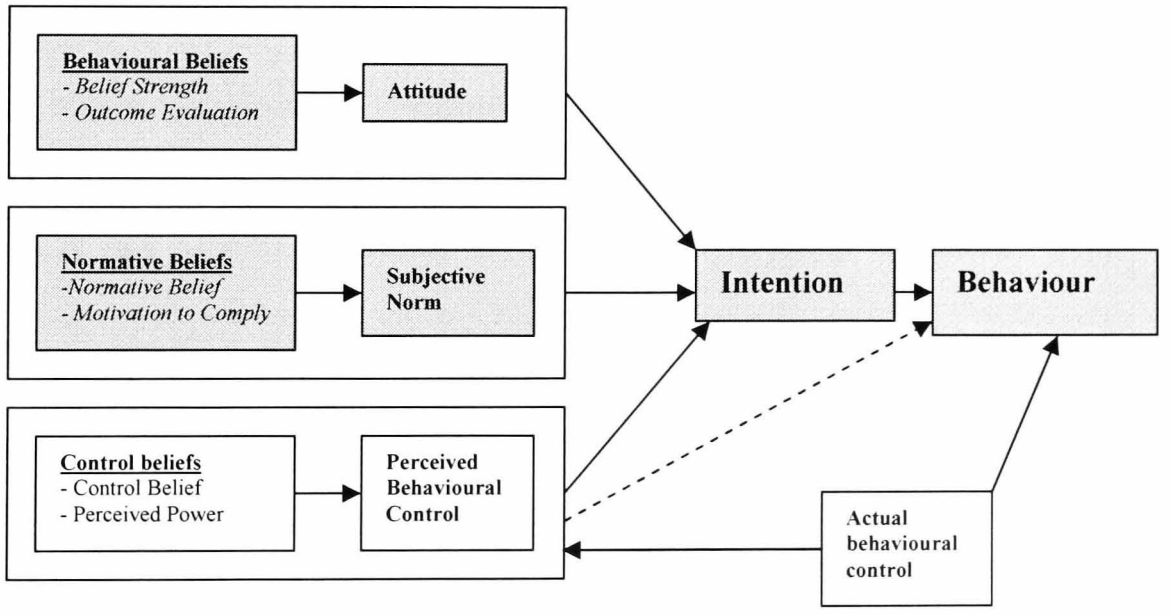
2.3.2 Motives and Behaviour – a theoretical review

As discussed in the preceding section, motives can be considered as one of the factors underlying behaviour. In this vein, the concept of motives has received considerable attention from applied psychologists and theorists to explain human behaviour. Various theoretical frameworks have been used to guide motivational assessments, including several prominent theories such as the Theory of Reasoned Action (Ajzen & Fishbein, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1985), Reasons Theory (Westaby, 1996) and Behavioural Reasoning Theory (Westaby & Fishbein, 2005), which will be further discussed.

i) Theory of Reasoned Action (1975)

The Theory of Reasoned Action (TRA) was developed by Ajzen and Fishbein (1975) to provide a framework relating behaviour with *intention* as an antecedent. The TRA posits that the conduct of behaviour is the

outcome of an individual's intention to perform the behaviour. This intention, in turn, is determined by two factors: an individual's *attitude* toward the behaviour and his *subjective norm*. *Attitude* refers to the overall evaluation toward the performance of a particular behaviour. The more favourable the individual's evaluation toward the behaviour, the more likely it is to positively influence the intention to perform the behaviour. Meanwhile, *subjective norms* are the perceptions of a person's close acquaintances toward a particular behaviour. These perceptions are assumed to influence an individual's *intention* of conducting a particular behaviour. Positive views from these significant others will have a positive influence toward the intention to perform the behaviour, while negative views act as a hindrance toward the intention to perform the behaviour. The TRA is conceptualized in Figure 2.1, indicated by the shaded boxes. The boxes that are not shaded in the illustration refer to the Theory of Planned Behaviour, which will be discussed later.



Source: Fishbein and Ajzen, 1975 (shaded boxes) and Ajzen (1985) (all boxes)

Figure 2.1: Theory of Reasoned Action & the Theory of Planned Behaviour

ii) Self Efficacy Theory (1977)

Albert Bandura proposed the Self-Efficacy Theory (SET) in 1977, which originated from Social Cognitive Theory. Self-efficacy, as defined by Bandura, is a person's belief, confidence and self-conviction on the successful execution of a particular behaviour. This internal belief and confidence level will influence how individuals feel, think, behave and motivate themselves, and is developed through four key stages – cognitive, motivational, affective, and selection processes. Bandura claims that self-efficacy is the most crucial precondition for behavioural change, as it determines the initiation of coping behaviour. Different individuals will have different levels and strengths of self-efficacy. Individuals with higher levels of self-efficacy will be more confident about their ability to accomplish challenging tasks and thus possess a higher degree of optimism and assurance to successfully achieve an outcome. On the other hand, others with low levels of self-efficacy will be more submissive and lack the confidence to perform challenging tasks.

The SET distinguishes between two expectancy beliefs: *outcome expectations* and *efficacy expectations*. Outcome expectations refer to beliefs that certain behaviour will result in particular outcomes, while efficacy expectations are the beliefs that a person can successfully perform the behaviour to produce the desired outcome. Bandura further asserts that self-efficacy shapes a person's sense of motivation by influencing the nature of goals that people set for themselves. According to Bandura, expectations such as motivation, performance, and feelings of frustration associated with reoccurrences of failures will have an influence over affect and behavioural reactions. The Self-Efficacy Theory has contributed toward explaining various relationships between beliefs, attitudes, intentions, and behaviour, and has been the basis of various researches in diverse fields.

iii) Theory of Planned Behaviour (1985)

As an extension to the Theory of Reasoned Action (TRA) (explained in Part (i) of this sub-section), Ajzen (1985) introduced the Theory of Planned Behaviour, as shown in Figure 2.1 above. In addition to the TRA's *attitude* and *subjective norm*, a third antecedent of intention, called *perceived behavioural control*, was added. This concept refers to a person's belief as to whether they are able to perform certain behaviour and the perceived level of efforts required to execute it. The higher a person's perceived behavioural control, the stronger is his or her intentions to perform the behaviour. This additional concept to the theory originates from Bandura's (1977) Self-Efficacy Theory. As previously explained, self-efficacy refers to the belief and self-conviction that an individual has toward his or her own ability of performing a certain task.

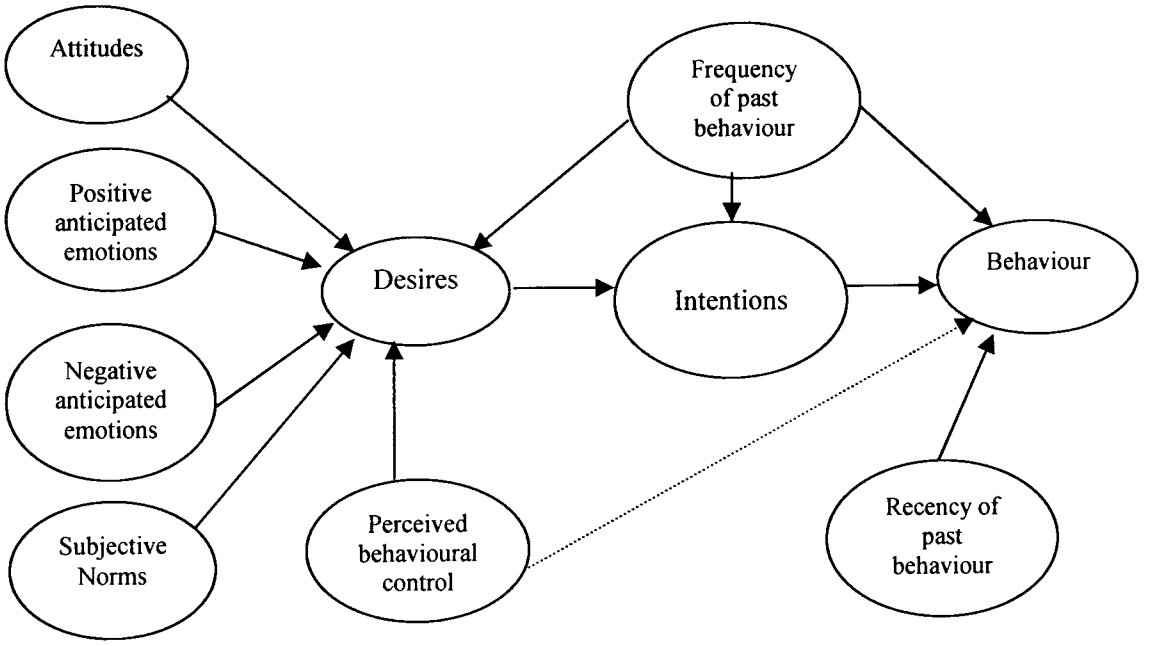
In addition to perceived behavioural control, actual behavioural control directly affects the execution of behaviour. Actual behavioural control reflects the ability of the individual to perform the behaviour, such as having the resources, skills and opportunity to conduct the behaviour. Without actual behavioural control, intentions alone will not necessarily transpire into actual behaviour. Generally, the TPB is based on cognitive processes, although one of its limitations is that it ignores the effect of human emotions on behaviour.

iv) Model of Goal-directed Behaviour (2001)

The model of goal-directed behaviour (MGB) proposed by Perugini and Bagozzi (2001) is an enrichment of the Theory of Planned Behaviour (TPB) (Ajzen, 1985), through the introduction of additional explanatory and mediating variables to the latter. Briefly, the MGB theorizes that *anticipated emotions* and *desires* are significant predictors of behaviour. As may be recalled from the preceding discussion, the TPB proposes that attitudes, subjective norms and perceived behavioural control influence

intentions, which in turn predicts behaviour. These relationships were shown in Figure 2.1.

In the model of goal-directed behaviour, one of the main revisions made to the TPB is the incorporation of *anticipated emotions* (AEs) as additional variables to the first level antecedents of the TPB. This can be noted from Figure 2.2, which illustrates the relationships between variables in the MGB. AEs are concerned with the feelings that are expected to arise from the achievement of goals. In the MGB, differentiation is made between positive and negative AEs. Positive AEs are the perceived emotional consequences that arise from successful realizations of goals, while negative AEs are the probable emotional consequences arising from the failure to achieve goals. According to Perugini and Bagozzi (2001), the decision-maker will consider the emotional consequences of succeeding or failing to accomplish a goal, which takes place prior to the decision of actually performing an action.



Source: Perugini & Bagozzi, 2001, p.80

Figure 2.2: The Model of Goal-directed Behaviour

The second modification to the TPB is the inclusion of *desires* as a mediating variable of intentions. This alteration was made in response to

the arguments made against the TPB concerning its failure to explain how intentions become energized (Perugini & Bagozzi, 2001; Calder & Ross, 1973). Perugini and Bagozzi (2001) argue that although attitudes, subjective norm and perceived behavioural control provide reasons for acting, they "do not incorporate explicit motivational content needed to induce an intention to act." In this essence, previous authors have suggested that desires provide the "connection condition" for intentions (Davis, 1984, p.53), such that the *desire* to act will then motivate an individual to form the intention to act in a particular way.

Finally, the MGB posits that *frequency of past behaviour* and *recency of past behaviour* should also be included in the model. Frequency of past behaviour is hypothesized to impact desires, intentions and behaviours, while recency of past behaviour influences behaviour alone, as shown in Figure 2. The authors argue that behaviours that are routinely performed (frequently practiced) reflect habit strength and therefore stimulate future behaviour. *Recency of past behaviour* is posited to influence behaviour through its influence on information processing, which may indirectly signify the actualizations of intentions (Perugini & Bagozzi, 2001, p.84).

In summary, the MGB posits that *anticipated emotions*, along with *attitudes*, *subjective norms* and *perceived behavioural control*, are mediated by desires to form intentions. Sequentially, *intentions* influence behaviour, along with frequency and recency of past behaviour. The main proposition of the theory is that individuals will first evaluate the perceived emotional consequences arising from goal attainment and goal failure. These emotions are channeled through desires, which consequentially "provide the motivational impetus" (Perugini & Bagozzi, 2001, p.85) directing the strengths of the antecedents toward intentions, and finally, behaviour.

v) Reasons Theory (1996)

Reasons Theory (RT) was established by Westaby and Fishbein (1996) to address the commonly accepted assumption that self-reported reasons are good representations of the motives governing behaviour. The theory argues that considering only one type of reasons (reasons *for* or reasons *against* performing certain behaviours) may be insufficient to fully understand the motivations driving actions. The theory assumes that both reasons for performing a behaviour, and reasons for not performing a behaviour will more accurately represent an individual's specific motives, depending on the behavioural frequency-intention of the individual's behaviour. Reasons Theory is based on three concepts: (a) behavioural frequency-intention (b) reasons for performing certain behaviours, and (c) reasons for not performing behaviour.

The Reasons Theory argues that a more valid assessment of motivation will be provided when respondents satisfy the three postulates mentioned above. To fully represent a person's motivation, researchers should utilize reasons for performing the behaviour in cases where the respondent indicates having some frequency (or intention) of performing the behaviour (for example when the respondent answers that they sometimes / often / always perform the behaviour). Researchers should also utilize reasons against performing a behaviour in cases where the respondent indicates some frequency (or intention) of not performing the behaviour (for instance when the respondent states that they sometimes / often / always do not perform the behaviour). Thus in certain situations respondents need to answer questions concerning both reasons for performing the behaviour and not performing the behaviour.

It is believed that prior to the Reasons Theory, no formal theoretical linkage between self-reported reasons and behavioural frequency/intention had been developed. In what Westaby and Fishbein (1996) refer to as the standard reasons approach, data on self-reported reasons are taken simply as they are and typically assumes that all reasons accurately represent people's motives. On the other hand, based on a hierarchical regression

analysis, Westaby and Fishbein show that the RT explains variance in behaviour over and above that explained by the standard reasons approach.

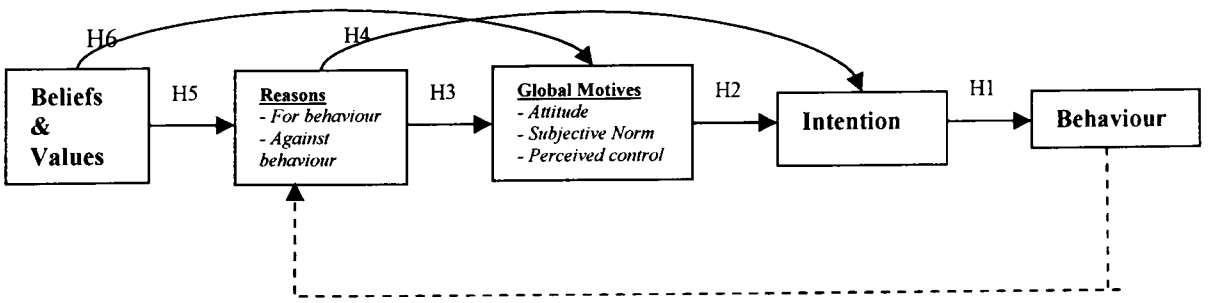
The second hypothesis of the RT tests how similar mean self-reported reason ratings are to the correlational results using both reason approaches. A respondent's rating of the importance of a reason can be regarded as his or her "subjective" estimation of the causal relationship between that reason and the person's behaviour. However, this is rarely given consideration in the self-reported reasons literature - if a sample had a higher mean rating, then the reason is assumed to have a stronger influence over the sample's behaviour. However, the RT assesses the factors influencing behaviour by examining the correlational relationship between the attributes (the rated reasons) and behaviour. A particular reason that is rated to be the most important reason for performing a behaviour is also expected to have strong correlation with behaviour, given that the subjective reason ratings have some validity. Correlation results from the RT showed that the attributes from the RT were more strongly correlated than the correlations from the standard reasons approach.

vi) Behavioural Reasoning Theory (2005)

Building on the earlier behavioural intentions models such as the TRA and TPB, Westaby (2005) proposed the Behavioural Reasoning Theory (BRT), which postulates that *reasons* connect together beliefs, global motives (e.g. attitudes, subjective norms, perceived control), intentions and behaviour. The theory assumes that reasons influence global motives and intentions, by justifying and rationalizing individuals' actions. Behavioural intention models like the TRA and TPB are based on belief concepts (behavioural, normative and control beliefs), which offer deeper understanding toward context-specific factors affecting behaviour. However, Westaby (2005, p.98) argues that reasons also deserve theoretical consideration since they have been tested to provide "predictive validity in a number of judgment and decision making contexts."

In the BRT, global motives and context-specific beliefs and reasons are clearly distinguished. Global motives are defined as "broad substantive factors that consistently influence intentions across diverse behavioural domains" (Westaby, 2005, p.98), which include attitude, subjective norm and perceived control. These variables have been proven to have a significant relationship with intentions (Ajzen, 2001). Context-specific beliefs and reasons are distinguished from global motives under the presumption that they are the preceding antecedents of global motives and intentions.

The BRT is conceptualized in the following diagram (Fig 2.3). Parallel to other behavioural theories, intention is hypothesized to have a significant influence over behaviour. Also akin to prior models, intention can be predicted by global motives. As a novel theoretical contribution, *reasons* are added to the model, as a predictor of global motives. In the model, reasons are assumed to operate through justification and defense mechanisms, and are also expected to directly predict intentions beyond that explained by global motives. In addition, reasons are the result of an individual's beliefs and values. Beliefs and values are predicted to have direct impact on global motives due to "automated processes that may circumvent deeper reason activation" (Westaby, 2005, p.99). Lastly, the dashed arrow connecting behaviour and reasons reflect the reinforcement of reasons after the conduct of a behaviour, which may be used to "support, distort, or rationalize behaviour", synonymous to dissonance theory.



Source: Westaby (2005, p.99)

Figure 2.3: Behavioural Reasoning Theory

Westaby (2005) further tested the BRT through the conduct of four separate empirical studies relating employee turnover and relocation decisions using confirmatory factor analysis and structural equation modelling. The variables under investigation were assessed through different measurement items in regards to attitude, subjective norm, perceived control, reasons for and against, beliefs, intention and behaviour. Results of these studies supported the overall theory, which proposed that reasons are fundamental in the relationship between people's beliefs, global motives, intentions and behaviour. In specific terms, the tests revealed the following results:

1) Reasons (for and against behaviour) were differentiated from global motives and intentions, and strengthened the prediction of intentions beyond those explained by global motives.

2) Intentions were the result of the information processed from global motives and reasons.

3) Beliefs and value concepts were related to reasons for and against behaviour.

4) Traditional belief concepts have direct linkages to global motives and intentions, unaccounted for by reasons.

Westaby stressed that reasons for and against behaviour should not be used in isolation but congruent to each other. Furthermore, the integration of global motives and belief concepts in addition to reasons are crucial to provide a more comprehensive understanding of behaviour.

In summary, this section defined the term 'motive' and traced the developments of relevant theories that provide the theoretical links between behaviour and its antecedents. Both the Theory of Reasoned Action and the Theory of Planned Behaviour hypothesize *intentions* as the main antecedent of planned behaviour. This postulation is enriched in the model of goal-directed behaviour (MGB) which posits that *desires* precede

intentions and prior to that, *emotions* influence desires. Meanwhile, Reasons Theory and Behavioural Reasoning Theory incorporate *reasons* as an antecedent of global motives and intentions. A general and common significance of all these behavioural theories is that behaviour occurs sequentially after an *intention* is formed, inferring that intentions are the main drivers of planned behaviour. Having reviewed the various theories of behaviour, the following section discusses the issue of household's saving motives.

2.4 WHAT MOTIVATES SAVING?

In the preceding section, motives in general were explained, and theoretical reviews of behaviour and motives were then discussed. Generally, motives have its origin in psychology and have been described as being a manifestation of needs or behavioural drives. However, in the context of saving behaviour, the motives to save have been described as a cognitive outcome and are more closely related to goals and purposes, rather than drives. As noted by Wärneryd (1999, p.265),

> Saving motives as they have been suggested by economists over the centuries have had little to do with the drive theories of behaviouristic psychology. They have been closer to cognitive learning theory since purposes rather than drives are stressed. The proponents of saving motives usually get their ideas from their own observations and insights. Interpreted in terms of psychology, the saving motives are related to goals since they express wishes to accomplish some objective. A goal is more specific than a motive and has an external reference.

From this statement, it can be conjectured that saving motives are the *goals* or *objectives* that savers wish to achieve as a result of saving, rather than an internal psychological force driving saving conduct.

The first known list of saving motives was developed by J. Maynard Keynes (1936) who outlined eight motives, which was later revised by one

additional motive (item 9 in the following list) by Browning and Lusardi (1996):

1. "To build up a reserve against unforeseen contingencies" (*the precautionary motive*);
2. "To provide for an anticipated future relationship between the income and the needs of the individual…." (*the life-cycle motive*);
3. "To enjoy interest and appreciation….." (*the intertemporal substitution motive*);
4. "To enjoy a gradually increasing expenditure…." (*the improvement motive*);
5. "To enjoy a sense of independence and the power to do things, though without a clear idea or definite intention of specific action" (*the independence motive*);
6. "To secure a masse de manoeuvre to carry out speculative or business projects" (*the enterprise motive*);
7. "To bequeath a fortune" (*the bequest motive*)
8. "To satisfy pure miserliness, i.e. unreasonable but insistent inhibitions against acts of expenditure as such" (*the avarice motive*);
9. To accumulate deposits to buy houses, cars, and other durables (*the down-payment motive*)

Browning and Lusardi (1996) offered some insights on the above list. First, the list appears to be comprehensive and captures a variety of motives that are likely to apply to heterogeneous households. Most likely, different households with diverse socio-demographic and economic backgrounds and varied circumstances will have different motives for saving. For example, households with children may save to finance their children's education or to leave a bequest, but those without children may view other motives as more important, such as for precautionary reasons or to enjoy accumulation of interest. Secondly, the motives appear to be complementary and are likely to change or coincide over the life-cycle. For instance, a younger individual at the start of career may save to purchase a house or for emergencies, and probably not for a bequest motive, but this

may change as the household progresses in the life-cycle. Lastly, several of the motives are more psychology-driven (such as the avarice and independence motive), thus are difficult to integrate within conventional economic models.

The literature reveals no specific rule in delineating saving motives. It has been observed that different authors have slightly different ways of categorizing these motives. Some authors suggest that these motives can be positioned in a hierarchical structure, following Maslow's (1954) hierarchy of needs theory. Xiao and Noring (1994) were one of the few who used this approach, using data on saving motives from the 1986 U.S. Survey of Consumer Finances (SCF). The categories of saving motives used were *Daily, Purchase, Emergency, Retire, Child* and *Grow*, which were assumed to reflect a hierarchical association among each other. However, the study merely investigated cross-tabulation associations (bivariate tests) between demographic factors and the propensity of having a particular motive, without incorporating unobservable heterogeneity amongst households and/or controlling for the variables. Results revealed that families in the low income group were more likely to save for "daily expenses", the middle income group tended to have "emergency" motives, while families in the high income group were more inclined to having a "retirement" motive. These findings were inferred to indicate a hierarchy of needs.

Extending the works of Xiao and Noring (1994), Devaney, Anong and Whirl (2007) proposed a model to examine the possibility of moving up on the hierarchy of motives. The hierarchical structure starts from (i) having no savings; (ii) physiological; (iii) safety; (iv) security; (v) love and societal; (vi) self-esteem and luxury; and (vii) self-actualization. The authors hypothesized that individuals would move up along the hierarchy as lower-level motives are satisfied. Data from the 2001 SCF were analyzed using a continuation ratio model, which was viewed appropriate "for any ordered categorical variable where the categories represent a progression of stages" (Devaney *et al.*, 2007, p.179). Results showed that age of the household head, family size and planning horizon length were

important predictors for advancing from lower to higher levels of the hierarchy.

Canova, Rattazzi and Webley (2005) analyzed saving motives to create a superordinate hierachical structure of goals. A sample of 97 participants were asked to provide reasons why they wanted to save, and then to provide justifications on these motives. The study found fifteen salient goals that implied a hierarchical function. More concrete goals were placed at the bottom of the hierarchy (e.g. "purchase", "holidays", "money availability") , while at the top of the hierarchy, more abstract goals (e.g. "self-esteem", "self-gratification"). The authors contended that the hierarchy of saving motives did not only depend on socio-demographic variables, but also on cognitive variables. The study concluded with a call for further research to be conducted on "how saving motivation influences saving intentions and saving behaviour" (Canova *et al.*, 2005, p.31).

Apart from categorizing saving motives in a hierarchical manner, the literature also reveals broad and narrow approaches of categorizing motives. For instance, some authors have defined them in a very 'micro' manner while some define them in broader contexts. In a "micro-analysis" of saving motives amongst Japanese households, Horioka and Watanabe (1997) used data from a national survey called the Survey of Financial Asset Choice of Households containing twelve specific categories of saving motives: *retirement, illness, children's education and marriage, housing, consumer durables, leisure, tax, business, bequests*, and *others*. Generally, these motives represent either one of the following motives: (i) life-cycle, (ii) precautionary, and (iii) bequest motives. The survey also gathered information on ten motives for dissaving as well as ten motives for borrowing. The dataset contained a breakdown of saving amounts associated with each motive, allowing estimation of the contribution of net saving (saving minus dissaving) for each of the motives possible. By estimating the amount of net saving of households for each of the twelve motives, results of the study revealed that retirement and precautionary

motives are significant determinants of net saving. Meanwhile, the bequest motive contributed to only 3% of total net saving for all the motives.

The other approach that has been taken is to categorize motives in a broader context. For instance, Wärneryd (1999) in his book entitled *The Psychology of Saving* suggests that there are four categories of saving motives which he stressed are not independent of each other. These are the habit formation, bequest, precautionary and profit motives. These motives are viewed to be more holistic and encompass the other micro-motives examined by other authors. However, in the context of this study, the "habit formation" motive is viewed as redundant, since it does not specifically meet any specific saving goal and is believed to implicitly represent all the other motives not covered within the other categories of saving motives. For the purpose of this study, the life-cycle motive, which has been established as one of the most basic underlying saving objective as hypothesized by Keynes (1936) and Modigliani and Brumberg (1954), is viewed to be more relevant and hence will form one of the main saving motivations to be considered.

With the exception of a handful of recent studies, most of the research conducted in regards to saving motives has typically focused on a single motive to examine its impact on saving behaviour. However, there have been propositions that saving motives are not mutually exclusive and that households may have more than one motive at a single time (Wärneryd, 1999; Dynan *et al.*, 2004; Browning & Lusardi, 1996). A recent study by Fisher and Montalto (2010) examined the effect of various saving motives simultaneously, using data from the 2007 Survey of Consumer Finances. The study also incorporated the effect of saving horizons on saving behaviour. The saving motives that were considered were: (i) emergency, (ii) down payment, (iii) life-cycle/retirement, (iv) education for children and/or grandchildren and (v) bequests/for the family. Two measures of dependent variable were used: (i) a binary dummy variable indicating that spending was less than income; and (ii) a dummy variable indicating that households saved regularly. Using logistic regressions, the study found that

saving for children's/grandchildren's education was significant in explaining the probability of saving over the past year. Having an emergency or retirement saving motive significantly increases the likelihood of saving regularly, supporting the life-cycle theory. Meanwhile the down payment and bequest motives were not significant determinants of saving over the past year or being a regular saver.

It is clear from the discussion above that different studies have different ways of categorizing saving motives. The present study will focus on four saving motives derived from Keynes (1936) and Wärneryd (1999), which are life-cycle, precautionary, bequest, and profit motives. These will be discussed in detail in the following sub-sections (Sub-sections 2.4.1 - 2.4.4).

2.4.1 Life-cycle Motives

The life-cycle saving motive as highlighted by Keynes (1936) is a consequence of temporary imbalances between income and expenditures that occur throughout the lifetime. Variations in income typically occur due to evolution of events that take place during an individual's lifespan – for example, marriage, purchase of major durable items, housing purchases, and children's education. The life-cycle hypothesis (LCH) conceptualized by Modigliani and Brumberg in 1954 is fundamentally an important theory governing saving behaviour, which posits that households will smooth out their consumption patterns over their life-cycle by dividing lifetime wealth by the number of years they expect to live (Palumbo, 1999) allowing constant real consumption levels throughout the life. In the course of having relatively high earning power particularly during mid-life, households save increasing amounts of their income and also pay off debts in order to prepare themselves for declining levels of income in the later part of their life-cycle (the retirement stage), resulting in a hump-shaped wealth pattern (Jappelli and Modigliani, 2003). The notion that individuals will find it optimal to equalise consumption across the periods of their life

is reflected in the decreasing marginal utility of consumption which implies that individuals will be better off by transferring funds for spending from a high-income period and to a low-income period (Banks & Tanner, 1996).

The LCH is illustrated in Figure 2.4, where young individuals will dissave by borrowing to fund desired consumption. Middle-aged cohorts with increasing levels of income will save part of their income while maintaining the same values of consumption[3]. In later stages of the life-cycle, individuals will dissave to finance their desired consumption needs.

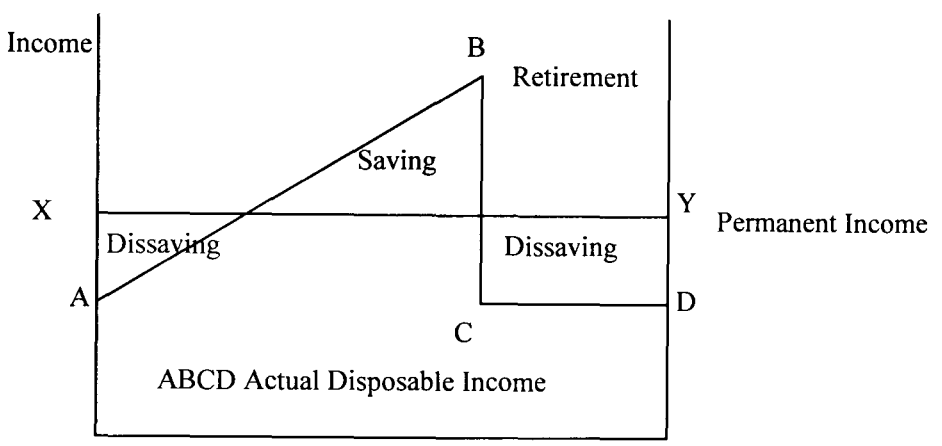


Figure 2.4: The Life-cycle Hypothesis

Empirically, however, there appears to be two major observations that are inconsistent with tenets of the LCH. First, there is evidence to suggest that the elderly do not dissave but instead continue to accumulate wealth as they age (Lusardi, 2000; Jappelli & Modigliani, 2003). Second, reports have highlighted concerns that households are not saving adequately for retirement. In the U.K., it has been reported that more than half of the British working population are not saving enough, or not saving at all, for their future retirement (Association of British Insurers, 2007).

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[3] This notion is equivalent to Friedman's (1957) Permanent Income Hypothesis (discussed in Sub-section 2.2.2) which contends that households tend to keep their expenditure levels constant over time and will not respond to transitory income shocks across the lifespan.

The choice between saving and consumption is an inter-temporal choice where households need to consider the trade-offs between immediate and future consumption (Gough & Sozou, 2005). This decision rests on the idea that households seek to optimise utility over their life-cycle, and will consider the weighted values of consumption between the present and the future. If households value immediate consumption more than future consumption, households will prefer to consume at the present time rather than save for tomorrow.

The life-cycle model is built on the assumption that agents act to maximize their utility and that they are rational in their decision-making. Nonetheless, while the LCH is a commendable effort and provides a good starting point for examining saving behaviour, it has been criticized as merely being a classic example of economic theorizing with severe limitations (Shefrin & Thaler, 1988). One aspect of these criticisms originates from a behavioural perspective which argues that ordinary people may not always act as rationally as the LCH assumes, but are largely influenced by emotions and their "bounded rationality" (Simon, 1955). The concept of "bounded rationality" does not mean that agents are irrational, but, as Jones (1999, p.297) explains,

> ....decision makers are intendedly rational; that is, they are goal oriented and adaptive, but because of human cognitive and emotional architecture, they sometimes fail, occasionally in important decisions. Limits on rational adaptation are of two types: procedural limits, which limit how we go about making decisions, and substantive limits, which affect particular choices directly.

The above excerpt suggests that individuals, in actual fact, strive to be rational in their decision making, but are limited by their own emotions and behaviour which sub-optimally affects their decisions. Thaler (1994) argues that typical individuals are not able to solve "multiperiod dynamic maximization problems" such as computing their utility-maximization levels or estimating future values of their consumption needs.

In regards to the life-cycle model, Shefrin and Thaler (1988) argue that numerous 'modifications' to the theory have been made to enable them to better explain the data, but these are usually made on ad hoc basis which requires different assumptions to accommodate the diverse empirical results. Recognizing the need for a more firm explanation, Shefrin and Thaler (1988) propose a formal enrichment to the LCH, called the Behavioural Life-cycle Hypothesis (BLCH), incorporating behavioural influences to reflect actual human conduct. Three behavioural components are included in the BLC – *self-control*, *mental accounting* and *framing*.

According to Shefrin and Thaler (1988), the problem of *self-control* relates to the lack of willpower, which may deter individuals from saving in the manner prescribed by normative theory (i.e. the LCH). Although an individual is aware of the importance of savings and the consequences of having inadequate saving during low periods of income, lack of self-control results in failure to implement purposeful actions in accordance to the recommendations of normative theory. More specifically, as a result of lacking self-control, individuals will fail to save regularly and to accumulate wealth for future consumption. Thus, deviations from the saving patterns as suggested by the LCH may be observed. The concept of *mental accounting* refers to the propensity of individuals to group their assets into several 'mental accounts' and use cognitive operations to organize, evaluate, and keep track of financial activities (Thaler, 1999). For example, people may categorize their assets into 'current assets' such as cash or checking accounts which can be used on a regular basis. They may also have a 'current wealth' category that includes savings accounts, stocks and bonds. A 'future income' account includes money that will be earned in the future such as retirement accounts. Mental accounting suggests that people will have different risk attitudes for each mental account.

Another cognitive illusion influencing the decision making process is *framing*, or *mental frames* – the illusionary states of mind that highly influence perceptions and therefore the decision making process. According to Shefrin (2002, p.23), a frame is "the form used to describe a

decision problem." The concept of *mental frames* was earlier proposed in the Prospect Theory (Kahneman & Tversky, 1979), which posits that there are two stages in the decision making process – first, the stage of "framing and editing" where initial investigation of the decision problem is undertaken, and followed by the second phase, which involves evaluating the framed prospects and choosing the prospect with the highest value. Framing refers to the manner in which the choice problem is presented and incorporates the influence of norms, habits and expectancies on the decision maker (Tversky & Kahneman, 1986). The Prospect Theory will also be discussed in Section 2.5.1 (Part iii).

While the BLCH offered by Shefrin and Thaler attempts to improve upon the traditional life-cycle model, incorporating behavioural aspects in such an economic- based model proves to be challenging. Meanwhile, other attempts have been made to modify the standard life-cycle model to make it more plausible, such as the introduction of bequest and precautionary motives for saving. The precautionary saving motives reflect the idea that households save to protect against income uncertainties in the future, resulting from unexpected medical expenses, unemployment, or uncertainties regarding length of life. Meanwhile, bequest motives suggest that households accumulate wealth to leave as inheritance to future generations. Bequest motives can explain why retired households continue to save during retirement. Sub-section 2.4.2 below discusses the precautionary motive in greater detail, which will be followed by Sub-section 2.4.3 which discusses bequest motives.

2.4.2 Precautionary motive

A major limitation of the traditional life-cycle/permanent income model is that it does not take into consideration the effects of uncertainty on saving behaviour. The fact that income is uncertain and can fluctuate over lifetime results presents further complications in predicting saving behaviour. Fortunately, though, the existences of precautionary saving models

incorporating uncertainty can potentially provide richer understanding to the saving puzzles.

Saving for precautionary motives suggests that people are preparing for uncertainties that may occur later in life, such as the risk of income variations, unexpected out-of-pocket medical expenses and length of life uncertainties (Kotlikoff, 1988). According to Abel (1985, p.777) "a precautionary demand for saving arises because an individual consumer does not know in advance the date at which he will die, and he wants to avoid low levels of consumption in the event that he lives longer than expected." Kimball (1990) claims that precautionary wealth is the difference between the wealth that consumers would hold in the absence of uncertainty and the amount that they hold when uncertainty is present. Examples of uncertainty are the fluctuations of future income, unemployment risk, and unexpected medical expenditure, which according to the theory of precautionary saving will result in a reduction of current consumption and an increase in saving as an act of self-insuring oneself in face of the consequences of these risks.

Pioneering theoretical work on precautionary savings is attributed to Hayne E. Leland (1968) who introduced the theory of optimal consumption under income uncertainty. In his two-period model, Leland demonstrated that precautionary saving, which arises in the presence of risk, is associated with convexity of the marginal utility function, or a positive third derivative of a von Neumann-Morgenstern utility function (Kimball, 1990, p.55). Further development in this area was conducted by Kimball (1990) who introduced a measure of the strength of precautionary savings using what he designated as the coefficient of *prudence*, a term reflecting the attitude that motivates precautionary savings.

At this juncture, an explanation of the distinction between *risk aversion* and *prudence* may be useful. According to Kimball (1990, p.54), "the term 'prudence' is meant to suggest the propensity to prepare and forearm oneself in the face of uncertainty, in contrast to 'risk aversion', which is how much one dislikes uncertainty and would turn away from uncertainty

if possible." In other words, prudent individuals will take precautions to face risk, while risk averse individuals dislike risks and will require compensation for the risks that they take. The amount of compensation required to accept risk, or the maximum amount willing to be paid to remove the risk, is referred to as the *risk premium*. Assuming all other factors are equal, people who are more risk averse will require a higher risk premium to induce them to accept risk.

Pratt (1964) and Arrow (1965) formalized the constructs of absolute risk aversion using a concave von Neumann-Morgenstern utility function (u) defined over income or wealth (w). This was accomplished by dividing the (negative of the) second derivative of a utility function by its first derivative. The resulting measure of *absolute risk aversion* (r) can be shown to be approximately equal to the individual's risk premium (that is, the maximum amount the individual would pay to remove the risk) divided by half the variance of the risk. The formula for risk aversion is as follows:

$$\textit{Absolute risk aversion} = -u''(w) / u'(w)$$

$$\textit{Relative risk aversion} = -w * u''(w) / u'(w)$$

where $u'(w)$ is the first-order derivatives and $u''(w)$ is the second-order derivative of the utility function.

While risk aversion measures the intensity of the desire to purchase insurance, prudence measures the intensity of the precautionary saving motive. In the context of consumption-saving decisions under uncertainty, Kimball (1990) stressed that prudence measures the sensitivity of choices to risk. He demonstrated the theory of precautionary saving being "isomorphic to the Arrow-Pratt theory of risk aversion" and introduced a measure of the strength of precautionary saving motive analogous to the Arrow-Pratt risk aversion measurement. While the sign of the second derivative of the utility function determined the presence or absence of risk aversion, the sign of the third derivate indicated the presence or absence of a precautionary saving motive. The measurement of prudence is given by the following formula:

$$Absolute\ prudence = -u'''(w) / u''(w) \text{ and}$$

$$Relative\ prudence = -w^* u'''(w) / u''(w)$$

In Kimball's estimation of prudence, the magnitude of its coefficient indicates the strength of precautionary savings when "utility functions are assumed to be additively time-separable", thus the larger the coefficient, the stronger the precautionary saving motive (Hau, 2002).

Despite the theoretical attention gained on the subject, empirical tests on precautionary savings, particularly in the estimation of prudence, are sparse and lags behind theoretical developments (Eisenhauer & Ventura, 2003; Guiso, Jappelli & Terlizze, 1992). This is mainly due to the complexities involved in empirical estimation, particularly in the measures employed. The following Parts (i–iii) discuss the measurement issues related to precautionary saving.

i) Measurement issues

Empirical studies on precautionary savings prove to be challenging. Contradictory findings merely reflect the inherent difficulties in measurement procedures, due to the absence of a direct and suitable approach to assess two important variables pertaining to precautionary motives, uncertainty and wealth. Estimations of "uncertainty" are especially difficult, due to the unobservable and subjective nature of the variable.

The assessment of precautionary saving is typically performed by using one of the two following methods. The first approach is by estimating the magnitude of the coefficient of *prudence*, which is the attitude driving precautionary behaviour (described in the previous section). A larger coefficient of prudence reflects a higher precautionary saving motive, and vice versa. The second method of examining precautionary saving is by assessing the changes in wealth accumulation in relation to risk. It is argued that households will want to conserve more wealth when they are faced with greater uncertainty such as the potential fluctuations in future income and sudden out-of-pocket medical expenses. The following

reduced-form equation is used in the estimation of precautionary saving to establish the magnitude and direction between wealth and the associated risk:

$$W_i / Y_i^p = f(\sigma_i, \boldsymbol{X}_i),$$

where, W_i is wealth held by household i, Y_i^p is the permanent non-property disposable income, σ_i is the uncertainty measure or risk, and $\boldsymbol{X}_i$ is the variable vector representing household characteristics that affect utility. The equation suggests that when uncertainty is higher, wealth accumulation will be greater. Although the above model is common research practice, different researchers use different measures of risk and wealth.

Various proxies of risk (σ) have been used by researchers. These include variance in income or consumption, subjective measures of income risk (such as probability of job loss), and risk associated with out-of-pocket medical expenses. Each of these measures has its own complications. For example, variance in income might simply reflect cases where people have 'noisier' income records, rather than reflecting true unexpected income shocks as may be interpreted by the researcher. Meanwhile, subjective measures of risk may incorporate biases due to misinterpretation of questions by the respondents. As an example, it is highly unlikely that typical laymen are able to give accurate or meaningful answers to the questions that ask for opinions on *probability* of job loss.

In addition, wealth measures vary as well. Total household net worth is composed of many asset and liability components, and selecting the most appropriate measure requires clear justification. Wealth components differ in liquidity and accessibility levels, and may be used in different ways than others. Some researchers use a measure of "very liquid wealth" (such as savings account, current account and certificate of deposits) to estimate wealth accumulation. However, restricting wealth to just liquid forms may lead to flawed measures and an underestimation of precautionary wealth, since people normally hold a range of assets with different liquidity levels

in their portfolios. Home equity[4], for example, is a common asset holding of households and can account for more than half of the total value of assets. This issue has resulted in the use of various categories of wealth such as "financial assets" (very liquid assets plus stocks, bonds, mutual funds, pension funds) and "net worth" (total value of assets minus liabilities) to capture a broader definition of wealth (see for example, Starr-McCluer, 1996; Lusardi, 1998, 2000; Carroll & Samwick, 1997).

Clearly, there are many approaches used by researchers to examine precautionary savings in terms of the proxies of risk and the estimations of wealth, with each approach having its own advantages and disadvantages. Unfortunately, researchers have not come to a consensus over the most suitable empirical estimation of precautionary saving. As a result, contradictory findings on the importance of precautionary savings have emerged. Part ii below discusses the major findings from the literature.

ii) Empirical Evidence

The precautionary saving theory predicts that households who own more health insurance will have lower precautionary savings, thus less wealthy holdings. All things being equal, households without health insurance face greater uncertainty in health expenses compared to insured households, and should thus have stronger precautionary motives to save against the possibility of accident or illness. Thus, higher wealth holdings would be expected amongst uninsured households, other things being equal. Starr-McCluer (1996) investigated the relationship between health insurance ownership and wealth holdings in the US. The data employed were the 1989 Survey of Consumer Finances (SCF), which contains detailed information on households' demographic characteristics, assets, liabilities and income. The SCF also includes data on households' health status and specific information on insurance coverage. Starr-McCluer discovered that, in contradiction to the prediction of the precautionary saving hypothesis, uninsured households maintained much lower levels of wealth than other

[4] Home equity is becoming less illiquid with the availability of home equity lines of credit where one can borrow against housing facility.

comparable insured households. This suggests that savings and health insurance are related for reasons that have little to do with uncertainty and precautionary motives. A possible explanation to this is that uninsured households have low levels of risk aversion, and therefore also hold low levels of precautionary savings. Similar findings were obtained from a study by Hubbard *et al.* (1994), which analyzed movements of household assets between 1984 and 1989 from the Panel Study of Income Dynamics (PSID), using simulated random shocks from the distributions of earnings and out-of–pocket medical expenses. Results revealed that poor households continued having low wealth, while those with higher lifetime earnings confirmed holding substantial assets near retirement. A possible reason for this observation is that households with low income may keep their asset holdings low to avoid discontinuation of government sponsored medical benefits or simply that the results reflect unmeasured differences in income between the insured and uninsured.

In contrast to the findings described above, compelling evidence on the precautionary saving motive has been found in most other studies. One example is a research by Lusardi (2000), which used subjective data on future expectations of job loss from the U.S. Health and Retirement Survey (HRS). Using this information, she constructed a measure of earnings variance and also accounted for past economic circumstances such as shocks to income, and also individual preference. Strong evidence of precautionary savings was present; many households made provisions to self-insure against earnings risk.

The use of ex-ante probability of job loss as a measure of uncertainty has also been employed by other researchers, and produced equivalent findings as Lusardi (2000). Carroll, Dynan and Krane (2003) focused on cross-sectional relationship between household wealth and unemployment risk using data from the SCF (for wealth data), and the Current Population Survey (CPS) (for unemployment data). Their model clearly revealed a positive relationship between the two variables. Differences amongst income-level groups were noted - households with low permanent income

appeared not to engage in precautionary saving (supporting the results of Hubbard *et al.*, 1994), while moderate and higher-income households were found to portray precautionary habits, as shown in the escalating levels of net worth when unemployment risk is increased. However, when home equity was excluded from total net worth, they found no evidence of precautionary motives, suggesting the possibility that home equity could be a major driving force connecting total net worth and the risk of becoming unemployed. This finding is counterintuitive, since it implies that precautionary response comes from the most illiquid household asset. Several reasons may be offered to explain this observation, such as the possibility that areas with high home equity prices also had higher unemployment rates during the period of examination, or it may simply be due to the fact that housing equity could be more liquid than perceived, given the availability of home equity lines of credit.

The use of subjective data as a proxy of risk has been employed by other researchers as well. Using a direct question from the SCF regarding desired precautionary wealth the respondent would set aside during times of emergency, Kennickell and Lusardi (2001) found strong evidence of precautionary motives. Results showed that the desired precautionary saving as reported by respondents do correlate with risk, especially in two groups of households - the older households and entrepreneurs. A main strength of this study is that the authors did not restrict attention to only one source of risk but used multiple variables (income, longevity, and health) to ensure robustness of their results. However, a major limitation of this study was that it used elicited *desired* precautionary saving which does not truly capture the actual amounts that the respondents save, as can be observed in the reported amounts being greater than actual financial assets. Two possible reasons for the greater amounts of desired precautionary saving compared to financial assets are that the financial assets may be under-declared, and/or that the respondents may respond to the question without taking into consideration their budget constraints.

Income variance proxies have also been frequently used as a measure of uncertainty, as in Carroll and Samwick (1997). To demonstrate the relationship between uncertainty and wealth, the authors used panel data from the U.S. Panel Study of Income Dynamics (PSID), which contained detailed information on income such as labour income of the head of the household, spouse and other household members; disability payments, welfare payments, and other forms of transfer income; unemployment insurance and Social Security. The authors made direct estimates of the variance of innovations to permanent income for each household and decomposed income uncertainty into a variance of transitory shocks and a variance of permanent shocks. Empirical results showed that net worth depended significantly on the degree of both transitory and permanent income uncertainty.

Similarly, Kazarosian (1997) used income uncertainty as a proxy for risk to test for the precautionary saving motive by using panel data from the National Longitudinal Survey. He derived measures of total, permanent and transitory income by using residuals of the individual's profile and found strong precautionary motives present. Results of the study showed that when uncertainty was doubled, the ratio of wealth to permanent income increased by 29 percent, reflecting considerable importance of the precautionary motive.

In the estimation of prudence, conflicting results have emerged – some studies find low and some find relatively high estimates of the coefficient of prudence. Dynan (1993) found an implausibly small estimate of prudence amongst American consumers, at 0.312, suggesting unimportance of precautionary saving. Prudence was estimated using consumption variability as a proxy of risk, which was believed to be an accurate representation of risk since it involves responses to unexpected changes in income. Furthermore, a broader measure of consumption from the 1985 U.S. Consumer Expenditure Survey (CEX) was used, which included nondurables and services consumption, rather than just food consumption. The insignificant estimate of prudence sustained, even after accounting for

possible biases such as liquidity-constraints of households. The author concluded that the results remained a puzzle, calling for further research using other data sources.

In contrast to Dynan (1993), the estimate of prudence by Merrigan and Normandin (1996) appeared to be more relevant, generally falling within the widely accepted range of 1 to 5 (Merrigan & Normandin, 1996, p. 1201). Data from the annual UK Family Expenditure Survey (FES) were employed, which contained considerable consumption expenditure details for a larger number of households (over 57,000) over a considerably longer period (1968-86). Econometric techniques were used to track each household's consumption movements over time. Estimates of the coefficient of prudence suggest that greater uncertainty leads to larger current saving. Furthermore, households that were less likely to face liquidity constraints or to share risks were more sensitive to uncertainty. Households for which the head worked in manufacturing were also more inclined to self-insure against uncertainty.

Significant evidence of precautionary saving has also been found in Italy, which was estimated to account for approximately 19 percent of total savings on average. The empirical estimation was performed by Eisenhauer and Ventura (2003) using data from the 1995 Survey of Italian Households' Income and Wealth conducted by the Bank of Italy. A measure of the absolute and relative prudence was obtained using a hypothetical question on risk tolerance. The income variability proxy was constructed by measuring the difference in real income for two consecutive waves of the survey (1993 and 1995).

iii) The importance of precautionary saving

The review of literature on empirical estimates demonstrates that precautionary savings play an important role in the economy. The evidence is reflected in a number of studies across different countries, albeit each country having its own welfare system and macroeconomic policy, and each study employing differing methodologies. In the U.S., for example,

Skinner (1988) concluded that 56 percent of an individual's lifetime wealth is the result of precautionary saving. This conclusion was based on the assessment of saving rates using the 1972-73 U.S. Consumer Expenditure Survey (CEX). Likewise, a close approximation was estimated by Caroll and Samwick (1998) who provided direct evidence that 50 percent of financial wealth, and 45 percent of total net worth in the U.S. are due to precautionary motives. This estimate was based on labour income uncertainty and wealth data from the Panel Study of Income Dynamics (PSID). Kennickell and Lusardi (2005) found that although precautionary motives were prevalent amongst all households in the U.S., desired precautionary wealth accounted for only 8% of total wealth and 20% of total financial wealth in the economy. Meanwhile, Eisenhauer and Ventura (2003) used data from a survey conducted by the Bank of Italy to measure absolute and relative prudence, and estimated that 19 percent of total saving is the consequence of precautionary saving. Dardanoni (1991) used survey data regarding consumption behaviour from the 1984 UK Family Expenditure Survey (FES) and estimated that 60 percent of saving constituted those driven by precautionary motives.

The contradictions in these findings are possibly due to the differences in the data used in the empirical estimation, the estimation methods, and the measures of risk (Kennickell & Lusardi, 2001). In addition, another plausible explanation to these inconsistencies is the dissimilarities in welfare systems of the countries in which the studies have taken place, resulting in sizeable effects on precautionary savings. For example, the availability of government-sponsored insurance in certain countries would naturally mirror lower precautionary savings as opposed to other countries where such benefits are absent.

iv) Summary

In summary, studies on the precautionary motive have yielded contradicting results. The review of literature demonstrates that scholars face major challenges and, evidently, no consensus can be reached on the

most suitable empirical measure of uncertainty and wealth. A statement by Carroll and Samwick (1998, p.410) best describes this situation:

> A major obstacle to empirical estimation of theoretically attractive models has been that theory provides no analytical result that tells the researcher exactly how to measure uncertainty in a parsimonious way. In principle, optimal behaviour depends on even the minutest details of the income distribution, so that, for example, two distributions that exhibit the same mean and variance might induce quite different precautionary saving.

In addition, the presence of other motives for saving such as the bequest motives makes the evaluation of precautionary accumulation more complex and challenging. In this respect, the bequest motive will next be examined.

2.4.3 Bequest motive

Setting aside income or wealth for the purpose of leaving a bequest for the next of kin has been identified as another main motive for saving (Bernheim, Shleifer & Summers, 1985). Kotlikoff and Summers (1981) estimated that 80 percent of accumulated wealth in the US comprised of intergenerational transfers, suggesting significant importance of bequest motives. However, the estimates of Kotlifkoff and Summers have not gone unchallenged; Modigliani (1988) estimated only about 20 percent of wealth consist of intergenerational transfers. Quite evidently, estimations of wealth resulting from intergenerational transfers and even precautionary motives (as discussed earlier) have produced mixed results, leading to much ambiguity in assessing with confidence the most accurate estimate. The large differences are due to contradicting treatment of conceptual and empirical methods such as treatment of income, wealth and certain expenditure (Kotlikoff & Summers, 1988; Modigliani, 1988) and also different periods under investigation, reflecting varying situations of the economy and thus, saving motives.

The relevance of the bequest motive for saving was first introduced by the classical and neoclassical economists but was subsequently questioned by supporters of the LCH. Ando and Modigliani (1963) in their classic paper explicitly stated a key assumption of the basic LCH model: "[t]he individual neither expects to receive nor desires to leave any inheritance." Thus, the bequest motive appears to be incompatible with the LCH since individuals are assumed to optimize all income during their lifetime and being altruistic simply does not synchronize with being rational (Wärneyrd, 1999).

The continuous debates regarding the bequest motive have resulted in several differing schools of thought. The first view is that bequests are unintended, which conforms with the LCH, while the second view is that bequests are intentional. These will be further explained.

i) Unintended / Accidental Bequests

Supporters of the LCH argue that motives for bequests are actually unintended or merely accidental bequests occurring as a result of precautionary savings and deferred consumption (Modigliani, 1988; Davies, 1981). The life-cycle model assumes that individuals are selfish and implies that they will not leave any bequests at all, or leave unintended bequests resulting from precautionary savings (Horioka, Nishikawa, Iwamoto & Kouno, 2001). Precautionary saving that arises from uncertainties of one's life span imply that when death occurs, the deceased will have some wealth holdings which is then passed on to his next of kin, i.e. an accidental bequest. In addition, the imperfections of capital, annuity and housing markets will make it difficult for individuals and households to smooth out the differences between their current income flows by optimizing their saving and dissaving behaviour over the life span (Hurd, 1987; Kohli & Kunemund, 2003).

Abel (1985) developed a theoretical model to demonstrate that accidental bequests by selfish consumers can result in a substantial portion of aggregate wealth. The model was based on individual utility-maximizing

behaviour and assumed, among other factors, that there was no private market for annuities and lifetime was uncertain. To allow simple analysis of the precautionary and accidental bequest in a general equilibrium model, Abel excluded the bequest motive from specification of the utility function and traced the impact of accidental bequests on consumption and saving of the next generation. The model was used to examine the implications of lifetime uncertainty on aggregate consumption and capital accumulation.

It may be argued that accidental bequests are not really motives per se, since the actual underlying motive is the precautionary motive, which does not originate from pure intention to leave a bequest. Nonetheless, unintended bequests have been found to account for sizeable transfers amongst generations (Davies, 1981), making its importance undeniable.

ii) Intended / Voluntary Bequests

Kotlikoff and Summers (1981) stressed the importance of bequests in aggregate saving through their approximation that four-fifths of U.S. wealth accumulation is due to inherited wealth. This implies that the life-cycle model without bequest motives is an inadequate description of saving behaviour in the U.S. Gale and Scholz's (1994) examination of household *intervivos* transfers also supported the significant role of intergenerational transfers. Intended *intervivos* transfers were estimated to account for at least 20 percent of US wealth. Inclusive of bequests, the estimation rises to at least 51 percent of net worth accumulation.

Under the intended bequests are three alternative explanations that have been used to elucidate bequests motives – the altruistic bequest motive (Becker, 1974; Barro, 1974, Becker & Tomes, 1979), the "joy of giving" bequest motive (Yaari, 1964) and the strategic exchange motive (Bernheim *et al.*. 1985; Cox & Rank, 1992). These will be discussed below.

Altruism

Pure altruism has been accepted by economists as the primary motive of intergenerational transfers. The altruism theory assumes affection, a moral

duty, or obligation. Paternal instincts will naturally harbour intergenerational altruism which implies that parents will want to leave a bequest to their descendants regardless of whether their children take care of them or extend them financial support. Bequests will be compensatory in that the child with the least earnings will be given the largest portion of the bequest, and vice versa (Horioka *et al.*, 2001; Light & McGarry, 2003; Norton & Taylor, 2001).

The altruistic model assumes that a parent obtains utility from his own consumption (C_p) as well as consumption of each of the children k (C_k) (Barro, 1974; Becker, 1974; Tomes, 1981). For simplicity, assume that there are two children in the family (k=1, 2). The utility function of the parent (U_p) can be written in terms of the utility of the child (V), as follows:

$$U_p = U[C_p, V(C_1), V(C_2)]$$

The parent will then have to decide how to allocate resources between his own consumption and each child. An optimal solution would be a situation when the marginal utility of a dollar transferred to each child and the marginal utility of the parent's own consumption are all equal. Since the marginal utility of a transfer depends on the child's income prior to the transfer, a key prediction of the model is that child income is negatively correlated with the transfers from the parent. As such, the lower the child's income, the higher will be the bequests or transfers from parents.

Joy of Giving

Bequests may arise from the "joy of giving", that is, parents leave bequests simply because they obtain utility directly from the bequest itself (Yaari, 1964). The "joy of giving" model is a non-altruistic model of bequests. Here, giving may persist even when the need of the recipient has been met, or giving takes place even if there is no need at all. This has been labeled as "impure altruism" (Andreoni, 1989) or "bequests for their own sake", or the "egoistic" bequest model (Laitner & Ohlsson, 2001). The utility function of the parent can be expressed as follows:

$$U_p = U[C_p, I_c],$$

where I_c equals the inheritance amount bequeathed to the child. Unlike the altruistic model, the child's income has no bearing on the parent's utility, thus having no impact on the bequest determination by the parent. Here, the parent's utility relates positively with the amount of the bequest. From the function, it can be noted that there is a trade-off between the utility of the parent's consumption and the amount of inheritance received by the child. The optimal position would be a situation where the marginal utility of the parent's consumption equals the marginal utility derived from the amount of inheritance left to the child.

Strategic exchange

As an alternative to conventional formulations of the bequest motive such as the altruistic model, Bernheim *et al.* (1985) proposed the "strategic bequest motive" in which parents use bequests strategically to influence the behaviour of their potential beneficiaries. In their proposed model, they argue that the individual will want to influence his/her beneficiaries' actions by conditioning the division of bequests. The actions of the parent may be overt, such as threatening to disinherit rebellious children, or it could be more subtle, such as rewarding more attentive children with family legacies. The plausibility of bequests is justified as they could result in better treatment by descendants, thus resulting in maximization of a person's own utility.

Bernheim *et al.* (1985) provide empirical evidence to support their hypothesis that bequests are used, partly, to influence the behaviour of potential beneficiaries. They use econometric analysis on specific data regarding assets and family interactions for a sample of elderly individuals. Data were obtained from the Longitudinal Retirement History Survey (LRHS) conducted by the Office of Research and Statistics of the Social Security Administration in the US. They used data from the 1969, 1971 and 1975 waves of the LRHS, with 1,166 usable observations for the purpose of the study. The authors formulate an equation by specifying the

supply of attention from children as a function of potential bequest per child. Light and McGarry (2003) simplify the utility function of the strategic exchange model of Bernheim *et al.* (1985) using the following equation:

$$U_p = U(C_p, S)$$

where S represents the "services" (attention, care or assistance) provided by the children. Using regression techniques, results of the analysis predict that in multiple-child families, bequeathable wealth is strongly correlated with attention provided by the children. They conclude that bequests are commonly used as compensation or "reward" for the services provided by beneficiaries.

iii) Empirical Evidence

Empirical research on the bequest motive mainly attempts to determine the validity of the bequest motive models previously described. For instance, a number of studies have revealed equal division of bequests by individuals to their heirs, suggesting strong rejection of the altruistic model. Menchik (1980) examined probate records of the Inheritance Tax Division of the Connecticut State Tax Department in the US and found that equal divisions of estate prevailed. Similarly, Wilhelm (1996) rejects the altruistic theory based on evidence from the Estate-Income Tax Match (EITM) in U.S. The EITM provides data of federal estate tax returns merged with beneficiaries' income tax return. Wilhelm finds little evidence that bequests are compensatory, and that most parents actually divide equally regardless of the earning levels of children.

Equivalent findings were revealed by Norton and Taylor (2001). Their study had linked data from a U.S. state probate court regarding actual size and division of estates, to a representative sample of the population in a defined locality. Respondents were interviewed regarding their need for, and receipt of, care prior to death. Norton and Taylor found that 70-83 percent of estates were divided equally. Dunn and Phillips (1997) investigated data from the Asset and Health Dynamics of the Oldest Old

(AHEAD) in the U.S. While *intervivos* transfers were found to be unequal depending on the heirs' level of income, no such evidence was found in relation to bequeathable transfers. A comparative study of Swedish and American micro data by Laitner and Ohlosson (2001) also found weak evidence of the altruistic model. They conclude that the egoistic/accidental bequest motive dominates.

Drawing from data collected by the National Longitudinal Surveys of Mature Women and Young Women (NLS), Light and McGarry (2003) sought to determine "why parents play favorites." For responses indicating unequal division of bequests, further qualitative investigation was conducted to obtain the reasons for intended unequal bequest. Some of the answers given referred to the financial needs of children as a determination of size of bequest, thus reflecting an altruistic motive, while others indicated the level of attention given by the children as the determining reason, thus implying an exchange motive. This suggested varying drivers of the bequest motive.

Evidence in support of the "joy of giving" model was found by Kopczuk and Lupton (2004) who examined the consumption expenditures of the elderly to support their proposition that heterogeneity in the desire to leave bequests has different effects on saving behaviour. They estimated the proportion of the elderly population that has a bequest motive and estimated the magnitude of this desire. They used panel data from the Asset and Health Dynamics among the Oldest Old (AHEAD) survey, which is a survey of household heads born in 1923 or earlier. The purpose of the AHEAD survey was to examine the relationship between age-related health changes in the elderly and the economic resources available to these households. Results of a switching regression showed that about 70 percent of the elderly population had a bequest motive. All else being equal, households with a bequest motive spent between $4,000 and $9,000 a year less on consumption expenditures. This is a contradiction to the assumption of the LCH of dissaving to maintain same levels of income throughout life, implying the existence of bequest intentions. A comparison of the projected

wealth profiles of the sample with and without a bequest motive, they concluded that 53 percent of the wealth measured in the sample of elderly single households was a result of a bequest motive. Although the results appeared to be consistent with both an altruistic and strategic bequest motive, these motives were not significant. In conclusion, they maintained that the egoistic bequest motive was the most plausible.

Other studies have found that bequest motives generally did not exist among the elderly. Hurd (1987) proposed a model of bequests in contradiction of the traditional life-cycle hypothesis, to test the evidence of cross-section data in the U.S., which suggested that wealth of the elderly increases with age. His model included testing for a bequest motive, to show that someone with a bequest motive should hold more wealth than those without a bequest motive. Data from the Longitudinal Retirement History Survey (LRHS), a survey of 11,000 households born between 1906 and 1911, and survived till 1969, were used as a basis of analysis. The LRHS contained questions about all assets and liabilities. Hurd studied the change over a two-year period in bequeathable wealth, and found no evidence of a bequest motive. The elderly in the sample of the RHS generally dissaved their real wealth, consistent with the strict life-cycle model.

Horioka *et al.* (2001) used 1996 and 1998 micro data from a Japanese survey called the Survey on the Financial Asset Choice of Households to analyze the strength and nature of the bequest motive and to investigate the impact of the bequest motive on economic behaviour of parents and children. The strength of bequest motives was determined by asking respondents a series of questions regarding bequests received in the past / expected to receive in the future and also the intentions of people to leave bequests to their children. Besides that, attitudes pertaining to bequests division were also sought. Results of the study suggested that bequest motives were weak in Japan as compared to the U.S., and that bequests were mainly unintended, arising from lifespan uncertainty or a quid pro quo for care and financial assistance received from their children during

old age. It appeared that the life-cycle model was the dominant model of household behaviour in both countries but was far more applicable in Japan than in the U.S. Furthermore, findings revealed that the altruism model was far more applicable in the U.S. than it was in Japan.

Another study regarding bequest motives was that conducted in Germany by Walliser and Winter (1998). They used data from the 1993 wave of the German Consumer Expenditure Survey (EVS) to investigate the importance of bequest motives and tax incentives for German life insurance demand. The researchers analyzed the data using a 3-period model of life-cycle savings decisions that captures the salient features of the German tax and pension system. Life insurance was modeled using a combination of term life insurance and a savings plan, and bequests was modeled using a "joy of giving" motive following Yaari (1965). In their study they demonstrated the sensitivity of life insurance demand and found that life insurance (whether life insurance cum savings or term life insurance) enhanced bequeathable wealth. The reason was clear: with increasing weight on bequests, the consumer sought to increase the life insurance coverage in case of early death but also wanted to save more to increase bequests that might occur at later points of the life-cycle. The mean life insurance policies' face values increased with the number of children, consistent with the presence of a bequest motive. Married people and families with children were more likely to purchase life insurance.

iv) Summary

Clearly, the bequest motive has spurred much research interest attempting to explore further the reasons underlying bequest motives. Four varying drivers have been identified – altruism, selfish strategic exchange, "joy of giving", and selfless accidental motives. While consensus has not been reached on identifying the "one" factor that motivates bequests, the significance of bequests in capital accumulation cannot be denied, as evidenced in Kotlikoff and Summers' (1981) estimates that 80% of accumulated wealth in the U.S. is a result of intergenerational transfers.

The last saving motive relevant to the context of this study, the profit motive, will now be discussed.

2.4.4 Profit Motive

The profit motive for saving is one of the four saving motives specifically highlighted by Wärneryd (1999). The underlying premise of the profit motive concerns the desire to realize a gain or return from the act of saving, and can be regarded as a reward or incentive for refraining from consumption in the current period. Keynes (1936, cited in Wärneryd, 1999) suggests that individuals' saving decisions are guided by two "decision dimensions" known as psychological time preference. The first facet of the decision entails "the propensity to consume" – which is the decision of how much to save and how much to consume, and this decision operates under the influence of the saving motives suggested earlier. The second aspect of the decision dimension involves the "liquidity preference" of the individual, which refers to the decision of the *form* in which the reserves from the first decision is to be held. The preference for liquidity decides how much to hold in the form of cash, and will thus have implications on the allocations of the reserves into various assets.

In relation to Keynes' (1936) list of saving motives mentioned in Section 2.4, three of the motives are viewed similar to the profit motive. These are the intertemporal substitution, improvement and enterprise motives, which are viewed to reflect a situation of betterment, aspirations for gains, or a desire to improve in life. In the desire to attain the 'rewards' from saving, savers need to consider which saving vehicle best satisfies his or her needs and preferences, and how resources are to be allocated between these various assets. Economic theory on saving behaviour generally assumes fungibility of wealth - it ignores the difference between a dollar placed in a savings account versus a dollar placed in bonds. As Solow (1987, cited in Winnet & Lewis, 1995) commented: "*We* (economists) think of wealth as fungible; *we* think a dollar is a dollar." As may have been observed in the

review of literature so far, the issue of saving has been discussed generically without much reference to different saving vehicles. It is widely known, however, that the financial market offers a wide variety of saving vehicles ranging from many types of risk-free to risky assets. Hence acknowledgement of these various types of assets is imperative in the study of saving behaviour.

In the determination of the form in which savings is to be held, the risk-return issue is perhaps the most crucial element that needs to be considered by households. According to Thompson (1993, p.4), "the mean-variance, or risk-return approach to portfolio analysis is based on the premise that the investor in allocating his wealth between different assets takes into account, not only the returns expected from alternative portfolio combinations, but also the risk attached to each such holding." Thus, households need to be aware of the risk levels and expected return on the assets to determine their optimal portfolio composition. In the context of expected utility, the risk-return or mean-variance approach assumes that the investor will choose a combination of expected return and risk which maximizes expected utility, subject to budget constraints (Thompson, 1993).

Since the profit motive involves the decision of allocating wealth into various assets with the objective of gaining interest or rewards, the discussion on the profit saving motive overlaps major aspects of the literature on portfolio allocation choice. Hence, the following section will review the literature on portfolio allocation choice, by discussing the theoretical background and empirical findings pertaining to the topic.

2.5 PORTFOLIO ALLOCATION DECISIONS

This section reviews the relevant literature in regards to portfolio allocation choice. To begin, classical economic theories of portfolio allocation will be examined, starting from the influential works of the renowned father of modern portfolio theory (MPT), Harry Markowitz (1952). Subsequent

contributing developments to MPT, such as the ideas of Roy (1952) and Tobin (1958) will also be discussed. As will be revealed from the review, risk and risk-attitude of investors are fundamental elements of portfolio analyses, hence, necessitating also a brief discussion on theories of decision-making under uncertainty. Critiques to these rational economic theories will be discussed, followed by propositions from a behavioural perspective. The following sub-section will present evidence on three stylized facts observed empirically that paradoxically contradict the prescriptions and predictions of modern portfolio theory. The main observations are the lack of portfolio diversification, stock market non-participation, and heterogeneity in household portfolios. Numerous efforts have been made to explain these divergences, ranging from theoretical alterations, calibrated models, and empirical research. Evidently, it appears that the determinants of portfolio allocation remain inconclusive.

2.5.1 Theoretical issues in the portfolio allocation choice

i) Modern Portfolio Theory

Modern Portfolio Theory (MPT) originates from the seminal works of Markowitz (1952) proposing an optimal solution for the selection of assets in an investor's portfolio. The central idea of the normative theory is that investors will consider the trade-off between expected return and riskiness of assets, and determine the best combination of assets in a portfolio that corresponds to their risk preferences. Expected returns (mean) pertain to the anticipated future gain to be received from the investment, while risk (variance) relates to the uncertainty attached to the asset's future price. Given the widely accepted inverse relationship of risk and return, investors will choose the portfolio with the least risk given a certain level of expected return, or, the portfolio with the highest expected return given a certain level of risk.

The MPT also suggests that diversification is a key factor to reduce riskiness of a portfolio, which can be accomplished by choosing assets

within the portfolio that are not perfectly positively correlated. Although diversification reduces riskiness of the portfolio, it would not totally eliminate portfolio risks. The implication of diversification is that the determination of an optimal portfolio depends not on the selection of singular assets with an optimal risk-return profile, but more importantly, on the optimal *combination* of assets within the portfolio. Rubinstein (2002, p.1042) remarked that "probably the most important aspect of Markowitz's work was to show that it is not a security's own risk that is important to an investor, but rather the contribution the security makes to the variance of his entire portfolio – and that this was primarily a question of its covariance with all the other securities in his portfolio."

In showing how the optimal portfolio can be determined, Markowitz (1952) demonstrated how the relationship between means, variances and covariances of assets can form a set of efficient combinations known as an *efficient frontier*. This frontier is regarded 'efficient' because underlying every point on the frontier is a portfolio with an optimal mean-variance combination. From the points on the frontier, an investor is able to determine the most efficient portfolio corresponding to his or her risk appetite.

Most economic theories, such as the MPT, are based on the assumption of a safe economic background. Roy (1952, p.432) argues against this superficial assumption and asserts that "to dispel this artificial sense of security, theory should take account of the often close resemblance between economic life and navigation in poorly charted waters or maneuvers in a hostile jungle." Hence, Roy introduced the principle of "safety-first" asserting that individuals aimed to minimize the chances of a disastrous event in their investments. A mean-variance efficient set similar to Markowitz efficient frontier was developed, incorporating an additional element to represent the "disaster level" that the investor sought to avoid. The concept of "safety-first" suggests that investors place importance on a certain threshold level of safety, before making subsequent risky decisions pertaining to their portfolios.

Tobin (1958) proposed the inclusion of a risk-free asset in the portfolio and suggested that investors have a preference for a certain level of liquidity (hence the idea of 'liquidity preference') by holding a certain amount of riskless asset. In Tobin's model of a two-asset portfolio, investors need to determine the allocation of wealth in the risk-free asset and the risky asset. The composition of risky assets, known as the market portfolio, is the same for all investors. Theoretically, all investors hold the same portfolio of risky assets, although the proportions held will depend on the risk preference of the investor. The two-stage process of determining the optimal risky portfolio and the division between the risky assets and the risk-free asset is known as the two-fund separation theorem. Tobin considered various settings in developing the optimal portfolio equilibrium for investors according to their risk preferences: risk-averse, risk-neutral and risk-loving investors. Risk-averse investors will require to be compensated in terms of higher expected return for an acceptance of increased risk, and will typically diversify their portfolios into both risk-free and risky assets. Risk-lovers, in contrast, will be willing to assume maximum risk and will invest all wealth into risky assets.

ii) The portfolio allocation problem

The portfolio allocation choice problem is discussed in great detail by Eeckhoudt, Gollier and Schlesinger (2005) who mathematically derive and solve portfolio allocation models based on the assumption that the investor is risk averse. In this regard, this sub-section summarizes the main points discussed in the chapter entitled *Static Portfolio Choices* by Eeckhoudt *et al.* (2005, p.65-73).

Eeckhoudt *et al.* (2005) explain that, given the choice between risk-free and risky assets, risk-averse individuals will choose to hold risky assets only if they are sufficiently compensated by appropriate returns on the portfolio. Driven by their tolerance for risk, agents will consider the trade-off between risk and return of assets, as well as the correlations between

assets. By diversifying assets in the portfolio, investors are able to minimize portfolio risk.

Eeckhoudt *et al.* (2005) further demonstrate how agents, given a sure wealth w_0, determine the optimal composition of his portfolio in a model of two assets comprising of one risky and one risk-free asset. For the sake of illustrative simplicity, the risk-free asset is assumed to be a government bond producing a yield of return, r. The risky asset is assumed to be a stock or a portfolio of stocks, providing a yield of return, $\tilde{e}$, which is random. In determining the optimal composition of the portfolio, investors must choose how much to be invested in stocks, denoted as α, and how much to be invested in bonds, denoted as $w_0 - \alpha$. At the end of the period, the value of the portfolio is given as:

$$(w_0 - a)(1 + r) + a(1 + \tilde{e}) = w_0(1 + r) + a(\tilde{e} - r) = w + a\tilde{y},$$

where $w = w_0(1 + r)$ is future wealth obtained from holding the risk-free strategy and $\tilde{y} = \tilde{e} - r$ is the excess return obtained from the risky asset over the risk-free asset (in other words, $\tilde{y}$ is the 'extra' return gained from investing in a risky asset). Risk–averse agents will be willing to hold positive amounts in the risky asset only if they are to be compensated with a positive excess return ($\tilde{y}$). Provided that this excess return is positive, the optimal amount held in stocks (α^*) is increased when risk aversion is reduced. Furthermore, α^* is increasing in wealth if absolute risk aversion is decreasing (DARA). Under decreasing absolute risk aversion (DARA), people who are more risk averse hold less risky portfolios, while those with higher wealth levels hold higher proportions of risky assets. The notion that wealth is positively related to holdings in risky assets is also supported by empirical evidence.

Eeckhoudt *et al.* (2005) conclude that under constant relative risk aversion, the optimal dollar amount that an investor holds in risky assets is proportional to the level of wealth held. The authors show that α^* is roughly proportional to $\tilde{y}$ (the "equity premium") and inversely proportional to riskiness of stock returns and to relative risk aversion. By

using known information on wealth amounts, it is thus possible to compute the optimal proportion that should be invested in stocks. However, it appears that these approximations are unrealistically high.

The effect of "background risk" is then introduced. Background risk refers to independent sources of risk (other than asset return variance) that are uninsurable. The most usual examples of background risk sources are human capital income risk (such as labour income and proprietary income). Gollier (2002) suggests that background risk and portfolio risks are substitutes, such that the presence of one risk reduces the demand for the other. This effect is termed as "temperance" by Kimball (1991). Eeckhoudt *et al.* (2005) demonstrate that the amount held in stocks (α^*) is smaller when background risk is introduced.

In a model of two risky assets which are independently and identically distributed (i.i.d.), the optimal composition of the investor's portfolio consists of an equal balance between the two assets. This reflects the notion of risk diversification for investors with a concave utility function (risk averse). Variance of the portfolio is minimized when the portfolio is perfectly balanced between the two i.i.d. assets (the variance of the portfolio equals the asset variance divided by a factor of 2). However, if the asset returns are not independent and identically distributed, the investor will need to consider the tradeoff between the mean and variance of the portfolio. This is because the inclusion of an asset with a lower expected return will adversely affect the mean of the portfolio.

From the amount of optimal shares invested in risky assets, it is then possible to compute the amount to be invested in risk-free assets, $w_0 - \alpha^*$. It is also shown that all investors, regardless of the risk aversion level, should purchase the same portfolio of risky assets, known as a "mutual fund." The only differentiating factor is the proportion held between risky and risk-free assets, determined by the risk aversion level of the investor.

These results suggest that the portfolio allocation decision is simpler than one may realize, although counterfactual. This is because of the

assumptions that investors have perfect knowledge of financial markets and that they have the same mean-variance preference.

iii) Theories of choice under uncertainty

Thus far, the discussion on portfolio allocation has focused on the developments of modern portfolio theory. Nonetheless, worth acknowledging and relevant to the discussion on portfolio allocation choice is the basic underlying premise of modern portfolio theory: the expected utility (EU) theory of von Neumann and Morgenstern (1944). The EU theory is the most widely accepted theory of decision-making under uncertainty. The basic argument of the EU theory is that in choosing among risky alternatives, investors will select a combination that maximizes his or her expected utility. Agents are typically assumed to be *risk-averse*, characterized by a concave utility function. The optimal solution for each individual will depend on the degree of concavity of the utility function, as defined by Arrow (1971) and Pratt (1964). By combining information on risk characteristics and the distribution of returns on financial assets, an optimal portfolio can be estimated (Gollier, 2002).

Friedman and Savage (1948), however, question the inconsistencies observed in individuals' behaviour when faced with risky choices and suggest that individuals do not necessarily have a uniform attitude toward risk. The phenomenon being referred to is the simultaneous act of purchasing insurance and gambling by certain individuals. On one hand, the individual chooses to purchase certainty (the relatively small insurance premium) in preference to uncertainty (the large probable loss incurred from a disastrous event), but on the other hand, he also chooses to purchase uncertainty (e.g. the small likelihood of winning a gamble) in preference to certainty (the small price of the lottery ticket). It seems ironic that individuals are willing to pay a premium to avoid risk and at the same time, to pay a sum to bear risk. Friedman and Savage provide a crude empirical

test by employing a few broad observations about the behaviour of individuals in choosing among risky alternatives. Evidently, the outcome of the test reveal that the observations are consistent after all, with the von Neumann-Morgenstern expected utility hypothesis conditional on a special shape of the total utility curve of money. The shape is based upon concave and convex portions, corresponding to the purchase of insurance policies and the purchase of lottery tickets, respectively (Friedman and Savage, 1948).

The EU theory discussed earlier has been regarded an important tool in the development of portfolio theory. However, the EU theory has not been excluded from criticism, even since the early years of its introduction. One of the main critiques to the EU theory come from Kahneman and Tversky's (1979) Prospect Theory, which provide an alternative model to explain choice among risky prospects. According to the theory, individuals tend to favour outcomes that are certain as opposed to those that are uncertain. This tendency is called the *certainty effect*, and "contributes to risk aversion in choices involving sure gains and to risk-seeking in choices involving sure losses" (Kahneman & Tversky, 1979, p.263). As earlier discussed in Sub-section 2.4.1, it is proposed that individuals frame their decisions based on value, rather than utility, and consider the gains and losses relative to the reference point (usually the current asset position of the individual). According to the theory, after the process of editing and evaluating prospective alternatives, the prospect with the highest value is chosen. The value function is generally concave for gains and convex for losses, with a steeper slope for losses than for gains.

Another theory that needs mentioning is the SP/A theory by Lopes (1987 cited in Shefrin & Statman, 2000) which is a psychological theory of choice under uncertainty. The abbreviation "SP/A" stands for *security*, *potential* and *aspiration*. The idea of *security* is similar to Roy's (1952) safety-first concept referring to the idea that individuals want to minimize the chances of falling into low levels of wealth. *Potential* refers to the desire to achieve high levels of wealth; and *aspiration* indicates the desire

to reach certain goals in life. In the SP/A theory, in choosing between risky alternatives, individuals are assumed to be influenced by the emotions of *hope* and *fear*. According to Lopes, *fear* causes an individual to overweight the chances of the most disastrous event, as opposed to the best possible outcome. In computing the expected wealth to be achieved, *fear* causes individuals to be pessimistic in their choices. Meanwhile, *hope* causes individuals to act overly optimistic in the computation of expected wealth. It is postulated that fear underlies security, while hope underlies potential (Lopes, 1987 cited in Shefrin & Statman, 2000, p.132).

iv) Behavioural portfolio theory

The critiques to the expected utility theory, as illustrated above, have direct implications on portfolio theory. EU theory essentially assumes that individuals are rational and make decisions regarding risk in a way that maximizes their utility. Contradictorily, psychologists have long argued that the "economic man" or "rational man" is very unlike the "real man" (Edwards, 1954). Furthermore, psychologists contend that the assumption of complete knowledge and possession of perfect computational skills of the "economic man", which supposedly allows him to achieve his highest level of utility, is completely overrated (Simon, 1955).

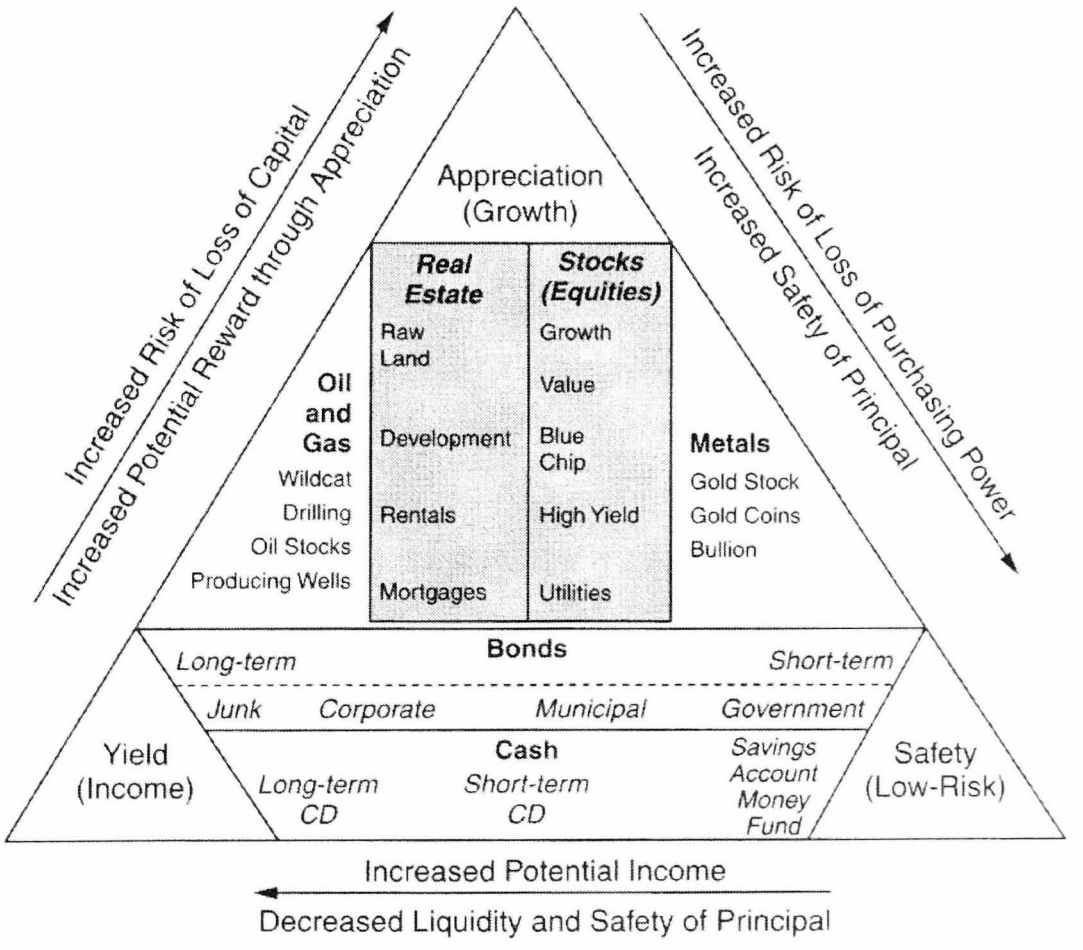
In consideration of the various counter-arguments of classical portfolio theory, more recent developments in the area of portfolio allocation draw upon behavioural aspects of risky decision-making. In this regard, Shefrin and Statman (2000) formalize a behavioural portfolio theory (BPT) that provides an alternative to traditional mean-variance portfolio theories. The theory stipulates that the portfolio decision is based on "expected wealth, desire for security and potential, aspiration levels, and probabilities of achieving aspiration levels" (Shefrin & Statman, 2000, p. 128). The BPT is derived from Kahneman and Tversky's (1998) Prospect Theory, and Lopes' (1987) SP/A theory. Two versions of the BPT are proposed: (i) a single account version of the BPT (*BPT-SA*), and (ii) a multiple account

version (*BPT-MA*). In the single account version, investors treat the portfolio as a whole account and take into consideration the covariance of assets as prescribed by Markowitz (1952). Although the selection of a portfolio according to the BPT-SA framework resembles that of the mean-variance framework, it is later demonstrated that the BPT-SA is not always mean-variance efficient. This occurs when high aspiration investors consider securities that have high variance but low expected returns (or "casino-type" securities, as Shefrin & Statman describes). These kinds of investors choose such investments not because they like the risk, but because it gives them the highest chance of achieving a certain desired aspiration level.

Shefrin and Statman (2000) argue that each individual's aspirations are unique. Some investors have low aspirations and some have high aspirations, but quite commonly, investors combine the two. Portfolios in the form of layered pyramids reflect this notion: the lower level of the pyramid represents the desire to avoid poverty and to guarantee financial survival, while the higher level represents the upside potential of gains. The second version of the BPT, the BPT multiple account version or BPT-MA, is based on the concept of mental accounts of the Prospect Theory. Unlike BPT-SA investors who consider covariances in their portfolios, BPT-MA investors seem to ignore covariances and segregate their portfolios into different mental accounts. These accounts seem to reflect different aspiration levels that investors have. Portfolios within the BPT-MA resemble layered pyramids whereby each layer (i.e. mental account) is associated with a particular aspiration level. The bottom layer of the portfolio pyramid represents assets in relation to aspirations of security (and hence, the emotions of *fear*), and the top layer of the pyramid reflect assets that are related to the desire for potential (and hence, the emotions of *hope*).

On a practical note, Shefrin (2000) highlights that financial planners usually recommend their clients to build portfolios in the form of a layered pyramid which represents a hierarchy of needs similar to the elements in

the SP/A theory (Lopes, 1987) and parallel to the argument of Shefrin and Statman (2000). The lowest level of the pyramid, as shown in Figure 2.5 below, represents a base for security and implies the highest form of liquidity (cash accounts and certificate of deposits). The second level is bonds (either short or long term), which are targeted to meet certain financial goals. For example, zero coupon bonds are typically used to fund children's education. On the third level of the pyramid are real estate and stocks, which are intended to realize appreciation and potential. The peak of the pyramid represents the most speculative investments, such as call options and lottery tickets. As demonstrated by Shefrin and Statman (2000), BPT investors are simultaneously risk averse and risk seeking (thus having low level aspirations as well as high level desires), resembling investors in the Friedman-Savage puzzle.



Source: Wall (1993, in Shefrin, 2002, p. 122)

Figure 2.5: The Portfolio Pyramid

Based on the ideas of Shefrin and Statman (2000), Siebenmorgan and Weber (2003) also take a behavioural approach in explaining the divergences of investors' behaviour from normative portfolio theory. They present a new BPT, incorporating three aspects that are considered in creating an optimal portfolio: expected returns, pure risk and naïve diversification. Investors have some intuition about the assets' risks but do not consider the covariances between assets. This idea supports the literature that covariances are largely ignored by investors (Weber & Camerer, 1998; Siebenmorgen, Weber & Weber, 2001). The idea of mental accounting also implies that correlations between assets are ignored, since each type of asset is regarded as a separate mental account. Meanwhile, the concept of naïve diversification suggests that, although investors do not take correlations into account, they will tend to separate their assets evenly into different accounts simply because they are aware of the benefits, although they lack the capability of constructing efficient portfolios. This lack of ability supports the argument that the "real man" is not fully informed about his economic environment and lacks the ability of computing an optimal mean-variance portfolio.

This section has dealt with the theories underlying portfolio choice. In summary, modern portfolio theory is a normative theory suggesting that risk-averse investors will determine their portfolios by considering the risk-return relationship of assets, as well as covariance of assets within the portfolio. Diversification is prescribed as the key to minimize portfolio risk. With the inclusion of a risk-free asset, individuals will allocate different proportions in the risk-free and the risky portfolio depending on their risk preferences. Although the proportions held between risky and risk-free assets vary, the combination of risky assets is postulated to be the same for all investors.

Behavioural portfolio theory (BPT), on the other hand, is a positive theory developed to provide an alternative explanation incorporating behavioural aspects of the investors. In the BPT, investors seem to display both risk aversion as well as risk-seeking behaviour, much like investors in the

Friedman-Savage puzzle. According to the BPT, investors tend to ignore correlations between assets and regard assets as distinct, reflecting the concept of mental accounting. In addition, investors are influenced by their emotions, desires and aspirations in the determination of an 'optimal' portfolio.

Having discussed the theories underlying portfolio allocation, the next section will present empirical evidence on actual household portfolio allocation choices. Evidently, results of these studies indicate stark divergences in comparison to the principles of modern portfolio theory.

2.5.2 Evidence on Households' Portfolio Allocation Choices

Despite sheer elegance of the MPT, empirical data pose significant challenges to the theory. Several recurring observations that seem to contradict theoretical recommendations are the lack of stock market participation and lack of diversification. The anomalies in behaviour and the failure of individuals to employ basic investment principles have been bluntly described as a 'sorry picture' (DeBondt, 1998), which merely reflects the difficulties in reconciling theory and evidence. In this regard, this section will review the literature pertaining to these two stylized facts observed in the data.

i) Diversification of portfolios

According to portfolio theory, investors should diversify their portfolios to remove idiosyncratic risks of individual stocks. Empirical data, however, reveal that households' portfolios are poorly diversified (Blume & Friend, 1975; Kelly, 1995; Sprudzs, 1998; Moskowitz & Vissing-Jorgensen, 2002; Polkovnichenko, 2005; Goetzmann & Kumar, 2008). The *first* stylized fact revealed by empirical data is that most households have incomplete portfolios – there is a tendency for households to *specialize* in only a few

assets and are inclined toward liquid and low-risk types of assets (Hochguertel *et al.*, 1997; Guiso *et al.*, 2002; Hochguertel, 2003). This phenomenon is observed not only in the U.S. but in other countries as well, such as in the Netherlands (Hochguertel *et al.*, 1997), Italy (Guiso & Jappelli, 2008), and the U.K. (Banks & Tanner, 2002).

Research on portfolio diversification has a long tradition in portfolio analysis (Guiso *et al.*, 2002). The interest in this area range from examining the extent of diversification within the equity portfolio (Goetzmann & Kumar, 2008; Kelly, 1995; Polkovnichenko, 2005) and across asset classes (Sprudz, 1998), and also determining the factors that contribute to the extent of diversification. This section will underscore some of the key research in regards to diversification of households' portfolios.

Due to availability of rich data sources from the U.S., it is not surprising that research has concentrated on examining portfolio diversification amongst American households. Kelly (1995) employed data from the U.S. Survey of Consumer Finances (SCF) in an attempt to assess the mean-variance efficiency of household portfolios, and used a logit regression on a dummy variable indicating the holdings of ten or more stocks in the portfolio. Personal characteristics, such as age, education, occupation and risk attitude, were found to be significant explanatory variables. The median stockholder holding stocks owned only one publicly traded stock, usually from the company he works in. Overall, evidence indicated under-diversification and inefficient mean-variance portfolios, even amongst rich households.

Equivalent findings were noted in a study by Polkovnichenko (2005) who used data from various waves of the SCF. Under-diversification was found to be prevalent, contradicting the notions of expected utility theory. In the study, a distinction between direct and indirect stock-holdings was made, and regressions were used to determine if direct-stock investors were aware of the higher risk associated with undiversified portfolios of individual stocks. The dependent variable consisted of two diversification measures: (i) the percentage of total financial wealth (FA) invested in direct stock-

holding (DIR), denoted as (DIR/FA); and (ii) the percentage of risky assets (RIS) allocated in direct stocks (DIR/RIS). The independent variables used were log of total financial assets, education of the most educated household member, number of dependants in the household and self-reported risk attitude. Results revealed that wealthier households held larger proportions of direct stock-holdings. This implied that education, number of dependants and risk attitude were negatively related to direct stock-holding. The main results of this study was that households simultaneously invested in well-diversified funds as well as in poorly-diversified portfolios of stocks, and that certain families with high savings did not invest in equities. These results bear resemblance to the findings of Kelly (1995).

Similar evidence has also been found in other research employing different data, such as a study by Goetzmann and Kumar (2008). Using data of 60,000 individual investors of a major US discount brokerage house between the periods 1991-1996, they discover that the portfolios of these investors were under-diversified. Results suggest that diversification patterns correlate with investors' individual characteristics and trading patterns. Under-diversification seemed to be more prevalent among investors who held only retirement accounts, and the level of diversification tended to increase with age, income, wealth and education. This pattern implied that the sophistication level of investors (presumably related to these life-cycle variables) had a positive influence over the degree of diversification.

ii) Stock market participation

Theoretically, life-cycle models predict that given the higher expected return of equities, all households should participate in the stock market as soon as saving takes place. Paradoxically, empirical studies have shown otherwise – data from the 2001 SCF, for example, indicate only 52% of US households held stocks (either directly or indirectly). The phenomenon of

low stock market participation is the *second* stylized fact that emerges from empirical research on household portfolio allocation.

Shum and Faig (2006) examined the determinants of stock holdings by using four waves of the SCF. A probit regression on the decision to participate in the stock market was employed, which was run on a number of explanatory variables such as age and time, financial net worth, real estate, risk attitude, entrepreneurial risk, labour income, saving motives, and professional financial advice. A hump-shaped age effect on stock ownership and equity shares was observed, where the likelihood of owning stocks increased with age till age 61, and the conditional equity shares peaked at around age 50. Several important observations emerged from the results: saving motives were important in explaining stockholdings. Specifically, education, household purchases and retirement motives increased the likelihood of holding stocks, while saving to invest in a private business reduced the likelihood of stock ownership. However, professional investment advice did not seem to explain stock holdings.

Other studies examined general holdings of risky versus riskless assets. In a study of Dutch households' portfolios, Hochguertel *et al.* (1997) investigated the determinants of total financial wealth as well as the selection between risky and risk-free assets. The authors used data from the 1998 Dutch Collective Bank Study, and reported that the dataset consisted of four major asset categories: risky financial assets (e.g. stocks and bonds), risk-free financial assets (e.g. saving accounts, checking accounts, certificate of deposits), life insurance, and primary residences. However, only the first two classes of assets were considered in this study. By estimating a portfolio allocation model by specifying a budget share equation on risky and riskless assets, the study showed that wealthier households held significantly higher proportions of risky assets, suggesting that stocks and bonds are a 'luxury' asset and that relative risk aversion decreases with wealth. Findings also revealed that the marginal tax rate and education significantly affected the decision to hold more risky assets.

2.5.3 Determinants of portfolio choice

The previous section emphasized the empirical divergences pertaining to portfolio choices of households. Not surprisingly, these anomalies have attracted a fair amount of research interest attempting to provide a more complete explanation. According to Gollier (2002), household portfolio determinants can be classified into three broad categories: genetics (which impacts risk attitude), financial objectives (such as retirement and children's education), and external factors (for example, distribution of returns, taxes and access to credit). This sub-section explores these issues.

i) Background risks

Modern portfolio theory assumes that the only source of risk encountered by the investor is portfolio risk. Realistically, however, there are other sources of risk that are exogenous and can cause great variability to households' earnings. As discussed earlier in Sub-section 2.5.1 (part iii), these types of risks arise from sources such as labour income and entrepreneurship, and are often termed as "background risks." Such risks are uninsurable and non-diversifiable (due to moral hazard and adverse selection), and can influence portfolio allocations by altering people's tolerance for stock market risk. Intuitively, households that are subject to larger amounts of background risk should reduce their overall exposure in risky investments and be more conservative in the allocation of their assets (Gollier, 2002). The "counter-effect" of reducing risk in one aspect in the presence of another source of risk is termed as a "tempering effect" (Kimball, 1991). As earlier discussed, Eeckhoudt *et al.* (2005) demonstrated that the presence of background risks reduces the proportion of wealth allocated in the risky asset.

A number of studies have investigated the explanatory power of background risk on portfolio choice, using a variety of data sources, and have emerged with mixed results. In general, results show that households with greater exposure to background risk have a smaller proportion of

stock in their portfolios. Using an Italian national household data, Guiso *et al.* (1996) proxy income risk, health risk and borrowing constraints, and test the impact of these variables on the demand for risky assets. Evidently, background risk affects portfolio choices by suppressing holdings in risky assets. These findings support models of precautionary saving behaviour incorporating prudence and may help to explain the stock market non-participation puzzle and the lack of portfolio diversification. The authors also find evidence that borrowing constraints induce people to keep their wealth in safer and more liquid form.

Heaton and Lucas (2000) studied how background risks (labour income, proprietary income and real estate) influence portfolio allocations. More specifically, the authors examined the volatility of the component of household income that can be considered background risk and examined the correlation between this component of income and stock returns. Two measures of wealth were used – liquid assets (sum of stocks, bonds, bills and cash, held either directly or indirectly) and total financial wealth (liquid assets plus housing equity, other real estate, trusts, and the value of all private businesses). Findings revealed that differences in background risks generated significant variations in asset holdings, supporting the results of prior research.

ii) Taxes

Taxes are typically ignored in models of modern portfolio theory. As such, the results derived from such theoretical models apply to non-taxable investors (Poterba, 2002). Tax regulations can significantly influence portfolio decisions, particularly the choice of holding stocks, bonds, owner-occupied holdings, and retirement funds. Across countries, differences in tax structures and incentives result in varied determinations of household portfolio structure. Empirical studies on taxation effects are concentrated in the U.S., due to the availability of household-level information.

To determine the impact of taxes on portfolio choice, studies have looked at the demand for taxable and tax-deferred accounts. This issue has been termed as an asset *location* choice rather than an asset allocation decision. In a related study, Bergstresser and Poterba (2004) examined this location and allocation decision using the various series of the SCF. Results showed that asset allocation inside and outside tax-deferred accounts were roughly the same, where 70% in each category is made up of equities. Furthermore, about two-thirds of households with financial assets in both taxable and tax-deferred accounts held portfolios that were tax efficient.

iii) Transaction costs

The literature suggests that transaction costs influence the decision to participate in equities. These costs include information-search costs, entry costs, transaction fees, brokerage fees, recurring costs for continued participation (Haliassos & Michaelides, 2002), and also intangible costs such as psychic cost of putting savings at risk (Heaton & Lucas, 2000).

In view of transaction costs that may affect portfolio choices, Gomes and Michaelides (2005) present a life-cycle asset allocation model (incorporating the precautionary, retirement and bequest motives) that includes a fixed cost to enter the stock market. Their model includes a fixed entry cost to the stock market and assumes preference heterogeneity (various levels of risk aversion). The authors argue that, on one hand, risk aversion deters stock market participation, but on the other hand, risk averse individuals are also prudent, thus will have more wealth over the life-cycle, and therefore will be more willing to pay for the fixed cost of entering the equity market. They argue that the second effect dominates, thus implying that the ultimate participants in the stock market are moderately risk averse individuals who are more willing to pay this fixed cost.

One argument that can be made regarding transaction costs of entering the stock market is that wealthier households should not be faced with this

problem. Surprisingly, studies have shown that stock market non-participation is evident even amongst rich households (Kelly, 1995; Polkovnichenko, 2005). Therefore, although participation costs may explain the non-participation of the lower income households, it is not sufficient to explain the phenomenon among richer households.

iv) Life-cycle factors

The life-cycle hypothesis (LCH) makes a prediction about the household's wealth accumulation pattern over the life-cycle, but as most economic theory, it ignores the separability of asset classes and assumes that wealth is completely fungible. In the standard life-cycle framework, asset accumulation is hump-shaped. Poterba and Samwick (2000) adapt the theoretical notion of the LCH by examining the patterns of asset accumulation in specific assets. Using the 1983, 1989 and 1992 waves of the SCF, the authors categorize assets into several categories: taxable equity, tax-exempt bonds, taxable bonds, tax-deferred accounts (IRA's Keoghs, and defined contribution pensions), bank accounts (including certificate of deposits and money market accounts) and other financial assets such as whole life insurance and trusts). Specific types of mutual funds (bonds or stock mutual funds) were assigned to the corresponding asset categories. Furthermore, taxable equity held directly in brokerage accounts and those held indirectly through mutual funds were also distinguished. The authors first perform a probit regression on whether the household has positive amounts in the specific categories, and secondly, they perform a tobit regression on the share of household's total financial assets held in each asset category. Results suggest that the hump-shaped pattern of the standard LCH differs across all assets. For example, real-estate and equities in privately held business is hump-shaped, but financial assets (as a percentage of total assets) are U-shaped. This compares closely to the results of a study of Hochguertel *et al.* (1997), which discovers a U-shaped pattern in risky assets.

Financial advisors usually suggest that optimal portfolio weights should be a function of age, such that older investors should hold relatively less stock. An early proposition by Samuelson (1969) suggests that more affluent "businessmen", as opposed to "widows", have relatively higher expectations of future income and longer time horizons, and should be able to assume more risk in their portfolios. However, the model developed rejects the concept of "businessman" risk since the same risk tolerance is observed over time. Bodie *et al.* (1992), in contrast, develop theoretical justification that older investors should in fact hold less stocks in the portfolios since young investors will have greater opportunity to smooth out income shocks along their lifetime. This is supported by Curcuru *et al.* (2005) who report summary statistics from different waves of the SCF, and find that stockholders are generally older, considerably wealthier and better educated. Similarly, Polkovnichenko (2006) demonstrate that younger households have relatively more conservative portfolios than the middle-aged households. This is because young investors have not yet accumulated enough wealth to sustain consumption sufficiently above habit. This pattern of portfolio allocation between young and middle-aged household is consistent with other empirical evidence (e.g. Heaton & Lucas, 2000; Faig & Shum, 2002).

v) Other determinants of Asset allocation

Other factors have been suggested as influential determinants of portfolio choice. As argued by Shefrin and Statman (2000), individual's aspirations and desires will shape their choice of portfolio allocation. Gollier (2002) and Campbell and Viciera (2002) also assert that financial objectives will lead to differences in asset holdings. This section will briefly review selected papers that have examined the impact of financial literacy (Guiso & Japelli, 2008), financial strategies (Gunnarsson & Wahlund, 1997) and financial needs (Xiao and Anderson, 1997), on the portfolio allocation choice.

Financial Literacy

Guiso and Jappelli (2008) suggest that financial literacy influences the degree of portfolio diversification. Selecting an optimal portfolio consisting of the most efficient combination of mean-variance assets requires a certain degree of knowledge regarding the financial environment. Using data from the Unicredit Clients' Survey (USC) from Italy, the authors find that financial literacy strongly influences the degree of portfolio diversification, supporting results of prior research (Lusardi & Mitchell, 2007; Christelis, Japelli & Padula, 2006; Alessie, Lusardi & van Rooji, 2007). Specifically, lack of financial literacy is a significant variable that helps to explain the lack of portfolio diversification. Results suggest that investors who are older, more risk averse, with low-income, and with low levels of education tend to be less financial literate.

Financial strategies

An exploratory study by Gunnarsson and Wahlund (1997) looked into the patterns of financial asset and debts of Swedish households. The study aimed to uncover if behavioural patterns, specifically financial strategies, were prevalent amongst Swedish households. Using a cluster analysis, savers were grouped into six categories according to their financial strategies. These groups were labeled as *residual savers, contractual savers, security savers, risk hedgers*, *prudent investors,* and *divergent strategies*. On average, residual savers had few assets and mainly held liquid assets for transaction purposes. Contractual savers relied on loans and credits, and held liquid financial assets. Security savers generally held retirement accounts and invested in stocks and bonds. Risk hedgers had the most diversified portfolios and were keen on investing in risky and long term assets. Prudent investors had many different forms of savings although tended to avoid risky asset such as shares. Investors employing divergent strategies owned complex and risky assets (such as options) and had well diversified portfolios. Overall, these results suggest that savers within each 'strategy' grouping were inclined toward holding similar types of assets.

The authors then segmented the sample into various life-cycle categories to reflect blocks of age groups. By examining the distribution of these life-cycle categories among the different financial strategies, the patterns of financial strategies were then matched to these groups. The main significant observation from this analysis is that the majority of young, single households and the retired households practiced the residual saving strategy and held safe and liquid assets.

Financial needs

Prior research has also investigated the relationship between family financial needs and household financial asset share. In Xiao and Noring's (1997) examination of the relationship between financial needs and shares of financial assets, family financial needs were conceptualized as a hierarchy of needs, based on Maslow (1954), representing three levels: survival, security and growth. For twelve different asset types, the share of each financial asset was used as indicators of financial needs. Results suggest that survival needs are reflected in holdings of checking and saving accounts, security needs are reflected by MMA-type checking accounts, employer-sponsored saving plans, pension plans, and certificate of deposits, and growth needs are reflected by other assets such as real estate, businesses and other real assets.

2.5.4 Conclusion

From the literature, it is evident that the portfolio allocation choice is influenced by a number of factors. Modern portfolio theory asserts that the mean-variance trade off is a crucial determinant, as well as the covariance of assets within the portfolio. The MPT has received its fair bit of criticism, particularly from a behavioural economics perspective, which argues that behavioural factors, such as aspirations and desires, are also important criteria in asset allocation decisions. Based on the propositions by past researchers (e.g. Gollier, 2002; Campbell & Viciera, 2002; Shefrin & Statman, 2000) that saving objectives and aspirations influence asset

determination, the present study postulates that saving motives will have a strong explanatory power on household portfolio choice. More of the conceptualization of the present research will be discussed in Chapter Three.

2.6 GAPS IN THE LITERATURE

Based on the review of literature conducted in the preceding sections, this section will bring to light three key issues that remain to be resolved. These include the determinants of saving motives, the question of co-existing saving motives, and the problem of household's portfolio allocation decisions.

2.6.1 What determines saving motives?

The review of literature has revealed a number of studies that examined saving motives. Although there are studies that have included saving motives as an explanatory variable to explain saving (e.g. Fisher & Montalto, 2010; Rha, Montalto & Hanna, 2006; Alessie *et al.*, 1999), not many have explored saving motives as an outcome variable. The works of researchers who have used saving motives as a dependent variable have been based on Maslow's hierarchy of needs and examined the placements and/or movements of saving in the hierarchy. However, the current study explores the various categories of saving motives as identified from traditional saving theories, and will investigate the characteristics of the household that shape these motives. The objective of this exploration is to determine the socio-demographic and behavioural characteristics of the household that impact their saving motives.

2.6.2 Overlapping motives – which dominates?

Economic theorists face a major challenge in providing a framework for empirical analysis: the incorporation of various saving motives to explain saving behaviour. Empirical analysis becomes complicated when it is recognized that a wide range of motives for saving exist, which can co-exist simultaneously at a given time or over a certain period (Harris *et al.*, 2002). However, Dynan *et al.* (2002) suggest that motives for saving are generally not distinct but actually overlap each other – for example, savings could simultaneously serve to meet both precautionary and bequest motives. According to Wärneryd (1999), saving motives are not mutually exclusive, and may concurrently operate at a single time. For example, households who have an altruistic bequest motive may also face uncertainty about the future. In this instance, the household will have two saving motives driving saving behaviour. Nonetheless, the debates by prior researchers regarding the importance of different motives (e.g. Kotlikoff & Summers, 1981; versus Modigliani, 1988) suggest that further research is needed to establish possible dominating effects between these motives.

In acknowledgement of the different overlapping motives, this research attempts to integrate the various key saving motives as outlined in the economic literature (the life-cycle, precautionary, bequest and profit motives) into a single framework, with the objective of establishing the significance of each saving motive on saving behaviour. As revealed from the literature review, studies that have incorporated the various saving motives are limited, with the exception of a handful of studies (e.g. Fisher & Montalto, 2010; Horioka & Watanabe, 1997; Rha, Montalto & Hanna, 2006). In addition, the categorization of saving motives performed by past studies have tended to neglect the *profit motive*, which will be included as one of the saving motives of interest in this study. The importance of including the profit motive is due to its connection to the issue of portfolio allocation choice, which is another important area of interest to the present study.

2.6.3 The link between saving motives and portfolio allocation

The discussion regarding portfolio allocation choice suggests that there are still many unanswered questions on how households allocate their wealth. The traditional view that investors mainly consider the risk-return relationship between assets in the portfolio appears to be challenged by the evidence, which suggests that households hold sub-optimal portfolio compositions. In particular, the data suggest that households' portfolios are concentrated in very few assets, and that risky assets are mainly avoided. Alternative portfolio allocation theories suggest that there may be other significant aspects driving the portfolio allocation choice, derived from behavioural characteristics of the investor.

The unresolved questions in this area of research point to a need for the current study to explore the relationship between behavioural aspects and portfolio allocation choice. This study will focus on the link between saving motives and portfolio decisions, as there appears to be no prior research examining this relationship. This proposition is made based on tenets of the Behavioural Portfolio Theory (Shefrin & Statman, 2000) that investor's decisions are guided by emotions and aspirations. As will later be argued in Chapter Three, saving motives can be viewed as representations of these emotions and aspirations, and hence, will impact portfolio allocation choices.

2.7 CONCLUSION

This chapter reviewed three key areas of the literature. The first area of the literature discussed household saving behaviour, by first defining saving, and followed by a discussion on household saving patterns. A main deduction that can be made from the works of prior researchers is that income is a key determinant of household saving. The second part of the literature review discussed the role of saving motives. It first explored motives in general and the key theories governing motives and behaviour. Then, the section proceeded by discussing four saving motives identified

from traditional saving theories: the life-cycle, precautionary, bequest and profit motives. The third main section of the chapter discussed the issue of portfolio allocation choice, by first exploring the underlying theories, followed by a discussion on the evidence pertaining to household's portfolio choices. The section also discussed other determinants of portfolio decisions, as emphasized in the literature. Finally, the chapter highlighted three key areas, viewed as 'knowledge gaps', which the present study seeks to explore.

Having reviewed the relevant literature in regards to household saving behaviour and portfolio choices, the following chapter proposes a conceptualization of the research, by proposing a research framework and the hypotheses to be tested.

Chapter Three

RESEARCH MODEL AND HYPOTHESES

3.1 INTRODUCTION

Chapter Two revealed several gaps in the literature that warrant undertaking of a comprehensive study on saving behaviour. To reiterate, the areas that have been identified as being under-researched are threefold. First, studies incorporating the various saving motives in a single model are limited. Studies have typically focused on a single motive to determine its significance on saving behaviour. This study aims to determine the importance of these motives relative to each other, in acknowledgement that more than one saving motive exists (Keynes, 1936; Wärneryd, 1999; Dynan *et al.*, 2002; Browning & Lusardi, 1996). Second, studies researching the underlying determinants of saving motives are practically non-existent. Following Keynes (1936) and Browning and Lusardi (1996), this study hence postulates that saving motives are shaped by socio-demographic characteristics of the households. Third, the simultaneous evaluation of portfolio allocation choice in the context of saving behaviour is called for (Guiso & Jappelli, 2002), considering the close relationship between these two decision dimensions of saving (portfolio allocation and saving decisions).

The purpose of this chapter is to present a model of saving behaviour based on the various constructs that have been identified from the literature. This study proposes a multi-stage approach in the evaluation of saving behaviour, which conceptualises the links between household characteristics, saving motives, the propensity to save, and portfolio allocation decisions. The rest of the chapter is structured in the following manner. Section 3.1 recapitulates the research objectives and research questions that underlie the research framework. Section 3.2 presents the research framework incorporating the main variables of interest. Section 3.3 proceeds by presenting the list of hypotheses to be tested.

3.2 PURPOSE OF THE STUDY

Prior to discussing the research framework, it may be useful to recapitulate the research objectives and research questions of this study. This is viewed imperative since the development of the research model is largely driven by the research aims and questions that are to be answered. As previously discussed in Section 1.2, the objectives of this study are:

1) To explore the underlying determinants of saving behaviour by focusing on the role of saving motives.

2) To identify the observable and unobservable households' characteristics that shape saving motives, prior to determining the impact of these motives on saving behaviour.

3) To bridge the gap in the literature by simultaneously examining the influence of the various saving motives on saving behaviour, and to examine the relative significance of each motive on saving decisions.

4) To provide a comprehensive framework to address the issues of household saving and portfolio decisions, by including saving motives as a common underlying explanatory variable.

In relation to the above mentioned research objectives, the specific research questions, as previously listed in Section 1.3, are as follows:

RQ1) What is the relationship between the posited antecedents of savings and the household's saving motives?

RQ2) What is the relationship between saving antecedents and motives, and the household's propensity to save?

RQ3) What is the relationship between the saving antecedents and motives, and the household's portfolio allocation choice?

Driven by these objectives and determination to answer the research questions, the following section will discuss the development of the

research framework and rudiments to the hypothesized relationships to be investigated.

3.3 A MODEL OF SAVING BEHAVIOUR

3.3.1 Focus of the study: Saving motives

Continuous efforts have been conducted amongst social science theorists and researchers to determine and understand the factors that influence human behaviour. It has been suggested that attitudes, intentions and reasons are some of the factors that positively impact behavioural conduct (Fishbein & Ajzen, 1975; Ajzen, 1985; Westaby & Fishbein, 1996). Understanding the factors underlying behaviour is crucial in the development of strategies, policies, and intervention programs, for the benefit of society, economy, and the nation as a whole.

Motives as an antecedent of behaviour have also gained much research interest, as discussed in detail in the previous chapter. Knowledge regarding motives and intentions provides appreciation and deeper understanding toward reasons for specific human conduct. It also offers a more comprehensive structure toward understanding the process of actions and helps to explain the occurrence of certain phenomena. In this essence, the main objective of this thesis is to add to the body of knowledge on saving behaviour by focusing on saving motives as underlying determinants of household saving behaviour and portfolios decisions.

Chapter Two discussed at length the various saving motives that have been posited to influence saving behaviour, originating from the ideas of Keynes (1936). Recall from Section 2.4 the eight motives Keynes proposed: *precautionary, life-cycle, intertemporal substitution, improvement, independence, enterprise, bequest,* and *avarice motives.* For the purpose of assimilating the various motives in a single framework, Keynes' list of saving motives will be consolidated into fewer groups in order to generate more conducive categories. Drawing on the list of eight saving motives, *independence* and *avarice* motives are removed due to the psychological connotation of the constructs which are typically difficult to interpret and quantify in traditional economic models, as pointed out by Browning and

Lusardi (1996). Meanwhile, the *intertemporal substitution*, *improvement* and *enterprise* motives appear to be captured in the profit saving motive suggested by Wärneryd (1999), since they all reflect a situation of betterment, a desire to improve in life, or an aspiration for rewards (for example, aspiring for an improvement in financial circumstances due to the receipt of interest or capital gains). Hence, the three concepts will be grouped under profit motive. In view of these considerations, Keynes' (1936) original list of saving motives will be reduced to four: *life-cycle*, *precautionary*, *bequest*, and *profit* motives, for the purpose of the present study.

Rather than focusing only on one motive in depth as has been typically done by most researchers, this study seeks to examine the various motives concurrently. As suggested by Browning and Lusardi (1996, p.1798), "many of the motives are complementary" – for example, households saving for their children's education (the life-cycle motive) are also likely to be saving for emergencies (the precautionary motive). At the same time, they may also save in high interest-bearing assets which reflect a profit motive for saving. Dynan *et al.* (2002) also argued that overlapping motives exist amongst households, as evidenced from data in the U.S. Survey of Consumer Finances. Furthermore, Wärneryd (1999) remarked that "the four motives are not mutually exclusive", and will possibly evolve over the life-cycle. Based on these conceptions, this study integrates the various motives for saving (life-cycle, precautionary, bequest and profit motive) in a single framework, as noted from the box in the centre of Figure 3.1. An advantage of incorporating all motives is that it may be able to clarify the relative importance of each motive. Figure 3.1 is a repetition of the conceptual model of the research as given in Section 1.3, although with specified explanatory variables.

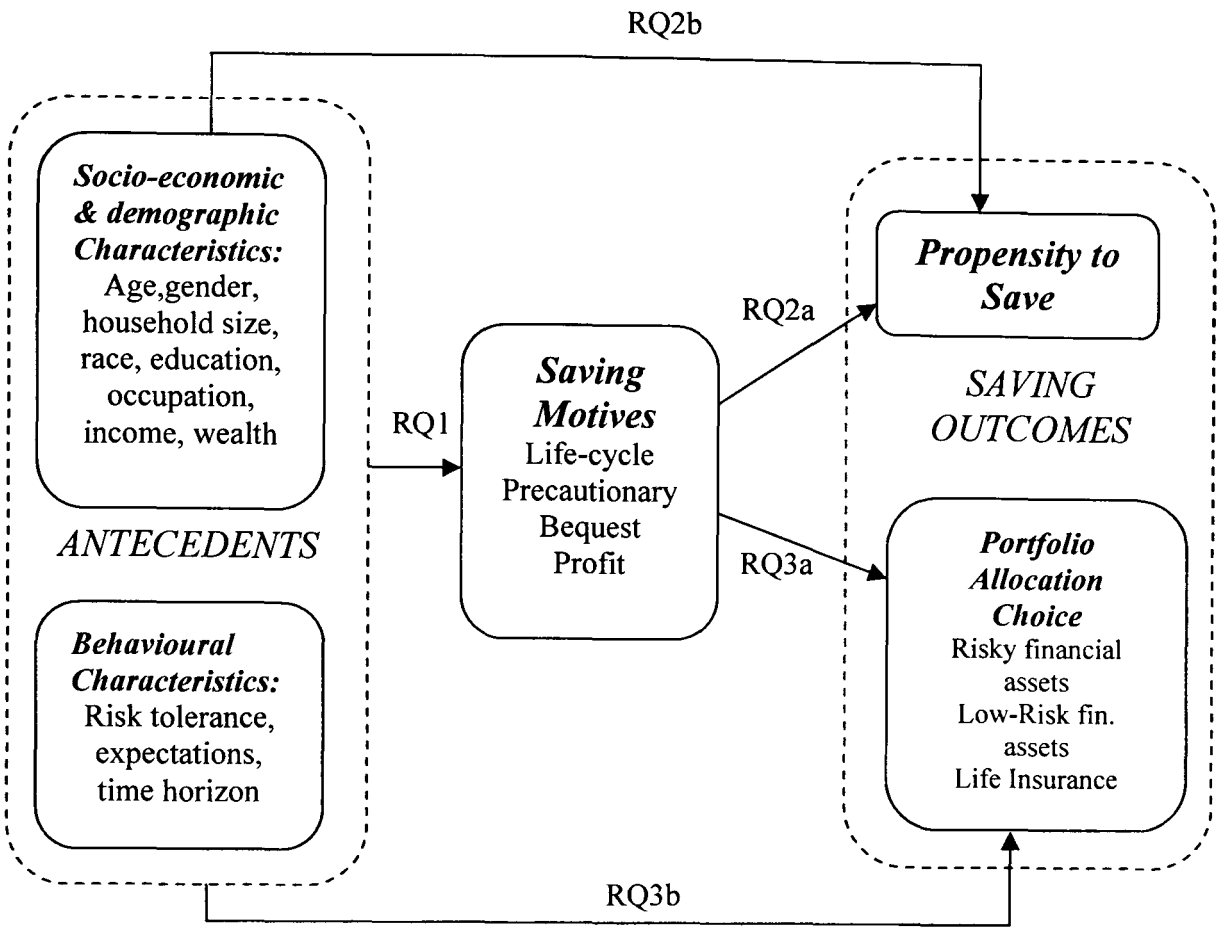


Figure 3.1: Conceptualisation of research

3.3.2 The determinants of saving motives (RQ1)

Having established the dimensions of saving motives to be included in the framework, the next aim of the thesis is to investigate the underlying determinants of these motives. In this regard, an important observation identified in the literature is a remark by Keynes (1936) subsequent to his discussion on saving motives:

> ...the strength of all these motives will vary enormously according to the institutions and organization of the economic society which we presume, according to habits formed by race, education, convention, religion and current morals according to present hopes and past experience, according to the scale and technique of capital equipment, and according to the prevailing distribution of wealth and the established standards of life. (p.109)

This statement clearly denotes that environmental factors and socio-demographic characteristics play an important role in the formation and strength of households' saving motives. External influences such as economic, societal, and institutional environments affect the intensity of these motives, while personal characteristics such as ethnicity, education, religion and other factors, are also likely to impact the reasons for saving. The notion that diversities in saving motives are the outcome of various circumstantial conditions of the household is also implied in the following statement by Browning and Lusardi (1996):

> It is unlikely that a single explanation will suffice for all members of a population at any given time or even for the same person over a long stretch of time. In particular, there is a widespread feeling that the wealthy have different motives to save from the less wealthy (p.1797)

The argument that saving motives are heterogeneous in the population and that they are shaped by socio-demographic factors is intuitive. Characteristics of the household such as age of the head of the household or size of the family are likely to affect the household's motivations to save. An older head of the household can be expected to be more concerned about precautionary saving, given that older individuals are more susceptible to uncertainties such as health and mortality risks. A household with children is more likely to think about leaving an inheritance for the next of kin, considering the adverse effects resulting from death of a breadwinner on surviving children, particularly minors. Furthermore, larger households are plausibly confronted with various prospective life-cycle events such as furthering education, marriage, upgrading the home, and so on, which potentially increase the likelihood of having life-cycle saving motives. More specific hypotheses pertaining to this relationship will be discussed in Chapter Five.

In addition to socio-demographic factors, it is also postulated that behavioural characteristics (risk tolerance, time preference and expectations) of the head of the household impact saving motives. For

instance, there is evidence to suggest that risk attitudes influences precautionary saving (Lusardi, 1998). The literature on portfolio allocation choice posits that risk aversion significantly influences the choice of saving in risky assets, thus, reflecting the desire to save for profit motives. Expectations regarding future economic situations of the household will also likely impact the motives to save. For example, if one anticipates the household's financial circumstances to improve in the future, this will likely reduce the probability of having a life-cycle or precautionary saving motive.

Time horizon, which refers to the financial planning horizon of the household, is also likely to shape household's saving motives. This variable is posited to have an impact on saving motives as different planning horizons relate to different goals in life. Saving motives are equivalent to financial goals that the household wishes to achieve. Thus, it also reflects the time horizon pertaining to the goal attainment target. Households with a longer financial planning horizon are more likely to have a profit motive to save, i.e. saving in anticipation for high rewards. Furthermore, those with longer time horizons are more likely to be concerned about life-cycle events, i.e. the anticipation of a reduction in income that will occur during retirement, for example.

The above notions form the basis for the second objective of this study, which is to identify the observable and unobservable households' characteristics that influence the motives to save. Specifically, it is posited that socio-demographic and behavioural characteristics of the household affect saving motives. This conception is reflected in the first research question: *What is the relationship between the posited antecedents of savings and the household's saving motives?* The arrow labelled as RQ1 in Figure 3.1 depicts this postulated relationship. In relation to this, the main hypothesis to be tested in this study is stated as:

H_A: Socio-demographic and behavioural characteristics of the household contribute significantly toward the household's saving motives.

This broad hypothesis can be broken down into more specific hypotheses, which will be elaborated in Chapter Five.

3.3.3 The relationship between saving motives and saving propensity (RQ2)

The next objective of the study is to examine the influence of saving motives on household saving, reflected in the second research question: *What is the relationship between saving antecedents and motives, and the household's propensity to save?* In the context of this study "propensity to save" refers to the intensity of setting aside a portion of income as saving, or an inclination to save. This is shown by arrow RQ2a of Figure 3.1. The intuition behind this proposition is such that if a person has a motive to save (say, for example, a precautionary motive), he or she should have a higher propensity to save, since motives reflect a person's intentions which sequentially compel the performance of positive actions. This conception is emphasized in behavioural theories such as Ajzen & Fishbein's (1975) Theory of Reasoned Action and Ajzen's (1985) Theory of Planned Behaviour which postulate that favourable intentions precede successful behaviour, subject to sufficient levels of behavioural control[5]. Therefore, the arrow labelled RQ2a denotes *planned* saving, and reflects a process of converting intentions into successful outcomes, as hypothesized by Ajzen's Theory of Planned Behaviour.

Meanwhile, the implication behind the TPB is that lack of behavioural control may result in unsuccessful or 'unplanned' behaviour. In other words, despite having the motive or intention to perform an action, the intended behaviour may not actually be materialized. 'Planned' behaviour may transpire quite differently and instead turn out to be an unintended action resulting from other exogenous factors which may either promote or discourage the performance of behaviour. Thus, if arrow RQ2a denotes an intention transpiring into action or *planned* saving, arrow RQ2b then

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[5] More details of these behavioural theories were discussed in Chapter 2 (Sub-section 2.3.2).

suggests that there is an unmediated and non-intentional effect between demographic variables and saving, which signifies *unplanned* saving.

The idea that saving may be a result of unplanned behaviour rests on two main factors. The first can be viewed as a demand-side factor, stemming from savers' capability to implement their saving motives. For instance, even if there was a certain motive to save, the non-performance of saving could be the result of lacking the capability of doing so from the perspective of the saver. Demographic characteristics can affect this capability – educational level, for example, denotes the ability to seek for information and make decisions regarding consumption and saving. Another example is age which indicates the level of knowledge and experience of the individual, which may influence the ability of searching for information and understanding financial affairs. Demographic factors may also reflect an individual's degree of self-control, which Shefrin & Thaler (1988) suggest will affect the successful implementation of saving intentions. A similar notion is also suggested in the Theory of Planned Behaviour (Ajzen, 1985) which asserts that lack of behavioural control may result in unsuccessful or 'unplanned' behaviour.

Meanwhile, the second factor relates to the saving industry's supply decision, where the power of granting customers' access to certain financial products lies in the hands of financial institutions. Although an individual may have a particular saving motive (for example, a bequest motive), he or she may not have the opportunity to save due to eligibility or accessibility restrictions enforced by financial institutions or regulators. For example, elderly households may have a bequest motive to save and may wish to allocate saving into life insurance policies, but impositions on the side of life insurance companies may restrict these groups of individuals from accessing the market. These issues will be further discussed in Chapter Six.

In relation to the second research question, the broad hypotheses to be tested are stated as follows:

H_B: Saving motives significantly impact the household's propensity to save.

H_C: The household's socio-demographic and behavioural characteristics significantly impact household saving.

Specific hypotheses in regards to the above hypotheses will be discussed in Chapter Six.

3.3.4 The link between saving motives and portfolio allocation choice (RQ3)

As previously discussed in Chapter Two, Keynes (1936) suggests that there are two decision dimensions considered by individuals in their saving decisions. The first relates to the propensity to consume (how changes in income relate to changes in consumption), which determines the proportion allocated between consumption and saving. The second dimension concerns the liquidity preference of the individual, and relates to the decision of the form in which the saving retained from the first decision is to be held. Based on these two closely related aspects, this study proposes a comprehensive model of saving behaviour, and integrates the portfolio allocation choice as a second order decision, following the decision to save. Hence, the third part of the study correlates the antecedents of saving with portfolio selection, and addresses the third research question: *What is the relationship between the saving antecedents and motives, and the household's portfolio allocation choice?* The research question pertaining to the third part of the model is represented by the arrows denoted as RQ3a and RQ3b shown in Figure 3.1. Arrow RQ3a posits that there is a relationship between saving motives and portfolio allocation choice, while RQ3b suggests that there exists also a direct relationship between socio-demographic factors and the portfolio allocation. RQ3b suggests that there is a non-motivated relationship between these demographic factors and the portfolio allocation decision, similar to the non-motivated relationship denoted by arrow RQ2b connecting the same explanatory variables with the propensity to save. The non-motivated role denotes capabilities on the part of the household to allocate wealth in their choice of assets. Although the motives to save will plausibly compel the household to save in certain types of assets, the household may not be capable of doing so due to

limitations in their own capabilities in selecting the appropriate type of asset. Furthermore, there may be supply-side constraints limiting accessibility to certain financial products. As will be discussed in Chapter Six (Sub-section 6.3.2, part 2), financial exclusion suggests that there will be certain groups of the population who are deprived of certain financial assets due to constraints imposed by financial institutions. For example, Leyshon & Thrift (1995) suggests that the economic power of individuals affect their ability of gaining access into the financial system, hence implying that households of certain economic stratums are deprived of full penetration to financial markets.

The hypothesized relationship between saving motives and portfolio allocation choice is based on the conceptions made in the Behavioural Portfolio Theory (BPT) (Shefrin and Statman, 2000) which suggest that the emotions of *hope* and *fear*, in conjunction with *aspirations* (for security and potential), are crucial aspects in the portfolio selection process. In the BPT, the portfolio is posited to resemble a pyramid, where the lower level relates to the *fear* of falling into poverty and the desire for security, and the upper level relates to the *hope* for potential and the aspirations to achieve high levels of wealth. These emotions are posited to influence the decision of allocating wealth into separate accounts representing different aspiration levels. Saving motives are argued to be synonymous with aspirations, because the motives to save, like aspirations, symbolize a desire for achieving a particular goal in life. Hence, the household's saving motives are posited to have an influence over the choice of assets the household chooses to hold. More of this conceptualisation will be discussed in Chapter Seven.

The general hypotheses pertaining to the third research question are stated as follows, although Chapter Seven will provide more specific explanation on each of these hypotheses:

H_D: Saving motives are significant predictors of portfolio allocation choice.

H_E: Household's characteristics are important determinants of portfolio allocation choice.

3.3.5 List of Main Hypotheses

This section discussed the conceptualisation of the research, based on the literature. To sum up the hypothesized links discussed earlier, Table 3.1 below summarizes the hypotheses to be tested in this study. Note that each main hypothesis will be further broken down into more specific hypotheses, which will be discussed in the corresponding chapters listed in Table 3.1 below.

Table 3.1: Main hypotheses of the study

Hypotheses	Statement	Addressed in
H_A	Socio-demographic and behavioural characteristics of the household contribute significantly toward the household's saving motives.	Chapter Five
H_B	Saving motives significantly impact the household's propensity to save.	Chapter Six
H_C	The household's socio-demographic and behavioural characteristics significantly impact household saving.	Chapter Six
H_D	Saving motives are significant predictors of portfolio allocation choice.	Chapter Seven
H_E	Household's characteristics are important determinants of portfolio allocation choice.	Chapter Seven

3.4 CONCLUSION

This chapter proposed a conceptual model of saving behaviour which was based on the literature on saving and on the objectives of the research. It

began by delineating the categories of saving motives to be used in the study, followed by explanations on each of the three main research questions which made up the research model. The main hypotheses were also given, although these will be discussed in greater detail in subsequent chapters. The chapter that follows will discuss the research methodology employed in this study.

Chapter Four

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Thus far, previous chapters of this thesis sought to establish the significance and rationale for the conduct of the study. As previously noted, there is a need for a comprehensive study examining saving behaviour and portfolio allocation choice due to the close relationship between the two aspects of household financial decisions. Reviews of the literature suggest that there is much room for furthering the understanding of saving behaviour, revealed through the gaps in knowledge identified from past research. This led to the development of a research model integrating the various aspects of saving behaviour to be investigated in this study, as detailed out in Chapter Three.

The purpose of this chapter is to explain and justify the research methodology that was chosen to provide answers to the research questions. In doing so, the chapter will begin by presenting an overview of the research philosophy and epistemology embraced by the researcher (Section 4.2). Guided by the research objectives, justification for the choice of research paradigm will also be given (Section 4.3). The rest of the chapter will then explain the methodology undertaken, including the choice between primary and secondary data (Section 4.4), evaluation of various data sources (Section 4.5), and description of the chosen dataset (Section 4.6). The following section (Section 4.7) will then describe the SCF dataset in greater detail, inclusive of the sample design, data collection procedures and missing data treatment, among other issues. These will be followed by a discussion on the explanatory variables relevant to the study (Section 4.8), analyses of descriptive statistics (Section 4.9), and analytical methods to be employed in the study (section 4.10). Section 4.11 concludes the chapter.

4.2 EPISTEMOLOGY AND PHILOSOPHY OF RESEARCH

This section will present an overview of research epistemology, the fundamental elements of inquiry in research and a brief exploration of research paradigms. This discussion is perceived to be necessary based on the view that, prior to any research endeavour, researchers should first have a basic understanding of research philosophies and the paradigm most suited in their area of study.

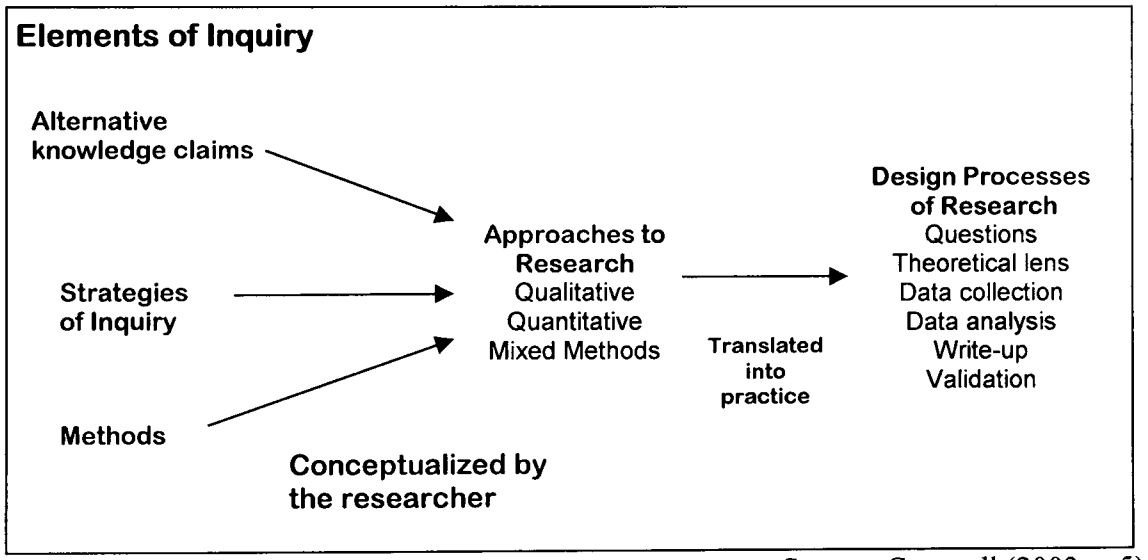
'Research' is the process of intellectual discovery, interpretation and communication of new knowledge and understanding the world around us (Ryan *et al.*, 2002). The conduct of a research reports an original experimentation to make new information available to the rest of the world; it is a way of generating new knowledge. Thus, any research is viewed worth conducting if it provides some form of contribution toward knowledge. Meanwhile, 'epistemology', which is often used interchangeably with 'theory of knowledge', is a branch of philosophy that deals with questions concerning the nature, scope, and sources of knowledge; it also provides the answers to a daunting variety of senses in areas of humanities and social sciences. According to Pollock & Cruz (1999, p.23),

> ... [T]he only uncontroversial claim we can make is that epistemology is an attempt to make sense of the possibility, nature, and limits of human intellectual achievement. Typically, the epistemologist does this by trying to illustrate the difference between knowledge and opinion, or the difference between good reasoning and poor reasoning.... Epistemology aims to understand general and ubiquitous elements of human inquiry, such as perceptual knowledge or inductive inference.

Hughes (1994) considered the philosophical level of a research to be related to its assumptions based on the most general features in the world, encompassing such aspects as the mind, matter, reality, reason, truth, nature of knowledge, and proofs of knowledge. Meanwhile, Easterby-Smith *et al.* (1997) identified three reasons why the exploration of

philosophy might be significant with particular reference to research methodology. First, it helps in the determination of the overall research strategy and research methods to be employed, including how evidence is gathered and the way it is interpreted. Second, understanding various research philosophies allows the evaluation of different methodologies and methods, and identifies the limitations of certain approaches at an early stage. Third, it enhances creativity and innovativeness in the adoption of methods that were previously beyond capabilities of the researcher.

In regards to research design, three issues have been identified as being of significant importance: (i) the knowledge claims of the researcher (ii) the strategies of inquiry influencing the procedures; and (iii) the methods of data collection and analyses (Ryan *et al.*, 2002). The three elements of inquiry combine to form different approaches to research, as conceptualized in the Figure 4.1 below:



Source: Creswell (2003, p.5)

Figure 4.1: Knowledge claims, strategies of inquiry, and methods leading to approaches and the design process

Fundamentally, researchers are guided by conceptual frameworks known as research paradigms. Scientific paradigms are "accepted examples of actual scientific practice, examples which include law, theory, application, and instrumentation together -- (that) provide models from which spring particular coherent traditions of scientific research" (Kuhn, 1970, p.10).

They are the worldviews or belief systems that guide researchers (Guba & Lincoln, 1994).

To assert a form of truth in research, conscious selection of an appropriate paradigm is vital to the production of quality results (Clear, 2001). Proctor (1998) believes that consistency between the objectives of a research, the research questions, the methods, and the personal philosophy of the researcher are essential in developing the rationale for any conduct of research. Kuhn (1970) highlights that in the carrying out of research endeavour, philosophical positions are adopted about the nature of matter, what can be known, and how this knowledge can be attained. Before any decision on research method can be made two distinct research philosophies need to be thoroughly understood before it can be adapted. Social scientists often debate regarding two major schools of thought: the positivist and post-positivist paradigms.

The positivist paradigm, also referred to as objectivist or empiricist, believes that the world is external and objective; and approaches social science by assuming that things can be studied as hard facts and that the relationship between these facts can be established as scientific laws (Smith, 1998). Knowledge is generated through empirical discovery based on hypotheses formulated from theory. This premise is based on the belief that reality exists beyond the researcher's perception either as an entity, an attribute or a cause (Bruner, 1986). Positivists argue that true belief is grounded in what is perceived and that what is perceived is derived from a value-free, independent reality (Ryan *et al.*, 2002).

Researchers of the positivist paradigm are inclined toward conducting research using a quantitative methodology in their search for causality and fundamental laws. Since positivists assume that social facts have an objective reality, variables are identified and relationships measured (Glesne & Peshkin, 1992). Positivist researchers remain emotionally detached and uninvolved with the objects of study, and are free of predispositions (Johnson & Onwuegbuzie, 2004).

The other end of the paradigm spectrum is the post-positivist school of thought (also classified as phenomenologist, interpretivist, realist, or constructivist). Post-positivism is consistent with positivism in assuming that an objective world exists, but it assumes that the world might not be readily comprehended, and that variable relations or facts might be only probabilistic, not deterministic (Gephart, 1999). Post-positivism provides an alternative to the traditions and foundations of positivism for conducting disciplined inquiry. For the post-positivist researcher, reality is not a rigid thing; instead it is the creation of those individuals involved in the research (Crossan, 2003). Forbes *et al.* (1999) suggest that post-positivism is concerned with establishing and searching for a 'warranted assertibility', that is, evidence that is valid and sound proof for the existence of phenomena (Philips, 1990). This is contrast to the positivist approach of making claims to absolute truth through the establishment of generalization and laws.

Post-positivist researchers assume that reality is socially constructed thus prefer to conduct qualitative studies which tend to argue for the superiority of constructivism, idealism, relativism, humanism, hermeneutics, and sometimes, postmodernism (Guba & Lincoln, 1989; Lincoln & Guba, 2000). The observer is part of the subject being observed, and the writing style of post-positivist researchers is oriented toward using detailed, emphatic descriptions. The following table highlights the key characteristics of the two philosophy paradigm alternatives.

Table 4.1: Research paradigms

	Positivist paradigm	**Phenomenological paradigm**
Basic beliefs	The world is external and objective	The world is socially constructed and subjective
	Observer is independent	Observer is part of what is observed
	Science is value-free	Science is driven by human interests
Researcher should	Focus on facts	Focus on meanings
	Look for causality and fundamental laws	Try to understand what is happening
	Reduce phenomenon to simplest elements	Look at the totality of each situation
	Formulate hypotheses and then test them	Develop ideas through induction from data
Preferred methods include	Operationalising concepts so that they can be measured	Using multiple methods to establish different view of phenomena
	Taking large samples	Small samples investigated in depth or over time

Source: Easterby-Smith *et al.*, (1991, p.27)

Having discussed the alternative research philosophies and paradigms, the following section will explain the research paradigm adopted by the researcher.

4.3 RESEARCH PARADIGM

The research paradigm assumed in this study was primarily guided by the research objectives and research questions. Hence, prior to a discussion on the paradigm of choice, it is essential to revisit the research questions governing the research, listed as the following:

RQ1) What is the relationship between the posited antecedents of savings and the household's saving motives?

RQ2) What is the relationship between saving antecedents and motives, and the household`s propensity to save?

RQ3) What is the relationship between the saving antecedents and motives, and the household's portfolio allocation choice?

The above research questions are conceptualized in the following research framework, as previously illustrated in Section 3.1:

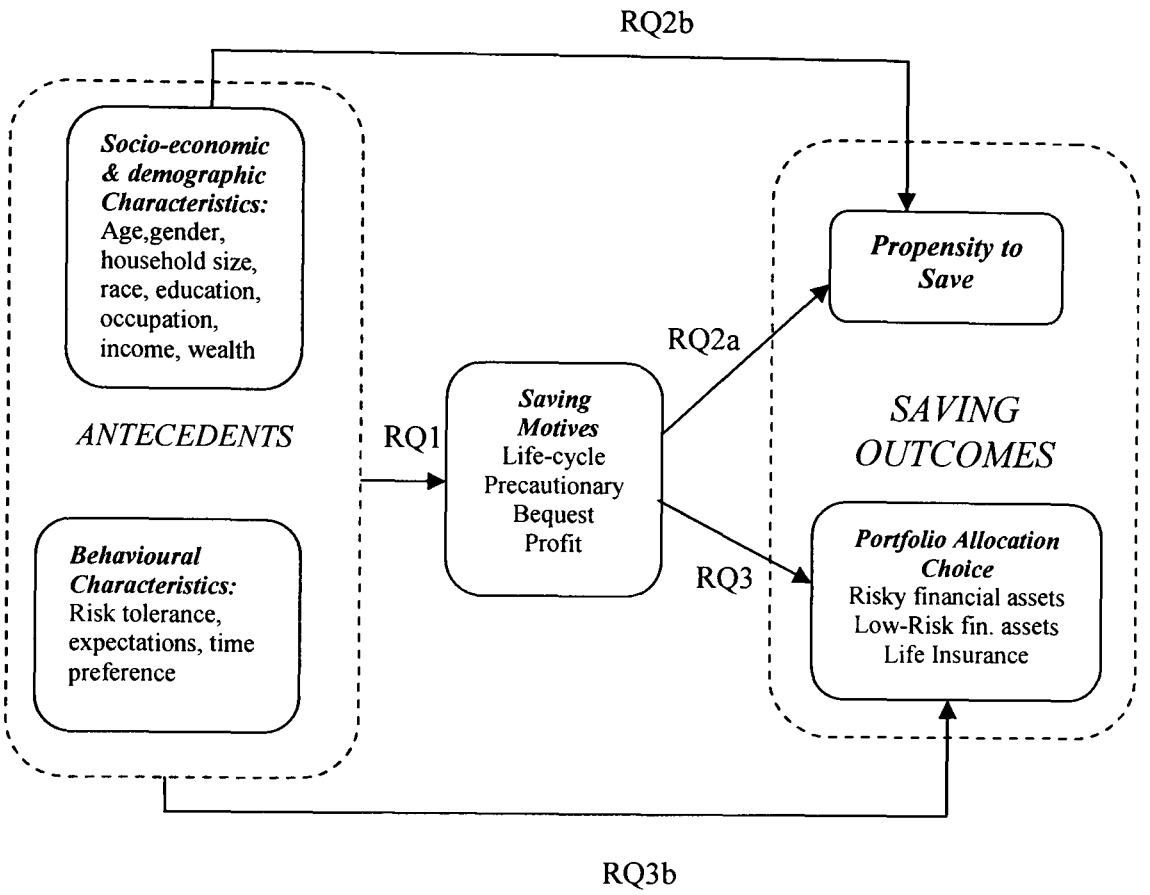


Figure 4.2: Research Framework and variables of interest in the study

The diagram above highlights the main variables of interest in the study. Of primary interest is the relationship between the antecedents of saving, saving motives, saving propensity and portfolio allocation decisions. To examine these relationships, the researcher will adopt the logical empiricist methodology which emphasizes on objective observation and quantitative measurement of social phenomena. The study of saving behaviour, although closely related to interpretation of humanistic nature, fundamentally originates in the study of economics. Although the study will focus on psychological rather than economic variables, the researcher intends to find logical connections between behavioural aspects and

economic activity, which can then be replicated to explain macroeconomic behavior. The importance of such research conduct is reflected in a claim by Wärneryd (1999, p. 342) that "psychologists have devoted little attention and effort toward studying phenomena that are related to saving.... Economists discovered at an early stage that human reactions...were important determinants of economic behavior."

The researcher sees herself fitting best within the positivist school of thought and believes that the phenomenon to be investigated in the study is external thus demanding an independent stance in her observation of the variables. Indeed, it is not peculiar for studies of saving behaviour to follow the patterns prescribed by the science or positivist paradigm. In fact, studies in this area are predominantly of the positivist paradigm (for example, see Canova *et al.*, 2005, Kohli & Kunemund, 2003; Horioka *et al.*, 2001; Brown & Kim, 1993; Headen & Lee, 1974; Burnett & Palmer, 1984; Lim & Haberman, 2004). This is not surprising since most of the questions attempted to be answered involve real-world issues and problems; thus these studies normally rely on microeconomic analysis and econometric techniques, which stem from the classical science paradigm (Dorfman & Tippins, 2006). Hence, in line with these studies, the author is inclined toward adopting a quantitative and statistical method of research and will remain independent and objective in her approach.

The strengths of quantitative research, which has influenced the stance of paradigm, are outlined below (Johnson & Onwuegbuzie, 2004):

i. Results are reliable; an accurate representation of the population is being studied. Therefore, research findings can be generalized when the data are based on random samples of sufficient size.

ii. Ability to test and validate already constructed theories about how a phenomenon occurs.

iii. Research results are independent of the researcher, therefore results are unbiased.

iv. Ability to test hypotheses that are constructed before the data are collected

v. Studies are replicable on other segments of the population.

Having established the research paradigm and the relative strengths of the methodology chosen, the next section will present the thought process that was assumed prior to determining the most appropriate data to be used in the study.

4.4 PRIMARY VERSUS SECONDARY DATA

This study aims to provide deeper understanding on the saving behaviour of households, by investigating saving motives and examining the impact of these motives on saving behaviour. The nature of this research involves probing into sensitive financial information, such as income and net worth, as well as looking into the financial attitudes and habits of households, which is foreseen to pose considerable challenges in terms of data collection. Researchers have found that questions probing into personal finances are amongst the most difficult to answer in households surveys (Sudman & Bradburn, 1974; Hurd, Juster & Smith, 2003). Reluctance on the part of the respondent is likely to be an issue, while another problem involves limited knowledge and accuracy in providing such information. Furthermore, accessing households from all economic strata of the nation, especially those from the higher net worth groups, are of grave concern.

The fundamental criterion in determining the type of data to be used in this study was the ability to meet the research objectives. As such, the sensitive nature of the data was seen as the main challenge possibly faced in data collection. With this in mind, the first issue that had to be considered was the determination between primary and secondary data. While the former option seemed more favourable such that data collection could be specifically tailored to the objectives of the study and that the results would provide insights to a sample of interest and relevance to the researcher,

there were many indications to suggest that the latter option would be a more practical alternative and would suffice in meeting the research objectives. The main indication was that a large extent of the literature on saving behaviour and motives clearly signalled a common methodological approach of using national-level secondary datasets. These include national surveys from the U.S. (e.g. the Panel Study of Income Dynamics, Survey of Consumer Finances, Health and Retirement Study), the UK (e.g. British Household Panel Survey, Family Expenditure Survey), Japan (e.g. Japanese Panel Survey of Consumers), Italy (e.g. Survey of Italian Households' Income and Wealth), Dutch (e.g. CentER Savings Survey) and Germany (e.g. German Aging Survey, German Consumer Expenditure Survey).

Generally, there are both pros and cons for using secondary data. The main disadvantage is that since data are collected by a third party, researchers will need to compromise with inadequacies or incompatibilities of the data to the research objectives. Furthermore, researchers will need to thoroughly study and understand the procedures that were conducted in terms of sampling, data collection and coding of variables, so that appropriate data analysis procedures can be undertaken. On the other hand, the obvious advantages of using these secondary data sources are that these datasets are readily available and accessible to researchers, do not involve monetary costs in terms of data collection, and are of high quality and reliability due to thorough sampling and data collection procedures. As a result of these factors, researchers using these datasets will have the luxury of easy access, convenience, assurance of data quality, minimal costs, and possible acceleration of research time.

Acknowledging the potential problems that might be faced in data collection and in consideration of the pros and cons of using secondary data, the obvious choice of action was to employ secondary data. This decision was further strengthened by methodologies employed by past researchers, where many national-level data sources were viewed capable of providing quality data for empirical analyses. Although still susceptible

to the data collection problems previously mentioned, these government-conducted surveys are perceived to be highly credible as they go through rigorous procedures to ensure robustness of data. Furthermore, most of these surveys have been ongoing for numerous years, and continuous efforts to improve the quality of data are typically undertaken. In view of the above factors, the use of secondary data was deemed to be the most appropriate alternative.

4.5 DATA SOURCE EVALUATION

Once the decision to use secondary data sources was made, the next step involved evaluating the range of data sources in order to establish aptness in achieving the research goals. From reviews of the literature, several datasets were short listed in the process of evaluation, namely the British Household Panel Survey, the English Longitudinal Survey of Aging, the Health and Retirement Survey, and the Survey of Consumer Finances. The former two surveys are based in the UK, while the latter two are based in the U.S. Evaluation of the datasets was generally guided by the suitability of the data to meet the three main research objectives, as described in Chapter 1. Three main aspects of the data that were deemed crucial to fulfill the research objectives were data regarding the various saving motives, saving behaviour and asset holdings. The following subsections provide brief descriptions and comments on each of the surveys that were shortlisted for evaluation.

4.5.1 British Household Panel Survey (BHPS)

The BHPS is an annual survey on 5,000 households (and approximately 10,000 individual respondents) conducted since 1991. The main objective of the BHPS is to study social and economic changes of household in the UK in order to model and predict their effects. The respondents are chosen

using stratified clustered sampling design and are re-interviewed in subsequent waves.

Amongst a vast amount of information, the BHPS contains data on whether respondents save, the reasons they save, and average monthly saving amounts. The survey also asks for the types of savings that the respondents have. However, the survey does not include the amounts that respondents hold in each specific asset types and has very limited data regarding life insurance. In regards to saving motives, the reasons listed appeared to reflect only life-cycle motives. Therefore, it would be difficult to gauge the importance of other saving motives such as bequests or precautionary saving motives. However, the presence of a precautionary saving motive may be measured by using a subjective probability of uncertainty as a proxy for risk (as used by Guariglia, 2001). The main motivation of using the BHPS is that it is UK-based, and would thus contribute toward understanding the behaviour of British savers. However, given the limitations of asset holdings, this dataset does not appear to be suited for the proposed research objectives.

4.5.2 English Longitudinal Study of Ageing (ELSA)

The ELSA is a biannual survey on the people living in England aged 50 and above. The survey covers topics such as health condition, economic situation and quality of life of elderly cohort. The sample consists of about 9,000 households, who are revisited every two years. Compared to other similar surveys, ELSA is fairly new as only three waves have been conducted - Wave 1 (2002-03), Wave 2 (2004-05) and Wave 3 (2006-07).

The ELSA does not specifically elicit reasons for savings. Thus, it would be difficult to directly assess saving motives. However, several questions included in the survey may be able to reveal the presence of a bequest motive and the precautionary saving motive. In terms of saving vehicles, ELSA appears to have more information compared to the BHPS in terms of soliciting information on the amounts in each saving vehicle. However,

similar to the BHPS, it has limited information on life insurance. Nonetheless, later on in the questionnaire respondents are asked several questions in relation to life insurance. These include the ownership of life insurance policies, death benefit and maturity value of the policies (if any).

Evaluation of the data available from this survey resulted in the following conclusion: this dataset would be appropriate if focus was on the bequest saving motive. This is because extensive information on inheritance and relationships with children is sought.

4.5.3 Survey of Consumer Finances (SCF)

The SCF is an American survey conducted every three years collecting information on the financial situation of US households. It is supported by the Federal Reserve Board in cooperation with the Department of Treasury in U.S. The survey uses a sample of approximately 4,500 randomly selected households throughout the country. The SCF includes detailed information on composition of household budget, loans, choice of financial institutions, employment, pensions, assets and liabilities of households.

A review of the SCF data revealed that the information contained in this dataset well fits the objectives of the current study. The survey contains a question that probes into all possible reasons for saving, which enables a holistic evaluation of which saving motive is the most important amongst households. The range of saving motive allows inference on the life-cycle, precautionary, bequests and profit motive. In addition, the survey includes questions that have been used by other researchers as proxies of certain behaviour, such as risk aversion, patience and optimism. The SCF also includes detailed information on the amounts and types of financial assets, including all possible managed funds, bank accounts, life insurance, and equity holding.

Based on evaluation of the SCF data, it appears that this data source suits the objectives of the study for the following reasons. Firstly, it allows

integration of various saving motives. Secondly, it contains detailed information on all possible types of asset holding. Thirdly, the SCF encompasses numerous behavioural factors, a vital component of this study. Fourthly, the dataset also includes a measure on saving, which is an imperative component of the study.

4.5.4 The Health and Retirement Study (HRS)

The HRS is a survey on 22,000 elderly Americans (ageing 50 and above) which started since 1992. It is a biannual national longitudinal study supported by the National Institute on Aging in the US. The objective of the study is to provide information on the elderly cohort's physical and mental health, insurance coverage, financial status, and retirement plans.

The HRS contains extensive information on elderly households, inclusive of questions on psychological aspects such as cognition and expectations. The HRS tops the other datasets for having detailed information on life insurance and health insurance policies. Apart from information on the amounts and types of life insurance owned as well as premiums paid, the survey also obtains information on beneficiaries of the policies, which is not available in the other datasets. However, the survey lacks information on overall saving motives with the exception of bequest motives. This is not surprising since the survey focuses on the elderly population, thus details on inheritance and intergenerational relationships are largely focused on.

4.6 SELECTION OF DATASET

Thorough examination of several potential data sources provided more solid grounds for determining the one that best fits the research objectives. Comparing each of the surveys facilitated the evaluation process by highlighting the merits and shortcomings of each, in terms of compatibility

with the research goals. The main decisive factor was to ensure robustness of the data in providing an empirical basis for contributing toward knowledge, rather than being limited to a certain country of choice. Thus, the option of data sources was broadened to include data sources based in other countries besides the UK.

The BHPS, which was initially thought to be an appropriate data source, was found to be inadequate since it does not contain details on personal life insurance, apart from health insurance. Also, although the survey contains quite detailed information on savings and saving habits, the elicited reasons for saving do not include the various motives but focus only on lifecycle motives. These limitations hampered the early intentions of the research of exploring British saving behaviour. Meanwhile, evaluation of data contained in the ELSA and HRS suggests that both surveys are suitable for examining the bequest motive, since both sample the elderly population and thus contains detailed information on life insurance and bequests. However, this study favours a more holistic view of saving motives, rather than to focus on a particular motive. Fortunately, the SCF contains quite extensive information on all saving motives, by the inclusion of a subjective question probing into the most important reasons for saving. This allows the integration of the various saving motives and examination of their relationships with saving behaviour. Extensive information on various possible asset types is also sought in the survey, perfectly complementing the interests of the study. Based on these factors, the SCF was deemed as the most appropriate data source for this study.

The next consideration was, *which SCF data cycle?* The SCF is conducted every three years, starting from 1983. This means that to date, eight datasets are available. One way of determining this would simply be to choose the most recent survey. The 2007 survey would have been the most current data cycle; however, it was not available for public use at the time the current research commenced. Furthermore, there would be aspects of inconsistency in the data collected considering the turn of events occurring in the economy in 2007. More specifically, the credit crunch crisis which is

believed to have sparked off in August 2007 would have possibly distorted the financial behaviour and attitudes of households in the U.S. whilst data collection was being conducted from May to December of the year.

The next option was the 2004 SCF, which was already available for use and would reflect the most recent circumstances of financial consumer behaviour in the US. Nevertheless, other factors still needed to be considered before firmly deciding on the 2004 data cycle. In comparison to the previous data cycle which is the 2001 SCF, the 2004 cycle appeared to be a more viable option since the former reflects an economy in recession. As reported by the National Bureau of Economic Research (NBER), the US economy began experiencing a recession since March 2001, which was further aggravated after the 9/11 incident. Assessment of the economy by the NBER is based on monthly chronology of several criteria such as employment, production and real income. According to the US Labour Department, in October 2001, the unemployment rate soared at 5.4 percent, with 415,000 job cuts across the nation. Since data collection of the SCF is conducted from May and December in each survey year, the 9/11 episode potentially distorts data collected in the period following September 11th and will misrepresent responses and as well as interpretation of empirical results.

In addition, the 2004 SCF was selected in view of the measures that were undertaken that year to improve quality of data. This was the result of observing deterioration in the standard of data over several past cycles of the survey. According to Kennickell (2006), the key measures that were implemented included improving the quality of interviewer recruitment, training, evaluation and retention. Interviewers were trained to listen actively, probe responses and provide clarifications to respondents whenever required. Several new procedures were also implemented to ensure compliance by interviewers and to monitor the standards of interview to ensure data quality.

In view of the above factors, the 2004 SCF is perceived to be the most appropriate data cycle for the purpose of this study. The survey will be

described in greater detail in the following section. Details regarding sampling, data collection, treatment of missing data, and analytical procedures will be given.

4.7 THE SURVEY OF CONSUMER FINANCES

4.7.1 Overview

The Survey of Consumer Finances (SCF) is an American-based cross-sectional survey which elicits extensive financial and wealth information from approximately 4,500 families in the U.S. The survey has been conducted every three years since 1983 and is sponsored by the U.S. Board of Governors of the Federal Reserve System in cooperation with the Statistics of Income Division (SOI). Data are collected by the National Opinion Research Center (NORC), a social science and survey research organization based at the University of Chicago, between May and December in each survey year.

The SCF focuses on collecting data regarding a wide range of households' financial matters including balance sheet and net worth information such as the types and amounts of assets, liabilities, savings, investments and borrowing; choice of financial institutions; attitudes and expectations about the future economic conditions; employment; and so on. The survey, which has been regarded as a highly reliable source of data on household wealth (Curtin *et al.*, 1989; Juster & Kuester, 1991), has been the basis of numerous studies investigating household savings (e.g. Starr-McCluer, 1996; Kennickell & Lusardi, 2001; Dynan, Skinner, & Zeldes, 2002), portfolio allocation (e.g. Poterba & Samwick, 1996; Scholz, 1994), borrowing and liquidity constraints (e.g. Jappelli, 1990; Cox & Jappelli, 1993), and wealth inequality (e.g Kennickell & Woodburn, 1997).

The following sections will describe issues pertaining to sample design, data collection procedures, treatment of missing data and procedures to uphold data quality of the SCF.

4.7.2 Sample design

The SCF employs a random dual-frame sampling procedure to ensure that its sample more accurately represents the U.S. population. The first frame consists of a standard multi-stage area probability (AP) sample taken from the U.S. Census records to give wide coverage of broadly distributed characteristics of the population. These characteristics include information such as checking account usage, credit card ownership, and mortgages. The initial procedure in the selection of the AP sample is the segregation of the country into geographical zones which are stratified according to urbanization, region and population size, and thereafter units are chosen on the basis of ensuring national representation. Following this, a sample of dwellings is drawn from smaller areas, where the main families of these dwellings are the potential AP respondents for the survey.

For the second frame, a list sample is chosen from a special tax-returns file developed by the Statistics of Income Division (SOI) of the IRS (Kennickell, 1998). The objective of having the list sample is to capture narrowly distributed characteristics of the population, such as ownership of businesses, corporate stocks and other high-valued assets. The list sample cases are given the opportunity to refuse their participation in the survey by returning a postcard before being approached by the SCF interviewer. In the 1995 SCF, more than twenty percent of the list sample chose not to participate. The list sample is selected by computing a proxy for net worth using information on asset income, which is then used to stratify the file. This stratifier is also known as a "wealth index" which is correlated with household wealth. The units that are selected into the sample are chosen at disproportionate rates of net worth groups, resulting in an over-sampling of wealthy households. Individuals listed in Forbes Magazine's list of 400 wealthiest people in the US are deliberately excluded.

Kennickell (1998) highlights several problems associated with the inclusion of wealthy households by way of the list sample. These include potential distortion of the financial variables toward the right hand side of the distribution, making it difficult to differentiate between reporting errors

and actual outliers. Wealthier households are also more likely to conceal certain financial information. The value estimation of more complex assets can also be more difficult. Furthermore, unique characteristics of certain individuals in this wealthy sample make the process of concealing the identity of some of these households more challenging. The final sample for the SCF consisted of 3,007 households from the AP sample and 1,515 households from the list sample.

4.7.3 Data Collection

Data for the SCF are collected by personal interviews or telephone calls when personal visits are not possible. In the 2004 survey, 44.7 percent of interviews were conducted through personal interviews while the remaining was conducted by telephone. Typically, the most financially knowledgeable member of the household is interviewed, and the input from other household members may also be recorded. To ensure more accurate details are given, respondents are encouraged to consult financial records. Approximately 30-40 percent of respondents refer to their financial documents during the interview (Fries, Starr-McCluer & Sunden, 1998).

The unit of analysis in the SCF is the "primary economic unit" (PEU), which is a subset of the household unit. The PEU consists of an economically dominant individual or couple plus all other individuals in the household who are financially interdependent with that individual or couple. Thus, other financially independent individuals within the same household are excluded. However, summary information is collected at the end of the interview for the other household members not part of the PEU.

Aided by computer-assisted personal interview (CAPI), interviewers first collect basic demographic information on all household members, such as age, sex and marital status. Then, data are collected on choice of financial institutions and details of assets and liabilities. Data on assets include those regarding checking, savings, money market, savings bonds, trust accounts, annuities, businesses, residence, real estate and other assets. Meanwhile,

information on liabilities includes credit card, mortgages, automobile loans, education loans, loans against insurance policies, and other liabilities. In addition, particulars regarding employment history, pension, inheritances, insurance, marital history, attitudes and numerous other items are also collected. Separate information on the respondent and spouse/partner is collected for variables concerning employment, pension and demographic variables. Data regarding educational and health status are also sought later in the interview. Due to the depth and intensity of information collected, the completion of one interview generally takes about 80 minutes for regular households and way over two hours for households with more complex financial circumstances (Aizcorbe *et al.*, 2003).

4.7.4 Missing data

Generally, a major challenge faced by all researchers in regards to data collection is the issue of missing data. This is particularly so for surveys such as the SCF which probe into personal financial information at great depths. Missing data can be the result of pure ignorance, inability, or refusal on the part of the respondents to provide the answers to the survey questions. Data recording errors could also be another reason. By standards of other major government surveys the response rate of SCF can be considered low (Aizcorbe *et al.*, 2003). The problem is more prevalent in the list sample of wealthier households, where the response rate is half that of the AP sample. In 1998 and 2001, the response rate for the AP sample was about 70 percent, while the overall response rate for the list sample was about 30 percent. Within the list sample itself, the portion of wealthier households that responded was only about 10 percent. It appears that refusal to participate in the survey is highly correlated with net worth. For the subsections that follow, which elaborate on missing data issues, the main references are Kennickell and McManus (1994), Kennickell (1998) and Montalto and Sung (1996).

To deal with the issue of item non-response, the SCF imputes missing variables using a multiple imputation method (Rubin, 1987) which aims to provide the best possible estimates of the unobservable missing data (Montalto & Sung, 1996). This procedure was implemented starting from the 1989 SCF. Multiple imputations provide information that can be used to assess the extra variability due to the unknown missing values. Using stochastic multivariate procedures, the imputation process replaces each missing value with two or more values to simulate the sampling distribution of the missing values (Montalto & Sung, 1996). The estimation to the true sampling distribution improves as more imputed values are generated. Beginning from the 1989 SCF, five imputations of the dataset are generated.

Specifically for the purpose of treating missing data in the SCF, a special software termed as FRITZ (Federal Reserve Imputation Technique Zeta) was developed, following the suggestions of Rubin (1987). As opposed to imputing a single estimate for each case of missing data, multiple responses are provided for each item to represent a possible range of responses for the particular observation. The consequence of employing this multiple imputation technique is a complete dataset with no missing values, plus, a total dataset which is five times larger than the true sample size. Each respondent will have five different sets of data, each referred to as an "implicate." Although the process of multiple imputations will provide researchers with a complete dataset with no missing values, the process of mastering the method of analysis can be quite a challenge, given that there are five full datasets (Montalto & Yuh, 1998). For the 2004 SCF, the full dataset contains 22,610 observations, five times the actual sample size of 4,522. However, the dataset that is made public contains only 4,519 observations, as three observations with extremely high income and wealth levels (close to the minimum requirement of being listed on the Forbes 400 list of wealthy Americans) are removed from the dataset as privacy protection measures.

Multiple imputation procedures

The FRITZ system is an iterative multiple imputations model based on ideas of Gibbs sampling (Kennickell & McManus, 1994). The system deals with three types of imputation - continuous variables, multinomial variables and binary variables - and treats each variable separately rather than concurrently drawing a vector of variables. In the first iteration, the model first decides whether a particular variable for a given case should be imputed. Should a particular continuous variable need to be imputed, the FRITZ system computes a regression for the case using the variables in a generated maximal set. The key purpose of the first iteration is to construct reliable starting values (Kennickell & McManus, 1994), and as imputations progress through the iteration, the resulting 'complete' dataset is used to estimate the covariance and other statistics needed for the subsequent iteration. In the second iteration, all population moments are computed using the values from the first iteration, and a new version of the dataset is progressively imputed. The process is repeated in the iterations that follow.

For values that were reported within ranges, the FRITZ system adopts a compromise solution. Range responses often contain substantial information on the location of the true value. Values reported by respondents as ranges are initialized at their midpoints, and these values are used as conditioning variables for other imputations until a value within a range is imputed. According to Kennickell (1998), experiments in imputed cases with range reports reveal that the distributions of imputed data with and without accounting for the range constraints do not differ much.

Usually, the distribution of key imputations does not vary much following the first several iterations. Based on past work of SCF imputations, convergence of key statistics appeared to occur quickly; for example, the 1989 cross-section imputations seemed to have converged by the fifth iteration. The iteration process is time and labour intensive, considering that each iteration takes about two weeks of computer time and extensive human effort is required to evaluate the output.

4.7.5 Recommended analytical procedures

Montalto and Yuh (1998) recommend that the most appropriate method of analyzing multiple imputed data is to combine the results obtained independently across the five separate implicates using multiple imputation combining rules. This approach of inference is referred to as repeated-imputation inferences (RII) (Rubin, 1987, 1996). The RII method incorporates the variability due to missing values, or imputation error, in the variance of estimates (Montalto, 1998) and is appropriate whenever inferences made from the data analysis are based on point estimates and variances. To compute descriptive statistics such as means, medians and frequencies, the recommended procedure is to compute the desired statistic separately for each implicate using the sample weight. The average of the estimates for the five implicates is the final point estimate (SCF Codebook, 2004).

The SCF Codebook suggests users of the SCF dataset to be cautious in running complex data analysis such as regressions. This is because the presence of five implicates may lead to inaccurate estimates, as regression packages may consider each of the five implicates as separate cases. Hence, this may lead to overestimation of statistical significance of the results. The SCF Codebook proposes users to regress the average of the dependent and independent values across the five implicates. An alternative method would be to multiply the standard errors of the regressions by the square root of five.

The advantage of RII is that more efficient estimates will be produced since data from all implicates are used, rather than from just one implicate. If only one implicate was used for analysis, the imputed figures would be treated as though they were the true values. Since there will be no missing values, estimates of variance will be small, resulting in overestimation of statistical significance between variables. Montalto and Yuh (1998) remarked that "the combining rules average over the variability between the individual implicates to produce the best estimate of what the results would have been if the missing data had been observed." Another added

benefit of the RII is that they provide a basis for more valid inference since the variability due to missing values (i.e. imputation error) is incorporated into the variance estimates.

In view that the observations in the dataset are in 'repetitions' of five cases due to the multiple imputation treatment, the present study opts to use the *robust cluster standard error* approach. According to Stock & Watson (2007, p.367), *cluster standard errors* "allow the errors to be correlated within a cluster, or grouping, but assume that they are uncorrelated for errors not in the same cluster." Hence, by using this option, the correlation between the five 'repeated' observations is taken into account and thus produces more accurate estimates of standard errors. For the purpose of this study, a new variable called "household" was created to group every five repeated cases in a single cluster. In running the regressions on STATA, the robust cluster standard error option is chosen, by using the *vce* (*cluster household*) which follows after the standard command for the regressions.

4.7.6 Disclosure protection

The multiple imputation technique which treats missing data also serves to protect the confidentiality and identity of the respondents. From financial information provided in the survey, there is always the likelihood of being able to identify a particular respondent. The SCF faces two serious disclosure risks. First, the financial information provided in the SCF is extremely sensitive as it focuses on financial information inclusive of balance sheet information and financial behaviour. Second, the oversampling of wealthy households in certain localities may make them more identifiable. Thus, for the purpose of identity protection, data in the SCF is altered in several ways.

Kennickel (1997) clearly explains the process of "creating an entirely synthetic dataset using techniques of multiple imputation" for the 1992 SCF, as suggested by Rubin (1993). First, within geographic localities,

observations were sorted and aligned by key characteristics, and between localities cases was swapped across other similar observations. Second, unusual categories were combined with similar categories – for example, among owners of miscellaneous vehicles, the categories "boat", "airplane" and "helicopter" were combined. Third, a group of cases with unusual wealth or income was chosen along with a random group of other observations. For these observations, key variables which were originally complete responses were multiply imputed subject to range constraints. In the process, it was made certain that the outcomes would be close to the original values as reported by the respondents. Fourth, other types of unstipulated operations were conducted to generally increase "the perceived uncertainty associated with all variables in every observation; these operations affected both actual data values and the "shadow" variables in the dataset that describe the original state of each variable" (Kennickell, 1997). Finally, all figures for continuous variables were rounded. This makes it impossible to differentiate between the original variables and those that were altered and imputed.

4.7.7 Weighting

The dual-frame sampling method employed in the SCF is meant to provide a more thorough representation of households from all net worth strata of the economy. The area probability sample is a good portrayal of the general population, while the list sample provides representation of wealthy families. However, as a result of this sampling method, the final sample tends to over-portray wealthier households, therefore not truly representing the US population as a whole. In the 2004 SCF, for example, one third of respondents came from the list sample and the remaining from the AP sample. To overcome this problem, researchers are recommended to use the weights provided by the SCF to obtain more meaningful estimates of the American population. The 2004 SCF codebook states that "weights play a critical role in interpreting the survey data. The main dataset contains the final non-response-adjusted sampling weights. These weights

are intended to compensate for unequal probabilities of selection in the original design and for unit non-response (failure to obtain an interview)."

For the purpose of data analysis, the SCF sample design must be converted according to these analysis weights, which stipulate the number of households in the population that are comparable to each household in the SCF sample. According to Kennickell and Woodburn (1997), "the weights for each case correspond to the inverse of its probability of observation, which is usually expressed as the probability of selection multiplied by the probability of response."

4.7.8 Data Quality

In view of the large amount as well as complexity of information gathered from respondents of the SCF, upholding the level of data quality is of paramount importance. However, given the rapid innovations that have taken place in the financial market over the past several years, families are faced with even more complex financial decisions and may find it increasingly difficult to understand the features of their financial instruments. This can potentially be a source of error, as reflected in Athey & Kennickell (2005) who outline several sources of error that can potentially affect data quality:

- Respondents not understanding or not being able to recall their finances
- Respondents misreporting / misclassifying their assets by not viewing their assets and debts in the same way as the researchers
- Interviewers misunderstanding or misreporting responses
- Interviewers not probing into incomplete or inconsistent responses.

In the 2004 SCF, various measures were taken to enhance data quality, which had been noted to be deteriorating over past series of the survey

(Kennickell, 2002). This included more dynamic interviewer recruitment and training, rapid turnaround, data quality feedback and also intensive reviewing and editing of data by the Federal Reserve Board (Athey & Kennickell, 2005).

To minimize possible errors in data recording and to enhance the quality of data collected, the NORC has initiated several changes since the 2004 SCF including improving the quality of interviewers. Interviewers are crucial to the success of data collection and are thus required to undergo sufficient training on general background, questionnaire content, questionnaire administration, persuasion skills and administrative matters (Kennickell, 2006). Interviewers are also trained to use active listening, probing and explanations, and need to abide by specific protocols during the interviewing process.

To ensure compliance by interviewers, several procedures were implemented to monitor the standards of interview data quality and provide feedback to interviewers about their performance. These procedures included computer-generated interviewer-specific reports that were processed right after the data for each case were transmitted to the data collection central office. This involved preparation of a report by the interviewers to briefly describe each interview. The other aspect of improving data quality was editing measures of the SCF data by subject-matter experts. These experts would review each case and score each case. For extremely serious cases, the interviewer would have to re-contact the respondent to obtain missing information, or in some instances to even repeat the whole interview with another more 'appropriate' respondent.

From the above description of the SCF, it is clear that thorough procedures are conducted throughout the entire survey process, beginning from the sampling design, questionnaire design, data collection and data editing. Furthermore, data quality improvement efforts are continuously undertaken throughout the various data cycles. As for data analysis, it is essential for researchers to grasp deep understanding on how to deal with the five implicates that are the result of multiple imputation procedures. In addition,

the use of weights is also crucial in order to portray an accurate representation of the population. These issues are amongst the main considerations for users of the dataset.

4.8 VARIABLES IN THE S.C.F. OF INTEREST TO THE STUDY

4.8.1 Demographic and Behavioural Variables

Figure 4.2 in Section 4.3 illustrated the research framework (as initially set out in Section 1.3) with details of the variables to be employed in the study. The antecedents of saving include demographic factors of the head of the household (age, gender, race, marital status, education level, occupation); household size; income; and behavioural factors (expectations of future economy, interest rates and income; financial planning horizon, and risk tolerance). Table 4.2 below provides details in regards to these variables, which includes the SCF variable names; the specific questions that were asked in the Survey of Consumer Finances; and how these variables were measured for the purpose of this study. As can be noted in the last column of Table 4.2, three of the variables are continuous variables (AGE, EDU and PEU), while the remaining are categorical variables. The variable for income is excluded from this list, and will be discussed separately in Sub-Section 4.8.2.

Table 4.2: List of variables in the SCF relevant to the study and the corresponding questions asked in the survey

Variable Description	SCF Code	Question asked in the survey	Variable Name (current study)
Age of the household head	X8022	How old are you? Code AGE	AGE=X8022 (Continuous variable)
Gender of the household head	X8021	Code sex without asking (unless necessary) 1. MALE 2. FEMALE	MALE= 1 if X8021=1, 0 if otherwise (Dummy variable)
Marital status of the household head	X8023	Are you/Is your [RELATIONSHIP] currently married or living with a partner, separated, divorced, widowed, or (have you/has [he/she]) never been married? NOTE: if R lives with a partner who is financially interdependent, this variable is always coded '2' for the head and partner. 1. MARRIED 2. LIVING WITH PARTNER 3. SEPARATED 4. DIVORCED 5. WIDOWED 6. NEVER MARRIED	COUPLE=1 if X8023=1 or 2; 0 if otherwise PRVMAR=1 IF X8023=3,4,5; 0 if otherwise NVRMAR=1 IF X8023 =6; 0 if otherwise (Dummy variables)
Household size	X7001	Number of people in the primary economic unit.	PEU=X7001 (Continuous variable)
Ethnicity of the household head	X6809	Which of these categories do you feel best describe you: (white, black or African-American,Hispanic or Latino, Asian, American Indian or Alaska Native,Hawaiian Native or other Pacific Islander, or another race?) 1. WHITE; (INCLUDE MIDDLE EASTERN/ARAB WITH WHITE); Caucasian 2. BLACK/AFRICAN-AMERICAN 3. HISPANIC/LATINO 4. ASIAN 5. AMERICAN INDIAN/ALASKA NATIVE 6. NATIVE HAWAIIAN/PACIFIC ISLANDER -7. OTHER	WHITE=1 if X6809=1, 0 if otherwise. BLACK=2 if X6809=2, 0 if otherwise. HISPANIC =3 if X6809=3, 0 if otherwise. OTHER_RACE=4 if X6809=4,5,6 or -7; 0 if otherwise. (Dummy variables)
Education level of the household head	X5901	What is the highest grade of school or year of college you completed? -1. No grades completed 1. 1ST GRADE 2. 2ND GRADE 3. 3RD GRADE 4. 4TH GRADE 5. 5TH GRADE 6. 6TH GRADE 7. 7TH GRADE 8. 8TH GRADE 9. 9TH GRADE 10. 10TH GRADE 11. 11TH GRADE 12. 12TH GRADE 13. 1 YEAR OF COLLEGE 14. 2 YEARS OF COLLEGE 15. 3 YEARS OF COLLEGE 16. 4 YEARS OF COLLEGE 17. GRADUATE SCHOOL	EDU=X5901 (Continuous variable)
Occupational status of household head	X4106	Next are some questions about your current, main job. Do you work for someone else, are you self-employed, or what? IF R SAYS ("I RUN MY OWN/SPOUSE RUNS OWN) BUSINESS", CODE AS SELF-EMPLOYED	OWNBIZ = 1 if X4106=1, 0 if otherwise. EMPLOYED1 if X4106=2 or 3, 0 if

		1. Someone else 2. Self-employed; other closely held business owned by PEU; consultant 3. PARTNERSHIP; law firm; medical/dental partnership; other non-publicly-traded business in which R has an interest -7. Other	otherwise. (Dummy variables)
Expectations of the economy	X301	I'd like to start this interview by asking you about your expectations for the future. Over the next five years, do you expect the U.S. economy as a whole to perform better, worse, or about the same as it has over the past five years? 1. Better 2. Worse 3. About the same	EXPECON=1 if X301=1, 0 if otherwise (Dummy variable)
Expectations of interest	X302	Five years from now, do you think interest rates will be higher, lower, or about the same as today? 1. Higher 2. Lower 3. About the same	EXPINT=1 if X302=1, 0 if otherwise (Dummy variable)
Expectations of income	X7364	Over the next year, do you expect your total family income to go up more than prices, less than prices, or about the same as prices? 1. Up more 2. Up less 3. About the same	EXPINC=1 if X302=1, 0 if otherwise (Dummy variable)
Financial planning horizon	X3008	In planning (your/your family's) saving and spending, which of the time periods listed on this page is most important to you? 1. NEXT FEW MONTHS 2. NEXT YEAR 3. NEXT FEW YEARS 4. NEXT 5-10 YEARS 5. LONGER THAN 10 YEARS	TIME_HORIZON=1 if X3008=1, 2 or 3; 0 if otherwise (Dummy variable)
Risk tolerance level	X3014	Which of the statements on this page comes closest to the amount of financial risk that you and your (husband/wife/partner) are willing to take when you save or make investments? 1. Take substantial financial risks expecting to earn substantial returns 2. Take above average financial risks expecting to earn above average returns 3. Take average financial risks expecting to earn average returns 4. Not willing to take any financial risks	RISKTOL=1 if X3014=1 or 2, 0 if otherwise (Dummy variables)

4.8.2 Income Variable

One of the explanatory variables that will be used in the study in the examination of RQ1, RQ2 and RQ3 is income. The SCF includes very detailed information regarding household earnings, which includes capital and non-capital income. Table 4.3 below lists down the various income data elicited in the SCF, which can be broken down into two components: (i) noncapital income (INCOME) which include labour income (wages and

salary); income from a professional practice, business, partnership or farm; unemployment or worker's compensation; income from child support or alimony; welfare receipts; income from Social Security, pensions, annuities, disability or retirement programs; and other income excluding investment income; and (ii) income derived from investments (INVEST_INC) including interest income; dividends; gains/losses from mutual fund, bonds and stocks investments; and income from rents, trust, royalties. The total annual income of the household is labeled as TOTINC, equivalent to the sum INCOME and INVEST_INC.

Table 4.3: Components of income included in the 2004 SCF

SCF Code	TYPE OF INCOME
	(I) NONCAPITAL INCOME (*INCOME*) = X5702 + X5704 + X5716 + X5718 + X5720 + X5722 + X5724
X5702	Wages and salaries
X5704	Net annual income from a professional practice, business, limited partnership, or farm
X5716	Annual income from unemployment or worker's compensation
X5718	Annual income from child support or alimony
X5720	Annual income from TANF, food stamps, or other forms of welfare or assistance such as SSI
X5722	Net income from Social Security or other pensions, annuities, or other disability or retirement programs
X5724	Other income sources • Settlements; from lawsuits, divorce, insurance • Gambling winnings; prize money • Education scholarships or grants (not including loans); G.I. Bill; "fellowships" • Honorarium • Agricultural support payments; rural housing subsidy • "IRA"; IRA/401(k) withdrawal; withdrawal from • Deferred compensation account and not reported elsewhere as an IRA or pension withdrawal • Inheritance/gifts • Other help/support from relatives • Repayment of debts • Income tax refund • Care of foster child in the home • Housing subsidy/rent paid by a government agency or employer • Trustee fee; executor fee • Director's fee • Misc. other fees (e.g., fee for guaranteeing a loan, jury duty) • Gift or support • Amount of loan forgiven • Sale of asset (coding as capital gain/loss); combined interest and principal on notes/loans) • Alaska Permanent Fund • Payment from former employer • Foreign earned income • Net operating loss carry forward • Referral fee
	(II) INVESTMENT INCOME (*INVEST_INC*) = X5706 + X5708 + X5710 + X5712 + X5714
X5706	Annual income from non-taxable investments such as municipal bonds
X5708	Annual income from other interest
X5710	Annual income from dividends in 2003
X5712	Annual income from net gains or losses from mutual funds or from the sale of stocks, bonds, or real estate
X5714	Annual income from net rent, trusts, or royalties from any other investment or business
	TOTAL INCOME (TOTINC = INCOME + INVEST_INC)

4.9 DESCRIPTIVE STATISTICS

4.9.1 Descriptive statistics of demographic factors

This section provides analyses on descriptive statistics of the independent variables that are used in this study. The descriptive statistics are shown in Table 4.4 and Table 4.5 below. Table 4.4 describes the independent variables that are continuous, including age of the household head, household size and education level of the head of the household.

Table 4.4: Descriptive statistics of demographic factors (continuous variables)

Variable	Obs	Mean	Std. Dev.	Min	Max
AGE	4519	49.54	17.27	18	95
PEU	4519	2.39	1.38	1	10
EDU	4519	13.27	2.93	1	17

As can be noted from the table above, the total number of households in the sample is 4,519. The age of the household head ranges between 18 to 95 years old, with an average of 49.5 years. The minimum household size is one (a single member household), while the maximum size is ten. On average, the household consists of two members. Table 4.4 also shows that the education level of the household head, which ranges between one and seventeen. 'One' indicates that the household head had undergone only one year of school education, while '17' indicates that the household head had attended graduate school. The average education level attended by the household head is 13 years.

Table 4.5 below shows the descriptive statistics for categorical independent variables employed in the current study. These variables are gender, marital status, race, and behavioural factors (risk tolerance, expectations of economy, expectations of interest, expectations of income, and time horizon).

Table 4.5: Descriptive statistics of demographic factors (categorical variables)

Variable	Category	Obs	Percentage
GENDER	MALE	3,543	78.4
	FEMALE	976	21.6
	Total	**4519**	**100**
MARITAL STATUS	COUPLE	2,986	66.08
	PRVMAR	978	21.64
	NVRMAR	555	12.28
	Total	**4519**	**100**
RACE	White	3,521	77.92
	Black	484	10.71
	Hispanic	348	7.7
	Other_RACE	166	3.67
	Total	**4519**	**100**

The first categorical variable shown in Table 4.5 above is gender. More than three quarters of the household heads are male, while the remaining are female. Approximately 66% (two-thirds) of the households are either married or living with partners, more than twenty percent have previously been married, while the remaining twelve percent have never been married. In terms of ethnicity of the household head, close to 80% are Caucasian, about 10 percent of them are African-American, approximately 8 percent are Hispanics, while the remaining 4 percent are of other races.

4.9.2 Descriptive statistics of behavioural factors

The following table (Table 4.6) provides a tabulation of behavioural factors of households interviewed in the 2004 SCF. The behavioural factors that are of interest to this study are risk tolerance, expectations of the economy, expectations of interest rates, expectations of income, and time horizon.

Table 4.6: Descriptive statistics of behavioural factors (categorical variables)

Variable	Category	Obs	Percentage
RISKTOL	Low	3,372	74.62
	High	1,147	25.38
	Total	**4,519**	**100**
EXPECON	Negative	2,392	52.93
	Positive	2,127	47.07
	Total	**4,519**	**100**
EXPINT	Negative	777	17.19
	Positive	3,742	82.81
	Total	**4,519**	**100**
EXPINC	Negative	3,247	71.85
	Positive	1,272	28.15
	Total	**4,519**	**100**
TIME_HORIZON	Less than 5 yrs	2,398	53.06
	5 yrs & above	2,121	46.94
	Total	**4,519**	**100**

From Table 4.6, it can be noted that approximately three-quarters of households are only willing to take average financial risks with expectations of earning average returns, or are not willing to take any financial risks. This indicates that most American households are risk averse and cautious of their investments. In terms of expectations, three variables are of interest to this study. The first is expectations of the economy (EXPECON). Majority of households have low expectations of the economy (53%), while the remaining have positive expectations that the U.S. economy will perform better in the next five years of the survey compared to the previous five years of the survey. The second expectation variable is expectations of interest rates (EXPINT), where more than 80% of respondents have positive expectations that interest rates in the next five years will be higher than current interest rates. The third expectations variable is expectations of income (EXPINC). More than 70% of households expect family income over the following year to rise at higher rates than prices of the current year, while the remaining households expect family income to rise less or at about the same rate as prices. The last behavioural factor relates to the financial planning horizon of the

household. Most households (over 50%) claim that their most important financial planning period is less than five years; while the remaining 47% claim that their most important financial planning period is five years or more.

4.9.3 Descriptive statistics for income

Table 4.7 below shows some descriptive statistics (using the weights) for the income variables in the SCF (INCOME, INVEST_INC and TOTINC). As can be noted from the second column in the table below, the total number of observations is 4,519 households. The mean values for INCOME, INVEST_INC and TOTINC are approximately $59,000, $8,300 and $68,000, respectively. A striking observation from the table below is the extremely wide dispersion of income in the sample. From the last two columns in the table, it can be noted that the minimum value for INCOME is (-$660,000) and the maximum is $75 million. For INVEST_INC the minimum annual losses are (-$955,500), while the maximum income made from investments are $75 million. Finally, for total annual income (TOTINC) which is the sum of INCOME and INVEST_INC, the minimum value is (-$226,000) and the maximum value is $107 million.

Table 4.7: Summary of statistics for income variables

Variable	Obs	Mean	Std. Dev.	Min	Max
INCOME	4519	59292.33	125215.1	-660000	75,000,000
INVEST_INC	4529	8312.355	151935.6	-955500	107,000,000
TOTINC	4519	67604.69	212334.3	-226000	107,000,000

The following table indicates the number of households that reported negative values. A total of 115 households (2.5%) reported negative income, 2241 of households (53.6%) reported negative investment income, while 23 households (0.51%) reported negative values of total income.

Table 4.8: Breakdown of households with positive and non-positive values of income

(n=4519)	INCOME		INVEST_INC		TOTINC	
	Non-positive	Positive	Non-positive	Positive	Non-positive	Positive
Frequency	115	4404	2241	2098	23	4496
Percent	2.54	97.46	53.57	46.43	0.51	99.49

To have a better idea on which variables produce negative values, as well as to see which variables produce extremely high values, Table 4.9 below shows the itemized descriptions for each component of the income variables. As expected, the negative values of the income variables are a result of annual losses of businesses and losses from risky investments.

Table 4.9: Descriptive statistics of individual components of income

Variable	Obs	Mean	Std. Dev.	Min	Max
Salary	4,519	47,567.20	108,683.70	0	75,000,000
Business	4,519	3,796.03	54,427.06	-1,000,000	35,000,000
Municipal bonds	4,519	513.01	13,407.63	0	15,000,000
Interest	4,519	880.49	11,522.89	0	5,400,000
Dividends	4,519	951.21	21,712.94	0	22,100,000
MF/stocks/bonds /real estate	4,519	2,171.94	76,445.44	-1,000,000	31,500,000
Rents/trusts/ royalties	4,519	3,795.71	106,665.00	-1,000,000	102,000,000
Unemployement/ Worker's compensation	4,519	288.57	1,511.57	0	22,000
Child support/alimony	4,519	272.21	2,375.50	0	100,000
Welfare Assistance	4,519	281.56	1,394.24	0	24,000
Social security/ pensions/annuities	4,519	6,700.31	20,864.13	0	9,000,000
Other income	4,519	386.46	9,447.72	-5,500	1,000,000

Table 4.10 below provides more detailed descriptive statistics of the income variables. It shows the percentile breakdowns of income, as well as variance, skewness and kurtosis. The data below show wide distribution of income, which are skewed to the right. As discussed earlier, the SCF oversamples wealthy households; however, this problem is rectified by

using a weight variable included in the SCF which weights each case according to a factor which represents the number of households in the U.S. that are similar to that observation. The information provided below (as well as in the earlier tables of this section) has been weighted and uses only the first implicate of the SCF dataset.

Table 4.10: Detailed summary of income variables

PERCENTILE	INCOME	INVEST_INC	TOTINC
1%	800	-5000	1510
5%	6600	0	7000
10%	9900	0	10480
25%	20000	0	21000
50%	40000	0	42000
75%	71400	190	75000
90%	115400	6000	125000
95%	159000	17000	180000
99%	335000	131650	442000
Variance	1.57E+10	2.31E+10	4.51E+10
Skewness	74.77291	195.5261	100.9344
Kurtosis	22421.18	81847.89	27256.92

From the table, it can be noted that the 25th percentile cut-off points are $20,000 for INCOME, $0 for INVEST_INC, and $21,000 for TOTINC. For the 50th percentile, the cut-off points are $40,000 for INCOME, $0 for INVEST_INC and $42,000 for TOTINC. For the 75th percentile, the cut-off points are $71,400 for INCOME, $190 for INVEST_INC and $75,000. For the 99% percentile of households, the cut-off points are $335,000 for INCOME, $131,650 for INVEST_INC and $442,000 for TOTINC.

Several striking observations can be made out of these statistics. Firstly, they show how highly skewed the data are, as can be noted from the figures of the 99th percentile which are a striking contrast to the maximum values reported in Table 4.7 ($75 million for INCOME and $107 million for INVEST_INC and TOTINC). Secondly, the zero figures for INVEST_INC suggest that for the majority of households, the main (and sole) source of

income is from noncapital income rather than capital income. Thirdly, these data suggest that households do not own any 'investments'.

The following graphs illustrate the distribution of the income variables. Two approaches are taken to deal with the extremely wide distribution of income, as can be observed from Table 4.7. First, the cube root of the income values are taken to preserve the negative values reported (arising from losses from business and investments). The second approach is taking the log of the values; however, the negative values are dropped out since the logarithm of negative values cannot be defined. As will be discussed in the chapters that follow (Chapters Five, Six and Seven), the income variables that will be used in the multivariate analyses are the cube root of total income (CTOTINC – in Chapters Five and Six), and the cube root of income (CINCOME – in Chapter Seven).

Figure 4.3 below is a histogram of the cute root of total income, denoted as CTOTINC. Recall from the earlier discussion that total income includes all total income that the household received in the previous year, including both investment income and labour income. Meanwhile, Figure 4.4 shows the dispersion of the log of total income, denoted as log_TOTINC.

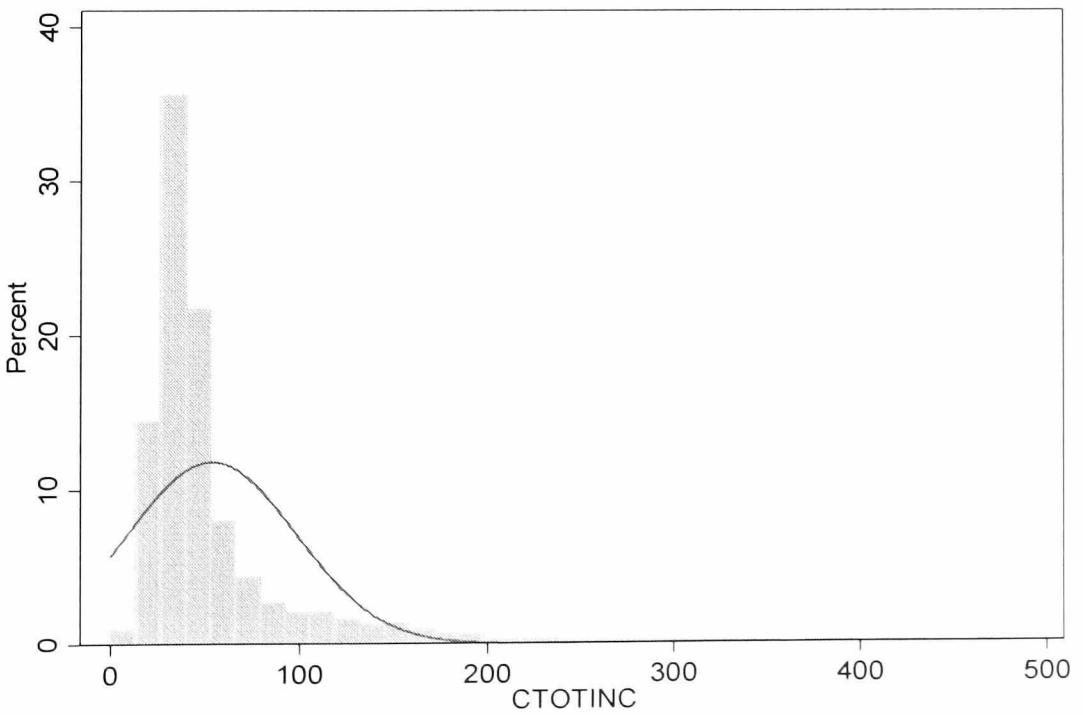


Figure 4.3: Histogram of CTOTINC (Cube root of total income)

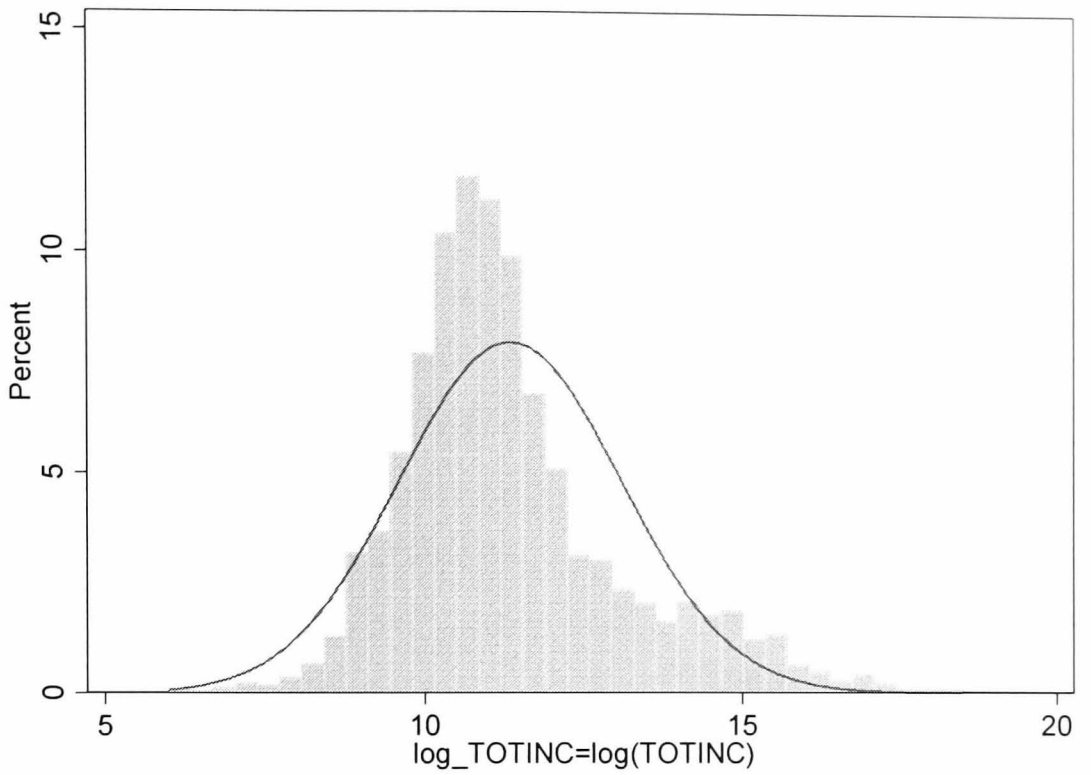


Figure 4.4: HISTOGRAM OF log_TOTINC (log of total income)

Figure 4.5 below illustrates the dispersion of the cube root of the INCOME variable, relabeled as CINCOME. INCOME is derived from total income minus investment income. Meanwhile, Figure 4.6 demonstrates the distribution for log of income, log_INCOME.

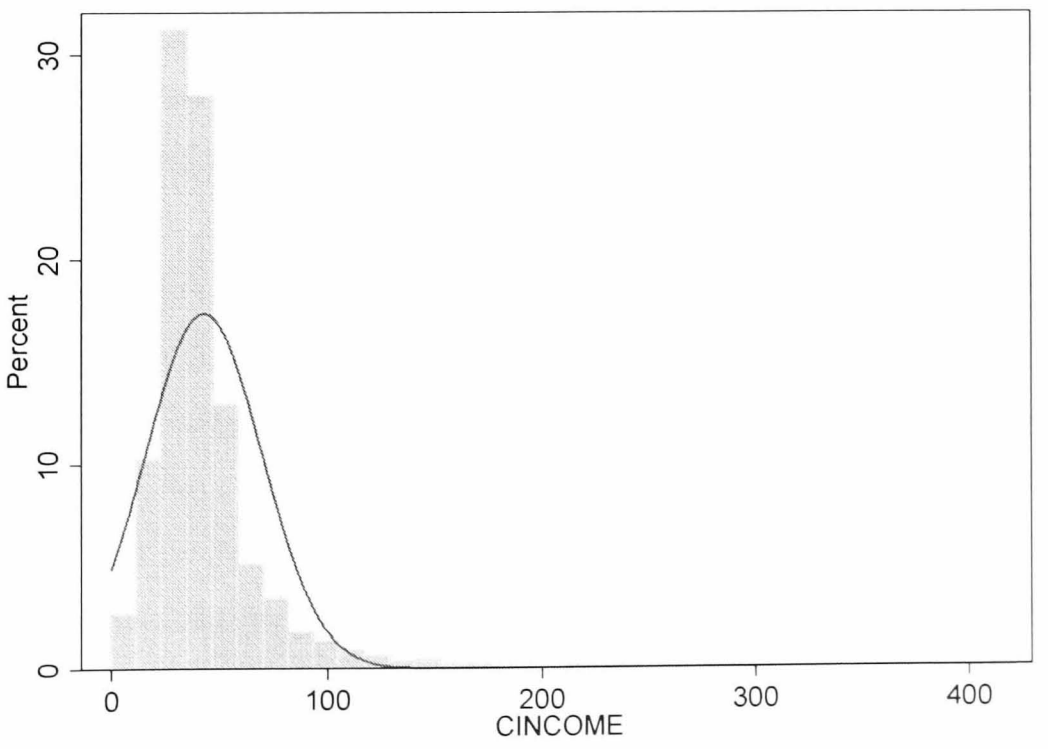


Figure 4.5: Histogram of CINCOME (cube root of INCOME)

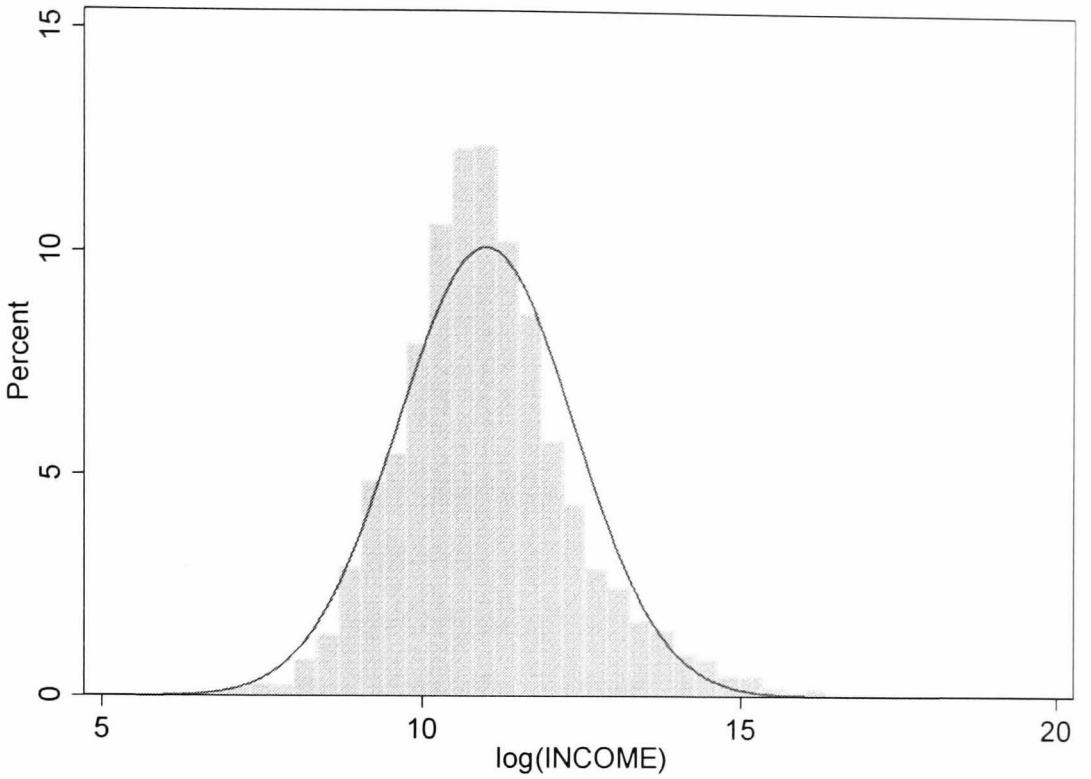


Figure 4.6: Histogram of log_INCOME using Implicate 1

4.10 ANALYTICAL METHODS

As stated in Section 4.2, the objective of the study is to examine three inter-related research questions, revolving around the issue of household saving behaviour. The first research question aims to establish the relationship between the posited antecedents of savings and household's saving motives. As will later be explained in Chapter Five (Sub-section 5.3.1), the dependent variables for RQ1 are dichotomous variables indicating the four saving motive variables (life-cycle, precautionary, bequest and profit motives). This research question will be analyzed using four separate logit regressions on each of the dependent variables. These analyses will be followed by a multinomial logit regression on the four saving motive categories simultaneously, with life-cycle motives as a base category. Further details of these analyses, including the specification model, will be discussed in Section 5.7.

The second research question seeks to determine the relationship between saving antecedents and motives, and the household's propensity to save.

The dependent variable pertaining to this research question is the propensity to save, which will be measured as an ordered categorical variable indicating three levels of household savings – negative savings, zero savings, and positive savings. The analysis that will be conducted is an ordered logit regression on the propensity to save. A more thorough explanation of the measurement and analytical procedures will be discussed in Chapter Six (Section 6.4).

The third research question examines the relationship between saving antecedents and motives, and the portfolio allocation choice. As will be discussed in Chapter Seven (Section 7.7), the portfolio allocation choice will be examined as two decisions. The first entails the decision of asset ownership, and the second decision pertains to the amount of holdings decision. The dependent variables for portfolio allocation are low-risk assets, high risk assets, and life insurance, and will be measured using two methods. The first measurement method for these asset categories are binary dummy variables, indicating positive holdings of assets in each category, or non-positive holdings. The second method that will be used to measure the asset categories is by taking the log values of the total amount holdings in each asset category, conditional on positive holdings in total assets. More details of the analysis procedures and measurement of portfolio allocation will be discussed in Chapter Seven.

Table 4.11 below briefly summarizes the measurement of variables and methods that will be conducted to analyze each research question. As mentioned earlier, more thorough discussion on the methods to be used in analyzing the research questions will be examined in each of the respective empirical chapters (Chapter Five – RQ1; Chapter Six – RQ2; and Chapter Seven – RQ3).

Table 4.11: Brief description of the measurement of dependent variables and analytical methods

Research Question	Dependent Variable	Analytical Method
RQ1 (Chapter Five): What is the relationship between the antecedents of saving and the household's saving motives?	A. Binary dummy variables on the four first-mentioned saving motive categories. i) LC ii) PREC iii) BEQUEST iv) PROFIT B. A dichotomous variable (SVGMOTIVES) indicating the four saving motive categories (LC, PREC, BEQUEST, PROFIT).	A. Four separate logit regressions on the four categories of saving motives. B. Multinomial logit regressions on the four saving motives simultaneously.
RQ2 (Chapter Six): What is the relationship between the antecedents of saving and motives, and the household's propensity to save?	An ordinal variable (SVGPROPENSITY) indicating three levels of saving propensity (negative, zero and positive savings):	Ordered logit regression on the dependent variable (saving propensity).
RQ3 (Chapter Seven): What is the relationship between the antecedents of saving and motives, and the household's propensity to save?	A. Ownership decision on the positive holdings of the three asset categories (dummy variables): i) POSITV_LOWRISK ii) POSITV_RISKY iii) POSITV_INSURANCE B. Holdings amount decision of the three asset categories (continuous variables): i) Log_LOWRISK ii) Log_RISKY iii) Log_INSURANCE	A. Trivariate probit regressions. B. Tobit regressions on each of the three asset categories.

4.11 CONCLUSION

This chapter began by presenting an overview on research philosophies and alternative research paradigms typically undertaken by researchers. It then proceeded by explaining the research paradigm positioned by the researcher, guided by the research objectives. Subsequently, the chapter provided justification for employing secondary data, and evaluated several shortlisted datasets employed by past researchers. Due to compatibility of data to the research objectives and reliability of data, the Survey of

Consumer Finances (SCF) was deemed the best option amongst other comparable national surveys. The SCF is a comprehensive household financial survey based in the U.S., and is backed by the U.S. Federal Reserve Board. Complete data on net worth positions, including detailed information on types and amounts of assets and liabilities, are elicited in the survey. Also included in the survey are questions probing into saving motives, saving habits, financial attitudes, risk tolerance and expectations The 2004 data cycle was viewed to be the most viable option, given that the dataset was the latest available version since the commencement of this study.

The chapter also included thorough description of the SCF in terms of sampling method, data collection procedures, treatment of missing data, recommended analytical procedures, weighting issues and data quality. After discussing the SCF dataset, a description of the explanatory variables of relevance to the study was given, inclusive of some basic analyses of descriptive statistics. Lastly, the chapter briefly explained the analytical methods that would be employed to analyze the research questions of the thesis.

The following chapter presents the first of three empirical chapters of this thesis. In particular, the first research question pertaining to household saving motives will be examined.

Chapter Five

MOTIVES FOR SAVING

5.1 INTRODUCTION

This is the first main chapter of the data analysis section of this thesis. The chapter focuses on the first research question (RQ1), which is to examine the relationship between saving motives and the antecedents of saving. From the review of literature conducted in Chapter Two, there appears to be limited research on the examination of the pre-determining factors that shape households' saving motives. As such, this chapter aims to reveal the characteristics of the household that influence the formation of saving motivations. This investigation is viewed as a preliminary yet imperative segment of this thesis, prior to further investigations on the impact of these motives on saving behaviour (Chapter Six). This chapter provides the first step of a holistic examination of saving behaviour and decisions.

The rest of this chapter will be structured in the following manner. Section 5.2 presents the research issues on saving motives and will identify the gaps in the literature. Section 5.3 will then explain how the dependent and independent variables were measured; and this is followed by a discussion of likely determinants of saving motives and their theoretical justifications (Section 5.4). This will be followed by Section 5.5, which discusses the hypotheses to be tested. Section 5.6 presents a brief analysis of descriptive statistics on saving motives derived from the 2004 SCF dataset. Next, Section 5.7 explains the model specification of multivariate tests, which comprises two parts: logit regressions and a multinomial logit regression. Section 5.8 will then present the results of the analyses. Section 5.9 discusses the results reported in Section 5.8, and finally, Section 5.10 concludes the chapter on saving motives.

5.2 SAVING MOTIVES: RESEARCH ISSUES

The phenomenon of saving and the motives for saving has received much research interest at least since the time of Keynes (1936), who proposed a comprehensive list of saving motives influencing the saving behaviour of households. As discussed in Chapter Two (Section 2.4), Keynes suggested eight saving motives governing households' saving decisions. In specific terms, these are the life-cycle, precautionary, inter-temporal substitution, improvement, independence, enterprise, bequest, and avarice motives. To this list, Browning and Lusardi (1996) added the 'down-payment' motive, which denotes the intention to save to accumulate deposits for asset purchases.

Most studies, have explored saving motives as an explanatory variable of saving rather than a dependent variable (see for example, Fisher & Montalto, 2010; Malroutu & Xiao, 1995; Yuh, Montalto & Yung, 1998; Hogarth & Anguelov, 2003; Rha, Montalto & Sung, 2006). Nevertheless, acknowledgement has to be given to a number of studies that have examined saving motives from the perspective of an outcome variable, such as Devaney *et al.* (2007), Xiao & Noring (1994), and Canova *et al.* (2005). A common feature of these studies is that they have been based on theories in the realm of psychology, particularly, Maslow's Hierarchy of Needs Theory. The justification for using Maslow's theory of needs as a basis for studying motives rests on the idea that households progress to higher levels of needs once the lower levels have been satisfied (Xiao & Noring, 1994). The progression or movement across levels implies a hierarchical structure. Xiao and Noring (1994) analyzed how saving motives differ according to characteristics of the household; however, the study employed only bi-variate (chi-square) tests without controlling the effects of other variables. Canova *et al.* (2005) examined the *links* between saving goals, which revealed that fifteen salient goals functioned hierarchically. Meanwhile, DeVaney *et al.* (2007) studied the *movements* from lower levels to higher levels of the hierarchy.

While previous studies as mentioned above have tended to categorize motives in the form of a hierarchical structure, this chapter conceptualizes saving motives based on traditional theories of saving. The chapter aims to determine the factors that influence these motives, and specifically, to address the first research question: *What is the relationship between the characteristics of a household and the household's saving motives?* The current study postulates that households' saving motives are influenced by observable and unobservable characteristics of the household and that systematic differences exist amongst households and their motives for saving. The literature review revealed one study that conducted a somewhat similar investigation (i.e. Alessie *et al.*, 1999), although only as a side-line analysis, where the importance of precautionary and bequest motives were examined using ordered probit regressions.

For the purpose of this study, the dependent variable under investigation comprises four categories of motives adapted from Keynes (1936). Although the early works of Keynes (1936) suggest eight categories of motives, certain motives (such as the independence and avarice motives) are not included because they are psychologically driven and difficult to interpret in traditional economic models (Browning & Lusardi, 1996). Furthermore, some of the other motives outlined by other researchers are actually part of a broader category, thus they will also not be explicitly used, but instead, included as part of the other main categories. The four categories that will be used in this study are the life-cycle, precautionary, bequest and profit motives (Keynes, 1936; Wärneryd, 1999), which are viewed to be more holistic and encompass other micro-motives examined by other authors.

Household characteristics and behavioural characteristics of the head of the household are hypothesized to have an effect on saving decisions and motives. Household characteristics include socio-demographic attributes such as the age of the household head, marital status, household size, income level, education, race, and gender of the head of the household. Behavioural factors of the head of the household comprise risk tolerance

level, time preference, and expectations. The postulated relationship between the independent variables and dependent variable is conceptualized in Figure 5.1. Variables in the box on the left are the antecedents that are hypothesised to (either positively or negatively) impact the saving motives shown in box on the right, as indicated by arrow RQ1. Specific hypotheses are dealt in Section 5.5.

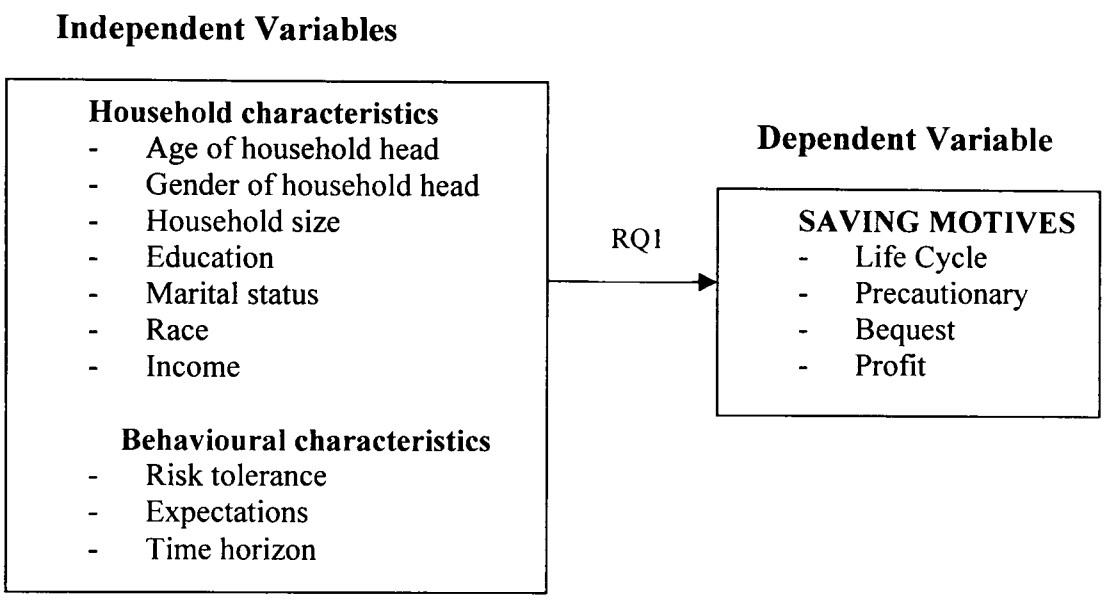


Figure 5.1: Postulated relationship between antecedents and saving motives

5.3 MEASUREMENT OF VARIABLES

This section will first describe how the dependent variable and independent variables were constructed and measured. Sub-section 5.3.1 explains the measurement for the dependent variable and Sub-section 5.3.2 explains how the independent variables were measured.

5.3.1 Dependent Variable: Saving Motives

The objective of this chapter is to investigate how socio-demographic and behavioural characteristics of the household shape their motives to save. One of the main concerns pertaining to the research methodology is the measurement of saving motives, which can be particularly challenging due to the unobservable nature of motives. However, reviews of the literature

on motives, in general, have shed light and substantiated the proposed measurement of saving motives that was conducted in this study.

As discussed in Chapter Two (Section 2.3.1), there are two independent systems governing an individual's motivational operation. These are implicit and explicit (or self-attributed) motives. Implicit motives are acquired sub-consciously through emotional experiences, which are developed from early childhood, while explicit or self-attributed motives are shaped consciously through cognitive processes, reflecting value and goals. In the context of saving behaviour, Wärneryd (1999) stressed that saving motives are more closely related to cognitive learning theory whereby *objectives* or *goals* are of more relevance. From the psychological literature, it has been suggested that explicit or self-attributed motives are usually assessed through self-report questionnaires.

Fortunately, the SCF includes a subjective question that allows respondents to self-report their main objectives for saving. The question in the SCF that elicits this information is worded as follows:

> *Now I'd like to ask you about your attitudes about savings. People have different reasons for saving, even though they may not be saving all the time. What are your most important reasons for saving?*

This question is open-ended whereby the respondents can provide various types of qualitative answers. According to the 2004 SCF codebook, 35 different types of responses were recorded according to the order given by the respondents. After recording the first response to the question, the interviewer would probe for further answers to ensure that respondents reveal all possible saving motives. For the 2004 SCF, up to a maximum of *six* responses were allowed for a single respondent.

Undeniably, there are advantages as well as disadvantages of using open-ended questions in surveys. The disadvantage is that when qualitative responses from open-ended questions are recoded to represent more meaningful quantitative measures, reliability may be lower compared to structured measures (Fyans, 1980). On the other hand, the advantage of

employing these open-ended questions is due to its simplicity in gathering responses, given that respondents can provide answers according to the exact responses in their minds and are not confined to a set of choice answers. Authors from across disciplines have employed such questions to examine human motives. For example, in a study of volunteer motives, Allison, Okun and Dutridge (2002) used an open-ended question to capture 'symbolic' motives. The symbolic approach represents 'accounts' generated to justify actions and focuses on the subjective meanings that individuals attach to behaviour, and are assessed through open-ended questions. Prior studies on volunteer motives have also used open-ended responses, which were later recoded into several categories for the purpose of further analysis (Nathanson & Eggleton, 1993).

From a psychological perspective, it is suggested that explicit or self-attributed motives reflect deliberate choices and conscious behaviour of human beings, and are typically assessed directly using self-report questionnaires. In the context of saving motives, the employment of subjective questions is also not uncommon. For example, Canova *et al.* (2005) elicited saving motives by asking respondents to write down four reasons why they planned to save, and to justify the importance of the motives. This procedure followed the approach used by Bagozzi and Edwards (1998) in the context of body weight regulation.

The SCF question on "the most important saving reasons" has also been employed by other authors as a measurement of household saving motives (e.g. Devaney *et al.*, 2007; Xiao & Noring, 1994; Xiao & Anderson, 1997). These studies re-grouped the total list of saving reasons into fewer categories of motives. For example, Xiao and Anderson (1997) grouped the motives into three categories: (i) survival, (ii) security and (iii) growth needs. Devaney *et al.* (2007) used seven categories: 'no savings', 'physiological or basic needs', 'safety needs', 'need for security in the future', 'love and societal needs', 'esteem and luxury needs', and 'self-actualization'. Fisher and Montalto (2010) used five categories of motives: (i) emergency, (ii) down payment, (iii) life-cycle/retirement, (iv) education

for children/grandchildren, and (v) bequest/for the family; although these motives were used as an independent variable rather than an outcome variable. The ways that these saving motives have been grouped differ according to the objectives and context that these studies were undertaken.

To construct a more meaningful dependent variable for the purpose of this study, the responses obtained from the saving motives question in the SCF were re-coded into four categories of saving motives as outlined in the literature (Keynes, 1936; Wärneryd, 1999). The categories are: *life-cycle* (LC), *precautionary* (PREC), *bequest* (BEQUEST), and *profit* (PROFIT) motives. Following the procedure performed by Devaney *et al.* (2007), the process of classifying the motives into these broader categories was performed by a panel of three behavioural researchers and the resulting categories were later reviewed and concurred by two independent reviewers. The rationale for grouping the motives as such is explained as follows.

The first category of saving motives is the *life-cycle motive*. As described in Chapter Two, life-cycle motives arise due to temporary imbalances between income and expenditure over the lifetime (Modigliani & Brumberg, 1954). Variations in expenditure are a result of events that are likely to take place over a typical lifespan, due to changes and personal developments that occur in life, such as getting married, having children, retiring, and furthering education. Thus, the responses given by SCF respondents that indicate an intention to save for *planned and foreseen* events in the future were included under the *life-cycle motive*.

The second category of saving motives is the *precautionary motive*. The reasons for saving that were grouped under the precautionary motive reflected a desire to prepare for future unexpected life uncertainties that might warrant the use of additional funds. Examples of these adversities are illnesses, accidents, emergencies, or sudden unemployment. According to Kimball (1990), precautionary saving is driven by prudence, thus responses that indicated prudent behaviour were also classified under the *precautionary motive*.

The third category is the bequest motive. *Bequest motives* reflect the desire to leave an inheritance to surviving family members in the event of death of the breadwinner. There may be two reasons for bequest motives; the first reason is to leave a bequest as income replacement (of the breadwinner) to surviving dependants, and the second reason is to inherit funds as a legacy for future generations. As such, responses indicating an intention to leave an estate or inheritance, as well as to cover funeral expenses, were categorized under the *bequest motive*. In addition, saving to make "charitable or religious contributions" in the future was also viewed as a bequest motive to reflect the notion that certain individuals may want to leave a legacy to charitable organizations.

Finally, the fourth category of saving motive is the *profit motive*. The profit motive denotes an intention to save to gain rewards from saving; hence, responses that reflected an intention to save for investment purposes such as to invest in a business, assets, or to gain interest, were grouped under the *profit motive*.

Apart from the above motives, there are also a number of respondents who did not report any saving motives. This is because they claimed not saving or not having the money to save. This group of respondents were categorized as 'others'. Table 5.1 lists the re-categorization of responses of the SCF question on saving motives.

Table 5.1: Categorization of saving motives from the 2004 SCF dataset

	Life-cycle motive (LC)
1.	Child education; education of grandchildren
2.	Own education; spouse/partner's education; education -- not known for
3.	whom
4.	Wedding, Bar Mitzvah, and other ceremonies
5.	To have children / a family
6.	To move
7.	Buying own house
8.	Purchase of cottage or second home for own use
9.	Buy a car, boat or other vehicle
10.	Home improvements / repairs
11.	To travel; take vacations; take other time off
12.	Buy durable household goods, appliances, home furnishing; hobby and recreational items; for other purchases not codable above or not further specified; "buy things when we need/want them"; special occasions
13.	"To enjoy life"
14.	Retirement / old age
15.	To meet contractual commitments (debt repayment / insurance, taxes, etc.), to pay off house
16.	Ordinary living expenses / bills
17.	"For the future"
18.	Like to save
19.	Don't wish to spend more
20.	To give gifts; "Christmas"
21.	Had extra income; saved because had the money left over – no other purpose specified
	"Wealth preservation"; maintain lifestyle
	Precautionary Motive (PREC)
1.	Reserves in case of unemployment
2.	In case of illness; medical/dental expenses
3.	Emergencies; "rainy days"; other unexpected needs; for "security" and independence
4.	Wise/prudent thing to do; good discipline to save; habit
5.	Liquidity; to have cash available / on hand
	Bequest Motive (BEQUEST)
1.	"For the children/family" n.f.s. ; "to help the kids out"; estate
2.	Burial / Funeral expenses
3.	Charitable or religious contributions
	Profit Motive (PROFIT)
1.	Buying (investing in) own business/ farm; equipment for business / farm
2.	Investments reasons (to get interest, to be diversified, to buy other forms of assets)
	Others
1.	Don't /can't save; "have no money"
2.	Other

As mentioned earlier, the SCF allows the respondent to provide up to six answers to the question on saving motives. This study, however, follows the method of Bucks, Kennickell and Moore (2006) by considering only

the first saving motive given by the respondent. By doing this it is assumed that the first response given is the first that comes to mind and hence reflects the *most important* saving motive. Furthermore, most respondents (58%) provided only one response to this question.

The dependent variable in this study is discrete in nature, which thus renders this study to employ a discrete-choice model. A respondent either has a certain saving motive or he/she does not have that motive. Thus the dependent variable takes a value of 1 or 0 on a particular motive depending on whether that motive is present or not. The dependent variables for the purpose of this study are listed as follows:

1. LC (equals one if the life-cycle motive was the first-mentioned saving motive, or zero if otherwise)

2. PREC (equals one if precautionary motive was the first-mentioned saving motive, or zero if otherwise)

3. BEQUEST (equals one if the bequest motive was the first-mentioned saving motives, or zero if otherwise)

4. PROFIT (equals one if the profit motive was the first-mentioned saving motives, or zero if otherwise)

Having explained how the dependent variable (saving motives) was measured, Sub-section 5.3.2 below explains how the independent variables were measured.

5.3.2 Independent variables

Before justifying the predicted relationships in relation to saving motives and household characteristics, this section will briefly explain how the independent variables were measured. For a brief summary on how these variables are worded in the SCF, refer to Table 4.2 in Chapter Four (Sub-section 4.8.1).

***Age**:* This variable represents the age of the household head, and is measured as a continuous variable. The survey simply asks "What is your age?" and records the age of the household head in years. The age variable in this study is labelled as AGE.

***Household size**:* The size of the household is measured as a continuous variable indicating the number of people in the household that are financially dependent on the head of the household. The unit of analysis is referred to as the 'primary economic unit', following the SCF. According to the SCF2004 Codebook, "a spouse/partner who lives there at the time of the interview or who usually lives there is assumed to be financially interrelated with the respondent. Similarly, children under the age of 18 are assumed to be financially dependent on the respondent, even though it is possible that some children of people outside the primary economic unit maybe included by this rule." In this study, the variable measuring household size is labelled as PEU.

Marital status: The SCF asks for the head of the household's marital status by asking "Are you currently married, living with a partner, separated, divorced, widowed, or have you never been married?" For the purpose of this study, marital status is measured as a dummy variable labelled COUPLE, which equals one if the respondent is currently married or living with a partner, and zero if otherwise. The purpose for differentiating between couples and the others are to control for the influence of a spouse or partner in household financial decisions, and to control for the possibility of having dual income-source in the family (household head and spouse/partner).

Gender: The gender variable in this study is a dummy variable that differentiates between male and female household heads. The variable is labelled as MALE, which equals one if the head of the household is male, or zero if the household head is female.

Education: The SCF collects information on the education level of the head of the household by asking "What is the highest grade of school or

year of college you completed?" Responses are coded from 1-17, indicating the number of schooling years completed by the respondent. For example, the lowest level equals 1 if the respondent completed the first grade, 12 equals having finished the 12^{th} grade of school, 16 equals having finished 4 years of college, and 17 refers to having completed graduate school. This variable is labelled as EDU and is measured as a continuous variable.

Race: This study includes race as a regressor to control for differences in culture, values and upbringing. The race variables are dummy variables labelled as WHITE (referring to white Americans), BLACK (referring to African-Americans), HISPANIC (referring to Hispanics), and Other_RACE (referring to all other races that are not captured in the other variables. The variables equal one if the respondent answers positively to that variable, or zero if otherwise.

Income: The household's financial position is measured in terms of the household annual income, which mainly includes labour income, and excludes investment income. This is based on the notion that for the majority of average households, labour income is the main funding of household consumption as opposed to capital income (Campbell, 1980). The income variable that will be used in this chapter is the cube root of total income, CTOTINC. The main reason for taking the cube root of income is to condense the spread of total income without eliminating negative figures (recall from Chapter Four, Sub-section 4.9.3, that the income variable is widely dispersed due to extreme values on the right-hand side of the distribution). The second reason for taking the cube root of income is to deliberately maintain negative figures, since it is acknowledged from the data that a number of households report negative income, due to losses reported from business ownership and losses from risky investments.

Occupational status: The SCF asks about the job of the respondent in the following question: "Do you work for someone else, are you self-employed, or what?" If the respondent answered "work for someone else",

this is labelled as EMPLOYED, if he/she answered "self-employed", this is labelled as OWNBIZ. The remaining category includes non-working individuals comprising students, homemakers, retirees, and unemployed individuals. All these variables are dummy variables that take on a value of 1 (representing a positive response to the variable) or zero (representing a negative response to the variable).

Expectations of the economy: The question in the SCF pertaining to expectations of the economy is worded as the following: "I'd like to start this interview by asking you about your expectations for the future. Over the next five years, do you expect the U.S. economy as a whole to perform better, worse, or about the same as it has over the past five years?" This dummy variable is labelled as EXPECON and coded 1 if the respondent expected the economy to perform better over the next five years, or zero if they expected the economy to perform worse or about the same over the past five years.

Expectations of future interest rates: Another question asks respondents regarding their views on future interest rates: "Five years from now, do you think interest rates will be higher, lower, or about the same as today?" This dummy variable, named EXPINT, is coded 1 if the respondent expects future interest rates to go up more than prices, or zero if the respondent expects future interest rates to be less than or about the same as prices.

Expectations of Income: A third question in the SCF regarding expectations asks about future household income: " Over the next year, do you expect your total family income to go up more than prices, less than prices, or about the same as prices?" Responses indicating positive expectations that total family income will go up more than prices are coded as 1, or zero if the respondent expects income to increase less than prices or about the same as prices. This variable is labelled as EXPINC.

Financial planning horizon: Financial planning horizon is included as an explanatory variable since the length of financial planning periods will likely affect the type of saving motives the households have. The question

pertaining to this variable is worded as such: "In planning your saving and spending, which of the time periods listed on this page is most important to you?" The respondent is required to choose among the following alternatives: (i) Next few months (ii) next year (iii) next few years (iv) next 5-10 years (v) longer than 10 years. For the purpose of this study, this variable is labelled as TIME_HORIZON and is a dummy variable coded as 1 if the respondent answers option (iv) or (v) (reflecting a longer time horizon), or zero if the other options are chosen (reflecting a short time horizon).

Risk tolerance: Another important behavioural factor pertains to risk-taking attitudes of the respondent. The SCF asks respondents: "Which of the statements on this page comes closest to the amount of financial risk that you are willing to take when you save or make investments?" The possible answers are one of the following: (i) take substantial financial risks expecting to earn substantial returns (ii) take above average financial risks expecting to earn above average returns (iii) take average financial risks expecting to earn average returns (iv) not willing to take any financial risks. This variable is denoted as RISKTOL and coded as 1 if the respondent picks options (i) or (ii) (more risk tolerant), or zero if he or she chooses option (iii) or (iv) (less risk tolerant).

5.4 DETERMINANTS OF SAVING MOTIVES

The objective of this section is to provide justification on the predicted relationships between saving motives (the dependent variable) and household characteristics (the independent variable). Recall from Chapter Three (Sub-section 3.3.2) the main hypothesis in regards to the determinants of saving motives:

H_A: Socio-demographic and behavioural characteristics of the household contribute significantly toward the household's saving motives.

In view that there are four saving motives to be explored in this study, the above hypothesis is further broken down into several more sub-hypotheses. In particular, this section is separated into four sub-sections: Sub-section 5.4.1 deals with hypotheses for life-cycle motives, Sub-section 5.4.2 explains the hypotheses for precautionary motives, Sub-section 5.4.3 explains the postulations for bequest motives, and finally, Sub-section 5.4.4 discusses the hypotheses in regards to the profit motive.

5.4.1 Life-cycle Motive (LC)

The life-cycle theory was developed by Modigliani, with Brumberg and Ando in the 1950s, to replace Keynes "fundamental psychological law" of savings (Baranzini, 2005). While Keynes (1936) asserted that the marginal and average propensities to save increase with income, Modigliani and his colleagues argued that the level of savings depended on the *age* of individuals, and hence, implying that demographic structure of society were more important determinants of saving, as opposed to household income (Baranzini, 2005).

Recall from Chapter Two the main propositions of the life-cycle theory: individuals are inclined to smooth out temporary imbalances between income and consumption over the lifetime. These imbalances arise due to variations in expenditure brought about by life-cycle events, or changes in income-earning abilities. During the early stages in life, individuals will need to borrow to be able to fund their desired consumption level. As income increases throughout life, households will keep real levels of consumption constant, hence, save remaining income. Saving will increase with income growth, but during retirement, dissaving will occur.

Age: The main essence of the LCH is that it predicts the pattern for households' life-cycle saving. The main postulation of the theory is that household saving is a function of age. As mentioned earlier, life-cycle savings increase throughout mid-life and eventually decline at old age. Based on the assumption that motives precede behaviour, it is expected that

the probability of having life-cycle saving motives will exhibit a similar relationship with age. Reasonably, young individuals, as opposed to their older counterparts, will have more forthcoming life-cycle events. For example, young individuals just starting out in life may want to start a family, may desire to purchase fixed assets, or pursue further education, and so on, which will necessitate the use of additional funds when these events actually occur. Hence, the motives to save for life-cycle purposes are expected to thrive and increase from the early stages of life, and throughout mid-life. During retirement, however, it is expected that individuals will have accomplished most of what they had desired earlier on in their lives and hence, will have a lower likelihood of having life-cycle motives.

To take into account the non-linear effect of age on the probability of having life-cycle motives, two variables denoting age (AGE and AGE^2) would ideally need to be included in the regression. However, to avoid multi-collinearity problems and to maintain consistency in testing the other saving motives, the analysis for life-cycle motives will first be conducted with only one variable for age included (AGE). Nonetheless, a logit regression including AGE^2 will be run separately to test the non-linear effect of age on life-cycle motives, as predicted by theory

Based on the above arguments, a hump-shaped relationship between age and the probability of having life-cycle motives is predicted.

H_{A1}: Age is related to the probability of having life-cycle motives (non-linear)

Marital status: Marital status of the head of the household is also predicted to have an effect on life-cycle motives. It is posited that individuals who are married or living with their partners are more likely to have life-cycle saving motives. This is because sharing one's life with a significant other will plausibly result in a greater number of life-cycle events throughout life (for example, to plan for children, to purchase a home, to go on vacations, for home improvements, and so on). On a similar

note, prior findings of Xiao and Noring (1994) have found that married individuals, as opposed to those who were not married, were more likely to report saving for 'retirement' (which is a life-cycle motive). In this study, marital status is included as a regressor and will differentiate between couples (either married or living together), and others who have never been married or were previously married (divorced, widowed, separated). Therefore, COUPLE is predicted to be positively related to the probability of having life-cycle motives.

H_{A2}: Marital status (COUPLE) is related to the probability of having life-cycle motives (+)

Household size: Plausibly, size of the household will affect their motives to save. This argument is based on the notion that larger families will have more planned events over the life-cycle relating to each household member. Life-cycle motives are predicted to be positively related to household size, measured as the number of members in the 'primary economic unit' (PEU).

H_{A3}: Household size is related to the probability of having life-cycle motives (+)

Income: One of the major specifications of the LCH is that individuals tend to spread out their life-time resources evenly and to ensure that the marginal utility of consumption is constant over time. In a similar vein, the Permanent Income Hypothesis suggests that households with higher current income save more than those with lower income, in order to compensate for lower income in the future (Friedman, 1957 cited in Leigh & Posso, 2009). Hence, a positive relationship between income and life-cycle motives is hypothesized. The income variable used in this study CTOTINC, which, as explained in Chapter Four (Sub-section 4.9.3), is the cube root of total income. Total income is equivalent to the sum of capital and non-capital income.

H_{A4}: Income (CTOTINC) is related to the probability of having life-cycle motives (+)

Education: Education is included to control for differences resulting from educational background of the household. Based on the view that education is reflective of occupational and financial status of the household, which may result in having more planned events over the life-cycle, education is posited to be positively related to the probability of having life-cycle motives.

H_{A5}: Education (EDU) is related to the probability of having life-cycle motives (+)

Race: Race of the household head is controlled to allow for differences in preferences, culture, upbringing and values. As noted in a study of cross-cultures by Webley *et al.* (2000), differences were noted in the saving motives of three nationalities (Italians, English and Israelis). The variables for race that will be included are BLACK, HISPANIC, and OTHER_RACE. The reference group is WHITE. The question-marks denoted in the parentheses (?) indicate ambiguous or uncertain predicted relationships.

H_{A6}: Race is related to the probability of having life-cycle motives (?)

Gender: Meanwhile, gender is included to control for variations in consumption and saving preferences that may plausibly exist between males and females.

H_{A7}: Gender (MALE) is related to the probability of having life-cycle motives (?)

The next group of independent variables pertaining to the study includes *behavioural characteristics,* which are hypothesized to influence financial decisions of the household. These variables include risk tolerance, time preference, and expectations.

Risk tolerance: As explained in Chapter Two (Sub-section 2.4.2), risk aversion describes the behaviour of individuals who dislike risks. In the context of life-cycle motives, there appears to be no valid presumption that risk tolerance will be significantly related to the probability of having life-

cycle motives. Hence, the relationship between risk tolerance and life-cycle motives is uncertain.

H_{A8}: Risk tolerance is related to the probability of having life-cycle motives (?)

Time horizon: Another behavioural factor that is predicted to influence the probability of having life-cycle motives is the financial planning horizon of the household. As suggested in the life-cycle theory, households wish to smooth out consumption over the life time. Longer financial planning horizons reflect a greater number of life-cycle events that may occur over the life time, similar to the earlier argument that younger households who have longer remaining life-span will more likely have life-cycle motives. Thus, it is hypothesized that the relationship between TIME_HORIZON and the probability of having life-cycle motives is positive.

H_{A9}: Time horizon is related to the probability of having life-cycle motives (+)

Expectations: The last group of behavioural factors that will be included is expectations. Three separate expectation variables will be included - expectations about the future economy (EXPECON), expectations of future interest rates (EXPINT) and expectations of future family income (EXPINC). Since it cannot reasonably be presumed that expectations of future income/economy/interest rates will affect the probability of having life-cycle motives, the predicted relationship is uncertain and is denoted as a question-mark. This is mainly due to the fact that life-cycle events will still be planned for, regardless of expectations of future economic conditions.

H_{A10}: Expectations are related to the probability of having life-cycle motives (?)

5.4.2 Precautionary Motive

Precautionary saving motives are based on the idea that individuals wish to prepare against uncertainties in income, health, or length of life (Kotlikoff,

1988). According to Kimball (1990), prudent individuals are compelled to prepare and forearm themselves in face of uncertainty; hence, have stronger propensities to save for precautionary reasons. It is posited that socio-demographic and behavioural characteristics of the household will have an influence on the propensity of having precautionary motives.

Age: According to the literature, some of the risks that household prepare for are income, health, and mortality risks. Reasonably, age will have an influence over the attitudes and response to these risks. Assuming other factors are equal, it would be reasonable to assume that older individuals are more susceptible to the earlier-mentioned risks, and hence, will be more prudent in their actions. Empirical findings have revealed that older individuals are more likely to have precautionary saving motives (Kennickell & Lusardi, 2001; Kazarosian, 1997; Lusardi, 1998, 2000). As argued earlier, older individuals are generally more vulnerable to health and mortality risks, thus should be more apprehensive about possible future life adversities. Based on these arguments, age is expected to be positively related to the probability of having precautionary motives.

H_{A11}: Age is related to the probability of having precautionary motives (+).

Household size: There is evidence to suggest that larger households are less likely to have precautionary motives. Research on precautionary motives, such as those by Guariglia (2001) and Kazarosian (1997), have found that households with more children (implying that households are larger) tended to save less for precautionary reasons. A likely justification, as noted from the literature, is that future income uncertainty is lower in the presence of children who can provide financial assistance when they grow older. However, the results of these studies arise from derivation of actual savings rather than motives. Another side of the argument is that the presence of children warrants greater need to save for precautionary reasons. Due to the ambiguity of this relationship, the predicted relationship between PEU and the probability of having precautionary motives is uncertain.

H_{A12}: Household size is related to the probability of having precautionary motives (?)

Gender: Gender is included to proxy for differences in tastes, preferences and risk-taking attitude between the two sexes. There is evidence to suggest that females are less risk-preferring than males (Grable, 2000; Possell & Ansic, 1997). Based on the argument that males are more risk tolerant than females, a negative relationship between gender and precautionary motives is predicted.

H_{A13}: Gender (MALE) is related to the probability of having precautionary motives (-)

Education: Based on the assumption that education signifies financial status, it is hypothesized that higher educated individuals will be less affected or concerned about future uncertainties that may occur. It is predicted that education and the probability of having precautionary motives will be negative.

H_{A14}: Education is related to the probability of having precautionary motives (-)

Race: As with the other saving motives, race is included as a regressor to control for differences in behaviour, culture, values and attitude toward risk, among different ethnic groups.

H_{A15}: Race is related to the probability of having precautionary motives (?)

Marital status: Marital status may affect attitudes toward future uncertainties. Respondents who are married or have a partner may feel less vulnerable to future risks, when there is a significant other who may provide financial assistance. Hence, it is likely that a negative relationship will prevail between COUPLE and precautionary motives.

H_{A16}: Marital status (COUPLE) is related to the probability of having precautionary motives (-)

Income: Past research has indicated that poor households have lower precautionary savings as opposed to those with higher income. Hubbard *et al.* (1994) examined the effect of uncertainty of income, medical expenses and length of life on household wealth accumulation. Findings revealed that low income households continued to have low wealth levels even in the presence of uncertainty. These results are counterintuitive and may be due to the fact that lower income individuals do receive social insurance benefits (Hubbard *et al.*, 1994). Nonetheless, these prior studies were based on actual savings and wealth rather than motives. A counter-argument to the above statement is that lower income households should be more concerned about unexpected emergencies as opposed to higher income households because lower income households would be more vulnerable to the effects of an income loss. Due to contradictions revealed from the literature, the predicted sign of relationship between income (CTOTINC) and the probability of having precautionary saving motives is uncertain.

H_{A17}: Income (CTOTINC) is related to the probability of having precautionary motives (?)

Risk tolerance: The precautionary saving theory suggests that households save to prepare for possible risks that may occur in the future. This leads to the plausible assumption that a person's risk attitude significantly impacts their propensity to take precautions in preparation of these risks. The results of a study by Lusardi (1998) found evidence that the more risk averse (thus the less risk tolerant) a person was, the higher their precautionary savings. A negative relationship is therefore expected to prevail between risk tolerance and the probability of having precautionary motives (i.e. higher risk tolerance levels depress the likelihood of having precautionary motives).

H_{A18}: Risk tolerance is related to the probability of having precautionary motives (-)

Time horizon: The relationship between financial planning horizon and precautionary saving motives is expected to be positive. This is because a longer time period entails more uncertainties regarding income, health, or

mortality. Empirically, such positive relationship has been noted in past research (e.g. Lusardi, 1998). Based on this premise, it is therefore expected that planning time horizon will be positively related to the probability of having precautionary motives.

H_{A19}: Time horizon is related to the probability of having precautionary motives (+).

Expectations: Differences in expectations are argued to have a positive influence on the probability of having precautionary saving motives. This is because differences in how individuals foresee future economic conditions are likely to have an impact on the way households respond to uncertainty. All things being equal, households with a positive outlook of the future economy and income conditions would be *less likely* to be prudent, as opposed to households with a pessimistic outlook. This notion is supported by evidence from past research (e.g. Guariglia, 2001; Lusardi, 2000), which have revealed that negative expectations of the future compelled households to save for precautionary reasons. As such, a negative relationship between the expectation variables and PREC is expected.

H_{A20}: Expectations are related to the probability of having precautionary motives. (-)

5.4.3 Bequest Motives

There is evidence to support the view that bequest motives are significant determinants of private saving (Kotlikoff & Summers, 1980; Bernheim, 1991; Kopczuk & Luton, 2004). In view of the literature suggesting that individual characteristics (such as age, education, gender, presence of children and race) have important effects on bequest behaviours, the current study posits that household characteristics are important determinants of the probability of having bequest motives.

Age: As discussed earlier in Chapter Two, the life-cycle hypothesis has received numerous criticisms due to evidence showing that households continue to save even during old age. It has been suggested that these

results could be due to the fact that elderly households save to leave inter-generational transfers to their next-of-kin. In similar vein, results of a study on bequest motives by Menchik & David (1983) revealed that wealth accumulation continued with age, implying the presence of bequest motives amongst households. In addition, the findings suggest that the strength of bequest motives increases with age. This may be explained by the notion that mortality becomes more imminent with age, hence triggering emotions of bequeathing to descendents. Similar results have been found in other studies, indicating that bequest motives are more likely to thrive amongst older individuals (e.g. Alessie *et al.*, 1997; Hurd, 1987; Kennickell & Lusardi, 2001). Based on these factors, age is predicted to be positively related to the probability of having bequest motives.

H_{A21}: Age is related to the probability of having bequest motives. (+)

Marital status: The marital status of the head of the household is included as a regressor to control for the influence of having a significant other (spouse/partner) on the probability of having bequest motives. Holding other factors constant, married individuals or those living with a partner may reasonably be assumed to have greater compulsions to leave behind a bequest, in view of the presence of a significant other that wealth can be transferred to. Based on this conception, couples are predicted to have a higher probability of having bequest motives.

H_{A22}: Marital status (COUPLE) is related to the probability of having bequest motives. (+)

Household size: Reasonably, larger families reflect the presence of more children or family members who are dependent on the head of the household. As discussed in Chapter Two (Sub-section 2.4.3), intentional bequests may arise from the feelings of altruism, or joy of giving, which may be more likely to be present when the welfare of a larger number of family members are to be concerned about. However, there appears to be contradicting evidence regarding the relationship between the number of children (hence, household size) and bequest motives. Some studies have found no significant relationship (Hurd, 1987; Kopczuk & Lupton, 2004)

between the variables, while others found a negative significant relationship (Fink & Redaelli, 2005) and also a positive significant relationship (Laitner & Juster, 1996; Alessie *et al.*, 1999). In view of these inconsistencies, the relationship between household size and bequest motives is uncertain.

H_{A23}: Household size (PEU) is related to the probability of having bequest motives. (?)

Race: Race is included as an independent variable to control for the effect of differences in culture on bequest motives. Prior studies suggest significant differences in bequeathing behaviour amongst different races. For example, Fink and Redaelli (2005) found that whites and Hispanics are more likely to bequeath than African Americans. Based on this evidence, it is hypothesized that race will impact the probability of having bequest motives.

H_{A24}: Race is related to the probability of having bequest motives (?)

Gender: Gender is included as an explanatory variable to control for differences in attitudes toward family relations, feelings of altruism, and parental instincts. It is unclear, *a priori*, whether differences will prevail among the gender groups and bequest motives.

H_{A25}: Gender is related to the probability of having bequest motives (?)

Income: Prior studies have found financial status of the household to be significantly related to the probability of having bequest motives. Fink and Redaelli (2005), for example, found that wealthier households were more certain about leaving sizable bequests. Similarly, Kopczuk and Lupton (2007) found that the self-reported probability of leaving a bequest was significantly related to the level of wealth and income. Laitner and Ohlsson (2001) also suggested that higher parental resources resulted in larger intergenerational transfers. Hence, income and the probability of having bequest motives are predicted to be positively related.

H_{A26}: Income (CTOTINC) is related to the probability of having bequest motives (+)

Education: As with the other saving motives, education is included as a control variable to proxy for differences in preferences of the household. Plausibly, higher educated individuals may have better foresights of the future of their dependants, and it is expected that a positive relationship between education and bequest motives will exist.

H_{A27}: Education is related to the probability of having bequest motives (+)

Time horizon: Arguably, longer financial planning horizons involve planning not only for life-cycle events, but also for the next generation. Therefore, households claiming to have long financial planning periods can be reasonably assumed to have a higher probability of having bequest motives. A positive relationship between time horizon and bequest motives is hypothesized.

H_{A28}: Time horizon is related to the prob. of having bequest motives (+)

Expectations: Future expectations may have an impact on bequest motives. When households have negative expectations that future economic conditions or own family income will be lower in the future, this may lead to a greater compulsion to set aside present income for bequest motives. Therefore, a negative relationship between expectations and bequest motives is predicted.

H_{A29}: Expectations are related to the probability of having bequest motives (-)

Risk tolerance: It is uncertain whether risk aversion will affect bequest motives, as the variable is an indication of risk attitudes, which is more relevant in the context of precautionary and profit motives. Hence, the relationship between risk aversion and bequest motives is ambiguous.

H_{A30}: Risk aversion is related to the prob. of having bequest motives (?)

5.4.4 Profit Motive

The profit motive for saving relates to the desire of realizing a gain from the act of saving. In the desire to attain the 'rewards' from saving, the issue of risk and return is also crucial since this influences the choice of asset allocation. Thus, the determinants of the profit motive can be viewed to be the same factors that influence financial risk-return decisions of an individual. An individual who is willing to accept higher risk for higher potential returns is therefore more likely to save for profit motive, as opposed to individuals not willing to assume risks.

Age: There are several contradicting arguments that can be made of the relationship between profit motives and age. On one hand, younger individuals have a longer time horizon to reap the rewards from saving, and also to recover from potential losses that may occur from investing in assets that give higher return. Furthermore, younger individuals have greater opportunities and capability of earning labour income, as opposed to their older counterparts. This will possibly influence the probability of saving to gain rewards. On the other hand, younger individuals are more likely to be liquidity constrained (Guiso *et al.*, 1996), while older individuals will have better knowledge and experience in investing opportunities (King & Leape, 1987), suggesting that the latter will have a higher probability of saving for profit reasons. There is also evidence suggesting that the probability of owning risky assets has a hump-shaped age profile (Banks & Tanner, 2002; Guiso & Jappelli, 2002), whereby the proportion of households holding risky assets increases throughout life, reaches a maximum, and then declines at retirement. Banks and Tanner (2002, p.231) suggested that, in a cross-section context, the hump-shaped pattern could be an indication that older individuals trade out of risky assets, or, that it could imply a "cohort effect" – meaning that these individuals were never as likely to own risky assets, and hence, did not

have a profit motive. These counter-arguments suggest that age and the probability of having profit motives is thus, *a priori*, uncertain.

H_{A31}: Age is related to the probability of having profit motives (?)

Gender: It has been found that gender is closely related to the risk-taking attitudes of individuals, hence, the profit motive for saving. Grable (2000) and Powell and Ansic (1997) found evidence that females were less risk preferring than males. It can therefore be assumed that females have a lower likelihood of having profit saving motives than males. Therefore, it is postulated that profit motives will be more prevalent among males rather than females.

H_{A32}: Gender (MALE) is related to the probability of having profit motives.(+)

Education: Educational attainment is an indication of a person's knowledge and information-seeking abilities. Having these skills implies that households are able to make decisions regarding the placement of wealth into assets that are able to meet profit motives. Hence, there is sufficient reason to believe that profit motives may be more prevalent amongst individuals with higher education levels. The findings of past research studies support this view (e.g. Halliossos & Bertaut, 1995; Sung & Hanna, 1996). The relationship between EDU and profit motive is predicted to be positive.

H_{A33}: Education (EDU) is related to the probability of having profit motives. (+)

Marital status: There is evidence to suggest that married individuals are less willing to assume risky investments, as opposed to single individuals (Roszkowski, Snelbecker & Leimberg, 1993). This implies a lower tendency to save for profit motives. Hence, a negative relationship between COUPLE and the profit motive is expected to prevail.

H_{A34}: Marital status (COUPLE) is related to the prob. of having profit motives. (-)

Race: As with the other motives, race is included to control for differences in risk attitudes, preferences and values arising from cultural upbringing, which may likely have different impact on the probability of having profit motives.

H_{A35}: Race is related to the probability of having profit motives. (?)

Household size: Size of the household (PEU) is hypothesized to be inversely related to the profit saving motive. The basis for this assumption is that risk-taking behaviour should be less prevalent when family size is larger. However, it can also be argued that the presence of more members in the household result in higher consumption needs, therefore, strengthening the desire to save with the intention of gaining more interest or rewards, in order to generate higher wealth for the family. Thus, the relationship between household size and the probability of having profit motives cannot be predicted with certainty, *a priori*.

H_{A36}: Household size (PEU) is related to the probability of having profit motives. (?)

Income: It may be reasonable to assume that individuals with higher income are better able to cope with possible losses incurred with riskier investments, implying a higher likelihood of having a profit motive for saving. On the other hand, the aspirations of accumulating more wealth (hence, save for profit motives) will be more common amongst poorer households, as these households are more likely to desire to improve their financial positions. Based on these counter-arguments, the relationship between profit motives and income is ambiguous.

H_{A37}: CTOTINC is related to the probability of having profit motives (?)

Risk tolerance: An individual's behavioural characteristics are assumed to be closely linked to saving decisions, including saving for profit motives. Risk tolerance reflects an individual's attitude toward risk and is expected to be an important component of financial decision making. It is expected

that risk tolerance (RISKTOL) will be positively related to the likelihood of having profit motives, since higher risk tolerance levels induce profit-seeking attitudes and reflect stronger willingness to assume more investment risk.

H_{A38}: Risk tolerance is related to the probability of having profit motives. (+)

Time horizon: Meanwhile, financial planning periods (planning horizon) are also crucial in determining whether an individual would have profit motives for saving. Individuals who have longer financial planning periods can be argued to aspire for more gains in their investments, hence, have a higher tendency to save for profit motives. Hence, a positive sign is predicted in the relationship between time horizon and the probability of having profit motive.

H_{A39}: Time horizon is related to the probability of having profit motives. (+)

Expectations: Similar to the above predictions, the expectation variables (EXPECON, EXPINT and EXPINC) are also predicted to be positively related to profit motives, as favourable expectations of the future will likely result in more favourable attitudes toward risk, and therefore, the probability of having profit motives.

H_{A40}: Expectations are related to the probability of having profit motives. (+)

Table 5.2 below summarizes the explanatory variables and the expected signs of relationships with the dependent variables (saving motives).

Table 5.2: Independent variables and predicted signs of relationship with the probabilities of having life-cycle, precautionary, bequest and profit motives

INDEPENDENT VARIABLES		Expected sign of relationship			
Demographic variables		**LC**	**PREC**	**BEQ**	**PROF**
AGE	Age of the respondent in years	nonlinear	+	+	?
MALE	1 if the respondent is male, 0 if female	?	-	?	+
EDU	Years of education attended by respondent (1-17 years)	+	-	+	+
Marital status: COUPLE	(Base group is NVRMAR & PRVMAR) 1 if respondent has a spouse/partner, 0 if otherwise	+	-	+	-
PEU	Number of people in the Primary Economic Unit	+	?	?	?
Race: BLACK HISP OTHER_RACE	(Base is WHITE) 1 if respondent is Black, 0 if otherwise 1 if respondent is Hispanic, 0 if otherwise 1 if respondent is of any other race not mentioned above, 0 if otherwise	?	?	?	?
CTOTINC	Cube root of total income	+	?	+	?
Behavioural Factors		**LC**	**PREC**	**BEQ**	**PROF**
RISKTOL	1 if the respondent is willing to take substantial or above average financial risk, 0 if otherwise	?	-	?	+
EXPECON	1 if expect the economy to be better over next 5 years, 0 otherwise	?	-	-	+
EXPINT	1 if expect interest rates to be same or worse over the next 5 years, 0 if otherwise	?	-	-	+
EXPINC	1 if expect family income to rise more than prices, 0 if otherwise	?	-	-	+
TIME	1 if most important financial planning period is more than 5 years, 0 if less than 5 years	+	+	+	+

5.5 ANALYSES OF DESCRIPTIVE STATISTICS

This section provides a brief analysis of the responses for saving motives that were sought in the 2004 SCF, based purely on descriptive statistics. For the purpose of the analysis for this chapter, the motives here are the *first-mentioned* saving motive reported by the respondent, which is assumed to be the most important saving motive of the household. The breakdown of saving motive percentages as reported by respondents in the survey is depicted in the following histogram (Figure 5.2).

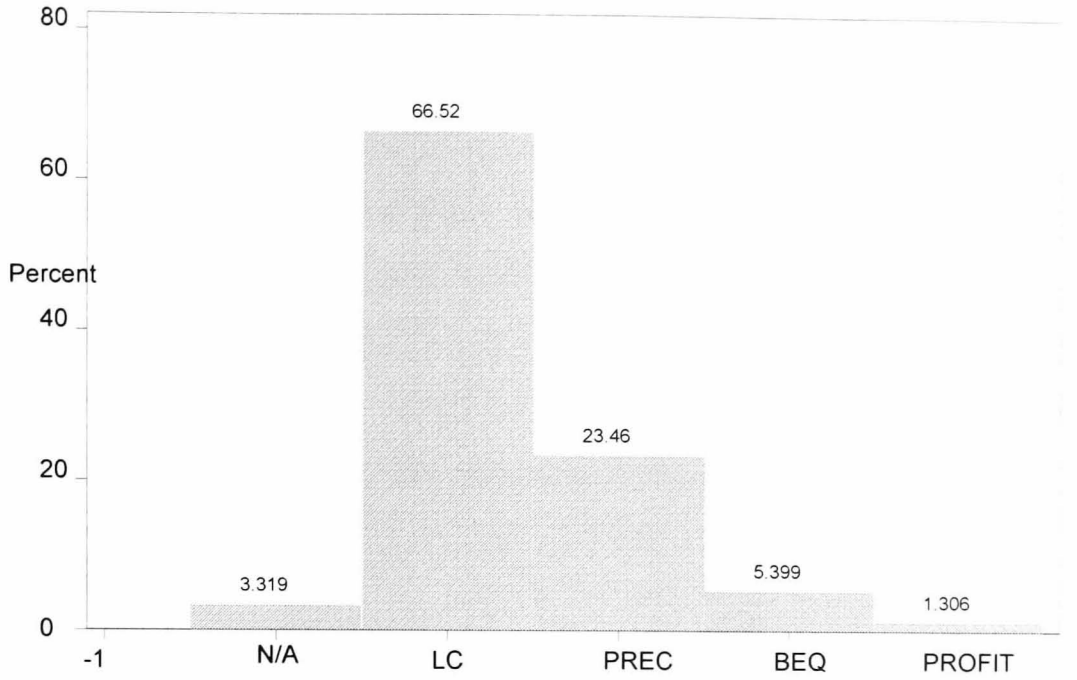


Figure 5.2: Breakdown of first-mentioned saving motive reported by households in the 2004 SCF

The figure above (Fig. 5.2) shows that the majority of first-mentioned motives are *life-cycle* motives, where approximately 67% of respondents provide a response that falls into this category. The second highest percentage is the *precautionary* motive, with 23% of respondents falling into this category. The *bequest* motive comes in as the third most popular motive, with 5.4% of respondents reporting this motive as their most important reason for saving. The least frequently reported saving motive is the *profit* motive, with only 1.3% of respondent providing this motive as their most important saving objective. Finally, the histogram above shows that approximately 3% of respondents do not provide any saving motive, and claim that they "don't/can't save" or "have no money."

The above diagram suggests that most individuals save for life-cycle reasons. Obviously, everyone goes through a "life-cycle", and hence, will experience, or anticipate experiencing, life-cycle events. Thus, it is not surprising that almost 70% of respondents indicated life-cycle motives as their most important saving reason.

5.6 UNIVARIATE ANALYSES

This section presents the results of univariate tests on each saving motive. For independent variables with only two categories (dichotomous), two-sample tests of proportions were performed. For independent variables with three or more categories, one-way analyses of variance (ANOVA) were carried out. In addition to the standard ANOVA test, the Kruskal-Wallis nonparametric test, which relaxes the assumptions of normality of distribution and equality of variance, was also conducted.

5.6.1 Two-sample tests of proportions

The first part of the univariate tests involves using two-sample tests of proportions on independent variables that are binary dummy variables. However, some of the continuous variables (such as EDU and PEU) are recoded into dummy variables for the purpose of these tests. The purpose of conducting two-sample tests of proportions is to compare the proportions of two subgroups having a particular saving motive. The test examines whether the proportions between the two subgroups differ significantly.=The null hypothesis of the two-sample test of proportions stipulates that within each class of saving motives, there is no significant difference between the proportions of subgroups having the motive (H_0: $p_1 = p_2$ against H_a: $p_1 \neq p_2$). For the purpose of these univariate tests, only the first implicate is used[6]. Table 5.3 summarizes the results of the two-sample tests on the proportions.

[6] This is because the 'cluster robust standard error' option is not allowed for these univariate tests.

Table 5.3: Two-sample tests of proportions on the life-cycle, precautionary, bequest and profit motives

(A)		(B)	(C)				(D)				(E)				(F)			
VARIABLE		OBS n= 4519	LIFECYCLE				PRECAUTIONARY				BEQUEST				PROFIT			
			Mean	SE	z	p-value	Mean	SE	z	p-value	Mean	SE	z	p-value	Mean	SE	z	p-value
1	GENDER																	
	Female	976	.6014	.0157			.2756	.0143			.0625	.0077			.0061	.0025		
	Male	3543	.6828	.0078	-4.77	.000	.2233	.0070	3.418	.001	.0517	.0037	1.328	.184	.0150	.0020	-2.15	.032
2	PEU																	
	1-2	2828	.6337	.0091			.2528	.0082			.0583	.0044			.0145	.0022		
	3 & over	1691	.7179	.0109	-5.81	.000	.2040	.0098	3.747	.000	.0467	.0051	1.674	.094	.0106	.0025	1.10	.270
3	EDU																	
	No degree	2334	.6354	.0100			.2442	.0089			.0651	.0051			.0099	.0020		
	Degree	2185	.6970	.0098	-4.39	.000	.2243	.0089	1.582	.114	.0421	.0043	3.422	.001	.0165	.0027	-1.96	.050
4	TIME HORIZON																	
	< 5 years	2398	.6243	.0099			.2631	.0090			.0525	.0046			.0129	.0023		
	> 5years	2121	.7115	.0098	-6.20	.000	.2023	.0087	4.820	.000	.0556	.0050	-.459	.646	.0132	.0025	-.081	.936
5	RISKTOL																	
	Low	3372	.6512	.0082			.2467	.0074			.0513	.0038			.0110	.0018		
	High	1147	.7061	.0134	-3.41	.001	.1988	.0118	3.311	.001	.0619	.0071	-1.37	.170	.0192	.0040	-2.12	.034
6	EXPECON																	
	Negative	2392	.6497	.0098			.2404	.0087			.0581	.0048			.0100	.0020		
	Positive	2127	.6827	.0101	-2.35	.019	.2280	.0091	.979	.328	.0494	.0047	1.298	.194	.0165	.0028	-1.90	.058
7	EXPINT																	
	Negative	777	.6203	.0174			.2561	.0157			.0579	.0084			.0090	.0034		
	Positive	3742	.6745	.0077	-2.91	.004	.2301	.0069	1.558	.119	.0532	.0036	.531	.595	.0139	.0019	-1.09	.275
8	EXPINC																	
	Negative	3247	.6597	.0083			.2436	.0075			.0533	.0039			.0083	.0016		
	Positive	1272	.6792	.0131	-1.25	.210	.2114	.0114	2.293	.022	.0558	.0064	-.340	.734	.0252	.0044	-4.49	.000

As may be observed from Table 5.3 (row 1), there are significant differences in the proportion of men and women having certain saving motives. The proportion of male respondents having the *life-cycle* and *profit motives* is significantly higher as opposed to female respondents. In particular, the proportion of men having the life-cycle motive is 68%, compared to 60% for women (z= -4.77, p=0.000); and the proportion of men respondents with the profit motive is 15% compared to 6% for women (z= -2.15, p= 0.032). On the other hand, women tend to be more likely to have *precautionary motives*, where 28% of women have precautionary motives, as opposed to 22% of men having the motive (z = 3.42, p=0.001). These results suggest that life-cycle and profit motives are more likely to be present amongst male respondents, while precautionary motives are more likely to exist among women. The results also show that the difference in proportions of male and female respondent having the *bequest motive* is not statistically significant.

Results of the univariate tests show significant differences in the proportion of small (1-2 members) and large (3 or more members) households with particular saving motives, as can be observed in row 2 of Table 5.3. The proportion of *large households* having life-cycle motives is 72%, compared to 63% for *smaller households* (z= -5.81, p=0.000). However, the proportion of large households with precautionary motives and profit motives was significantly lower compared to small households. These results appear counter-intuitive, as they seem to suggest that larger households are less worried about uncertainties that may occur in the future, and are also less likely to think about leaving an inheritance to the next of kin.

Row 3 of Table 5.3 shows that there are significant differences in the proportion of respondents who hold a *college degree* and those who do not hold a degree, and their saving motives. Results show that respondents with a college degree, as opposed to those without a degree, are more likely to have life-cycle motives and profit motives, and are less likely to have bequest motives.

There also appears to be significant differences between respondents with short (below five years) and long (five years and above) financial *planning horizons* and their saving motives. This can be noted in row 4 of Table 5.3. The proportion of households indicating a financial planning horizon of more than five years is higher (71%) compared to those with a time horizon of less than five years (62%). This is intuitive as the longer the financial planning horizon, the more life-cycle events the household needs to plan for. Meanwhile, the proportion of households having *precautionary motives* is higher for those with a short time horizon (26%), as opposed to those with a long time horizon (20%). This suggests that households are more worried about uncertainties in the short-term, and are less concerned about income risks and other uncertainties, when time horizon is longer.

Row 5 of Table 5.3 indicates that there are significant differences in the proportion of households with high and low *risk tolerance* levels, and their saving motives. The proportion of households with a *life-cycle motive* is higher amongst those with higher tolerance for risk (71%) compared to those with less risk tolerant (65%). However, the proportion of households with *precautionary motives* is higher for those with low risk tolerance levels (25%), as opposed to those with high levels of risk tolerance (20%). This suggests that respondents, who are more risk averse, are more likely to be concerned about future uncertainties, and hence, have precautionary motives.

As noted from row 6 of Table 5.3, results reveal differences in the proportion of households who display negative and positive *expectations* of the future economy, and their saving motives. The proportion of households with *life-cycle motives* is significantly higher for those who have positive expectations of the future economy (68%), and lower for those with negative expectations of the economy (65%) ($z= -2.35$, $p=0.019$). Similar findings are noted for *profit motives*, whereby the proportion of respondents with positive outlook of the future economy is higher (17%), compared to those with negative outlook of the economy (10%) ($z=1.90$, $p=0.058$).

Results from the above table (row 7) also show significant differences in the proportion of households with *life-cycle motives* who have positive expectations of *interest rates* (67%), as opposed to those with negative expectations of interest rates (62%) (z= -2.91, p=0.004). Results of the other saving motives do not reveal any significant differences between households with different expectations of future rate of returns.

Row 8 of Table 5.3 suggest that the proportion of households with *precautionary* saving motives is higher for respondents with *negative expectations* of future family income (24%) as opposed to those with positive expectations of household income (21%) (z=2.30, p=0.022). Meanwhile, the proportion of respondents with the *profit motives* is higher for respondents with positive expectations of future income (2.5%) compared to those with negative expectations of income (0.8%) (z= -4.49, p=0.000). This result is intuitive, since *precautionary motives* would naturally arise when future income is uncertain.

5.6.2 ANOVA and Kruskal-wallis tests

Table 5.4 below presents the results of univariate tests on independent variables with more than two categories (age, marital, race, income, and employment status groups). ANOVA tests are conducted to test whether differences among three or more groups exist. After conducting ANOVA, a non-parametric test called the Kruskal-Wallis (K-wallis) test was also performed. The K-wallis test is an alternative to the ANOVA, where it relaxes the assumptions of normal distribution and equal variances. The null hypothesis stipulates that the groups are equal, i.e. they come from the same population.

Table 5.4: ANOVA & Kruskal-Wallis Tests

(A)		(B)	(C)				(D)				(E)				(F)			
VARIABLE		OBS	LIFECYCLE				PRECAUTIONARY				BEQUEST				PROFIT			
			Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value
1	AGE																	
	Less than 20	178	.8439	.3777			.1260	.3454			.0000	.0000			.0000	.0000		
	20-34	1082	.6524	.4765			.2464	.4312			.0620	.2413			.0185	.1348		
	35-49	1562	.7138	.4521			.2211	.4151			.0344	.1823			.0036	.0599		
	50-64	1461	.7162	.4510			.2055	.4042			.0305	.1719			.0058	.0759		
	65 & over	879	.4777	.4998	168.94	.0001	.3532	.4782	61.221	.0001	.0913	.2881	52.317	.0001	.0031	.0558	5.046	.2826
2	MARITAL																	
	COUPLE	2986	.6985	.4589			.2143	.4104			.0488	.2156			.0133	.1149		
	PRVMAR	978	.5531	.4974			.2893	.4537			.0858	.2803			.0102	.1006		
	NVRMAR	555	.6828	.4657	70.829	.0001	2468	.4315	23.627	.0001	.0252	.1569	29.987	.0001	.0162	.1264	1.062	.5879
3	RACE																	
	Other	166	.7240	.4483			.1952	.3976			.0141	.1183			.0098	.0986		
	White	3521	.6674	.4712			.2461	.4308			.0459	.2093			.0044	.0659		
	Black	484	.5767	.4946			.2985	.4581			.0535	.2253			.0153	.1229		
	Hispanic	348	.6078	.4890	15.484	.0014	.2335	.4237	8.205	.0420	.1061	.3085	19.521	.0002	.0178	.1326	1.654	.6473
4	WORK																	
	Employed	2307	.7008	.4580			.2293	.4205			.0400	.1960			.0079	.0885		
	Self-employed	1171	.7360	.4410			.2067	.4051			.0268	.1615			.0062	.0787		
	Other	1041	.5109	.5001	108.20	.0001	.3133	.4641	34.246	.0001	.0858	.2803	24.114	.0001	.0065	.0802	19.364	
5	INCOME ($)																	
	<10,000	315	.5058	.5008			.2863	.4528			.0784	.2692			.0167	.1283		
	10k – 24999	666	.5490	.4980			.2970	.4573			.0810	.2730			.0103	.1008		
	25k – 49999	977	.6220	.4851			.2780	.4483			.0483	.2145			.0099	.0991		
	50k – 99999	952	.7210	.4487			.2204	.4147			.0413	.1993			.0010	.0320		
	100k -199999	572	.8069	.3951			.1708	.3767			.0174	.1307			.0030	.0549		
	200k-499999	366	.8056	.3963			.1697	.3758			.0206	.1423			.0029	.0535		
	500k-999999	168	.8613	.3467			.0968	.2966			.0188	.1361			.0209	.1433		
	1000k & over	503	.6704	.4705	158.76	.0001	.2131	.4099	48.07	.0001	.0888	.2848	63.53	.0001	.0106	.1023	48.40	0.0001

The mean and standard deviation are derived from ANOVA tests while the chi-square and p-values are from Kruskal-Wallis tests (assuming there are ties / identical values).

Table 5.4 (Row 1) indicates that there are significant differences between *age groups* having particular saving motives. Generally, the results suggest that the proportion of households with the *life-cycle motive* (column C of Table 5.4) is higher amongst younger respondents, as opposed to older respondents (χ^2=168.94, p=0.0001). The proportion of respondents with *precautionary motives* appear to be higher amongst the older age group, as opposed to the younger ones (χ^2=61.22, p=0.0001). *Bequest motives* also seem to be higher amongst older respondents, as opposed to other households in other age categories. The result also indicates that there are no statistical differences between the various age groups with *profit motives*.

As can be observed in Row 2 of Table 5.4, results of the K-wallis tests indicate that there are significant differences among *marital groups* having the *life-cycle* (χ^2=70.83, p=0.0001), *precautionary* (χ^2=23.63, p=0.0001), and *bequest* (χ^2=29.99, p=0.0001) motives. However, the results suggest that there are no substantial grounds to conclude that differences exist amongst marital groups having *profit motives* (χ^2=1.06, p=0.59). These results imply that marital status is an important predictor of the probability of having precautionary, bequest and profit motives, *but not* the life-cycle motive

Row 3 of Table 5.4 reveals differences in the proportion of households of different *ethnic groups* and the various saving motives. Differences amongst race groups are noted in those having the LC (χ^2=15.48, p=0.00), PREC (χ^2=8.21, p=0.04) and BEQUEST (χ^2=19.53, p=0.00) motives. However, there is insufficient evidence to conclude that there are differences between the race groups having profit motives (χ^2=1.65, p=0.65).

In terms of *work status*, results of the ANOVA and K-wallis test suggest that there are significant differences between subgroups of occupational status and saving motives. This can be observed in Row 4 of Table 5.4. Results imply that employed and self-employed respondents are more likely to have *life-cycle motives* (χ^2=108.20, p=0.0001), while those in the 'other' employment

group are more likely to have *precautionary* (χ^2=34.25, p=0.0001) and *bequest* motives (χ^2=24.11, p=0.0001). Possibly, this is because those in the other employment category consist of unemployed and retired individuals, hence resulting in stronger *precautionary* and *bequeathing* intentions. Meanwhile, results also reveal significant differences amongst households with *profit motives*, according to the different groups of employment categories (χ^2=19.36, p=0.0001). Respondents who are *employed* are more likely to have profit motives, compared to self-employed and those from the 'other' employment category.

As can be noted from Row 5 of Table 5.4, results show significant differences amongst *income* groups for *all* the saving motives. *Life-cycle motives* generally appear to be more prevalent amongst higher income households, while *precautionary motives* appear to be present amongst households of the lower income ($100,000 and below), and also the highest income group ($1 million and over). While the former results are intuitive such that lower income groups should be more concerned about future uncertainties, the fact that high income households display precautionary behaviour suggest that these households face greater income risk (plausibly due to more volatile income associated with high business earnings or performance related job compensations), and will have intentions to save to protect against the uncertainties in income.

In summary, the results of the univariate tests provide some indication regarding the impact of household characteristics on their saving motives, without controlling for the effect of other variables in the model. *Life-cycle motives* appear to be more prevalent amongst younger individuals, those with college education, have financial planning horizons of five years and more, and are more risk tolerance. Furthermore, households with life-cycle motives are typically whites, have higher income, and are either employed or self-employed. *Precautionary motives* seem to be common amongst households

with one or two members, with shorter financial planning horizons, those not in employment, and households headed by women. Households with precautionary motives are also those of lower income, and also those who expect future income to increase at a lower rate compared to rise in prices. *Bequest motives* appear to be present amongst households of lower education (those without college education), smaller household size, and Hispanic households. In addition, households who are either in the lowest income groups, or those in the highest income group, seem to be more likely to have bequest motives. *Profit motives* are more common amongst male-headed households, those with higher education, those who are more risk tolerant, and those who are employed. Households that have positive expectations regarding the future economy, and future income, are also more likely to have profit motives.

Although the univariate tests provide a general idea on which saving motives are more common amongst households of various characteristics, these analyses do not control for the effects of other variables. Hence, the univariate tests need to be followed by multivariate analyses that allow for the examination of various explanatory variables simultaneously, while holding the other variables in the model constant. Multivariate analysis will be dealt with in Sections 5.7 and 5.8.

5.7 MODEL SPECIFICATION OF MULTIVARIATE ANALYSES

This section will explain the specification model for the multivariate analysis on saving motives. It is posited that saving motives are determined by socio-demographic factors as well as behavioural characteristics of the household. Given that the dependent variables (saving motives) are categorical, a discrete-choice model is appropriate for the analyses. Two types of analyses were undertaken: (i) separate logit regressions on the four saving motives, and (ii) a multinomial logit model that examines the dependent variables

simultaneously, although in reference to a base category. The first part of the analysis will be discussed in Sub-section 5.7.1, while the second part of the analysis will be discussed in Sub-section 5.7.2.

5.7.1 Logit Regressions

The first part of the multivariate analyses comprised four binary logit regressions on the different saving motives. A logit model seeks to establish the relationship between the probability of an event happening (in this case, the probability of a respondent having a particular saving motive) and the probability of it not happening (not having the particular saving motive). This is analogous to the *odds* of an event happening, which the logit model measures as *log odds*. The logit model is expressed as:

$$ln\,[Pr_j / (1 - Pr_j)] = \alpha + \beta_1 \boldsymbol{X}_{ij} + \beta_2 \boldsymbol{Z}_{ij} + \varepsilon_i$$

where the dependent variable is the log of odds of choosing saving motive *j*, $\boldsymbol{X}_{ij}$ is a vector of variables pertaining to socio-economic and demographic characteristics of the household (AGE, MALE, EDU, PEU, COUPLE, BLACK, HISPANIC, OTHER_RACE and CTOTINC), $\boldsymbol{Z}_{ij}$ refers to a vector of variables in regards to behavioural characteristics of the household (EXPECON, EXPINT, EXPINC, RISKTOL and TIME_HORIZON), and ε_i is the error term. The parameters to be determined are denoted by the term $\boldsymbol{\beta}$.

In running the analyses, two issues are treated with caution. The *first* is the issue of 'multiple imputation' that the SCF uses to treat missing data. Recall from Chapter Four (Sub-section 4.7.4) the treatment of missing data using the 'multiple imputation' method (Rubin, 1987), whereby missing values are imputed using stochastic multivariate procedures. As a result of multiple imputation, five different datasets or implicates are generated. As discussed in the methodology chapter (Sub-section 4.7.6), to deal with the issue of having five multiple implicates, a 'cluster robust standard error' option in STATA is used to acknowledge the fact that a single observation is repeated five times as a result of the imputation process. The *second* issue that needs to be treated

with caution is the issue of over-sampling of wealthy households in the SCF. To deal with the un-representativeness of the sample, weights are used to ensure that the sample is representative of the U.S. population.

5.7.2 Multinomial Logit Regression

The second procedure that was conducted to analyze saving motives was a multinomial regression on all the four saving motives simultaneously. In deciding the most appropriate model, two main alternative methods of analysis were considered - the multinomial probit (MNP) and multinomial logit (MNL) models. The former, which was first formulated by Hausman and Wise (1978), was *initially* viewed more favourable as opposed to the latter due to the relaxation of the "independence of irrelevant alternatives" (IIA) property (McFadden, 1973) in the MNP model. In MNL models, the choice alternatives are required to be independent and uncorrelated with one another, but in MNP models, this requirement is relaxed. In the context of this study, the categories of saving motives may be perceived as interdependent since a person with a particular saving motive at a particular point in time could in fact have an intention to save for another reason. This view has been supported by Wärneryd (1999) and Browning and Lusardi (1995) who have stressed that saving motives are complementary and are not independent of each other. In fact, the SCF interview allowed the respondents to provide more than one saving motive, although for the purpose of the current analysis, only the first-mentioned motive is considered.

However, although the above reasoning may render the MNP to be more capable of handling the dichotomous dependent variable, applications of the MNP have been restricted and less popular amongst empiricists (Keane, 1994; Chintagunta, 1992; McCulloch & Rossi, 1992). This is due to the complexities related to the maximum likelihood estimation, which involves lengthy computational time. Long and Freese (2006, p.275) assert that although the

MNP model is typically used when alternatives are correlated, the MNP command using STATA (*mprobit*) actually assumes that the errors are uncorrelated. In addition, they claim that the MNP takes more than twice as long to produce results, and are not convinced that the use of the MNP is any more advantageous than the MNL considering that the results of the two models are almost equal (or quite similar). To validate this claim, an MNP on saving motives was first carried out and as predicted, the iteration of the maximum likelihood estimation was extremely slow to converge.

Another advantage of using logit over probit is due to the more convenient interpretation of the coefficients. Logit is interpreted using *log odds*, which can be converted to *odds* by taking the exponential of the log odds. However, probit is interpreted by using the standard deviation of the coefficients. The preference for logit over probit is supported by Long and Freese (2005, p.160):

> For predictions, there is little reason to prefer either logit or probit. If your substantive findings turn on whether you used logit or probit, we would not place much confidence in either result. In our own research, we tend to use logit, primarily because of the availability of interpretation in terms of odds and odds ratio.

In view of the aforesaid arguments, the MNL model was deemed appropriate in handling the multivariate analysis of saving motives[7].

In a multinomial logistic regression, one category of the dependent variable is selected as the comparison, or base, category, which is usually the group that receives the majority of responses. For a DV with m categories, a computation of $m-1$ equations is required for each of the categories relative to the base group. In the context of this study, LC is by default the base category since the majority of responses is the *life-cycle motive*. Three equations are therefore

[7] For comparison, a MNP model was also run, and results were almost equivalent to those of the MNL.

required for PREC, BEQUEST and PROFIT, in reference to LC as the base motive. The MNL model can be specified as:

$$ln\,(Pr_j/Pr_1) = \alpha + \boldsymbol{\beta}_i \boldsymbol{X}_{ij} + \boldsymbol{\beta}_2 \boldsymbol{Z}_{ij} + \varepsilon_i$$

where the dependent variable is the log of odds of choosing saving motive j over saving motive 1 (the base group), $\boldsymbol{X}_{ij}$ is a vector of characteristics assumed to influence the dependent variable for the ith household, $\boldsymbol{\beta}_i$ refers to the coefficients to be estimated, and ε_i is the error term.

In running the MNL, respondents who were classified under the "others" category were excluded since the saving motives for this group of respondents could not be defined in their answers (their responses indicated that they did not or could not save, or had no money). This eliminates approximately 3.3% of the sample resulting in a sample size of 4,363. The MNL was then run using sampling weights and the 'clustered robust standard error' option.

5.8 RESULTS OF MULTIVARIATE ANALYSES

5.8.1 Determinants of Saving Motives

This section reports the findings from the logit regressions on the four 'first-mentioned' saving motives (LC, PREC, BEQUEST, and PROFIT). Each of these dependent variables takes on the value of one if the respondent answered that this was his or her most important saving motive, or zero if otherwise. Results of the logit regressions are presented in four parts (Parts 1–4 below), according to the four saving motives. The coefficients indicated in the tables have been converted into the form of *odds ratio*, to allow for simplicity in interpretation.

The main hypothesis tested in this chapter is stated as follows:

H_A: Socio-demographic and behavioural characteristics of the household contribute significantly toward the household's saving motives.

i) Life-Cycle Motive

This section (part) presents the results of the logit regression on life-cycle motives as the most important saving motive indicated by respondents. The results are shown in Table 5.5 and Table 5.6 below, and will be analysed in relation to each of the hypotheses stated earlier in Section 5.5. Table 5.5 provides the main findings, while Table 5.6 shows the results pertaining to the additional age variable (AGE^2) to test the non-linear effect of life-cycle motives.

Table 5.5: Logit Regression on the Life-cycle Motive

LC	Coef.	Odds Ratio	Robust SE	z	P>|z|
AGE	-0.0129	0.9872	0.0026	-4.94	0.000
MALE	-0.1884	0.8283	0.1208	-1.56	0.119
EDU	0.0481	1.0493	0.0157	3.06	0.002
PEU	0.0181	1.0183	0.0363	0.50	0.618
COUPLE	0.3169	1.3729	0.1292	2.45	0.014
BLACK	-0.1780	0.8369	0.1163	-1.53	0.126
HISPANIC	-0.0698	0.9326	0.1383	-0.50	0.614
Other_RACE	0.1366	1.1464	0.2106	0.65	0.517
RISKTOL	0.1326	1.1428	0.1064	1.25	0.213
EXPECON	-0.0196	0.9806	0.0797	-0.25	0.805
EXPINT	0.0931	1.0976	0.0940	0.99	0.322
EXPINC	0.1413	1.1518	0.0974	1.45	0.147
TIME_HORIZON	0.3332	1.3954	0.0843	3.95	0.000
CTOTINC	0.0192	1.0194	0.0041	4.74	0.000
No. of obs = 22550; Wald Chi2 (15) = 195.79; Prob > chi2 = 0.0000; Pseudo R2 = 0.0552 (Std error adjusted for 4510 clusters in household)					

Table 5.6: Logit Regression on the Life-cycle Motive (with AGE^2)

LC	Coef.	Odds Ratio	Robust SE	z	P>|z|
AGE	0.0344	1.0350	0.0143	2.48	0.013
AGE2	0.0004	0.9996	0.0001	-3.40	0.001
MALE	-0.1846	0.8314	0.1013	-1.52	0.130
EDU	0.0482	1.0494	0.0166	3.05	0.002
PEU	0.0044	1.0044	0.0365	0.12	0.904
COUPLE	0.3282	1.3885	0.1804	2.53	0.012
BLACK	-0.2102	0.8104	0.0947	-1.80	0.072
HISPANIC	-0.0847	0.9188	0.1269	-0.61	0.539
Other_RACE	0.1031	1.1086	0.2354	0.49	0.627
RISKTOL	0.1393	1.1495	0.1221	1.31	0.190
EXPECON	-0.0090	0.9910	0.0791	-0.11	0.910
EXPINT	0.0834	1.0870	0.1026	0.88	0.376
EXPINC	0.1614	1.1751	0.1147	1.65	0.098
TIME_HORIZON	0.3005	1.3506	0.1143	3.55	0.000
CTOTINC	0.0155	1.0156	0.0041	3.84	0.000
No. of obs = 22550; Wald Chi2 (15) = 195.79; Prob > chi2 = 0.0000; Pseudo R2 = 0.0552 (Std error adjusted for 4510 clusters in household)					

H_{A1}: Age is related to the probability of having life-cycle saving motives.

Results of the logit regression, as shown in Table 5.5, reveal that age is negatively related to the probability of having life-cycle motives (z= -4.94, p=0.000). This suggests that as the individual ages, there is a lower tendency to save for life-cycle reasons. This finding appears to be contradictory to the predictions of the life-cycle theory, which postulates that life-cycle saving will thrive during the earlier parts of the individual's earning life, although it will drop during retirement.

To further test the proposition of the life-cycle hypothesis that life-cycle saving motives are non-linearly related to age (hump-shaped), a separate logit regression is run to include two age variables, AGE and AGE^2. As may be observed from Table 5.6, results provide support to the life-cycle hypothesis,

as indicated by the signs of relationship of the age variables. AGE is positively related to the odds of having life-cycle motives (z=2.48, p=0.013), while AGE^2 is negatively related to the dependent variable (z= -3.40, p=0.001). These results suggest that the effect of age on the dependent variable increases but at a diminishing rate, until it reaches a maximum point, and thereafter decreases.

To determine the age at which the life-cycle saving motives "level off" or reaches a maximum point, the derivative of the following function is taken:

$$y = a + bx + cx^2, \text{ where } x = \text{AGE}.$$

$$\frac{dy}{dx} = b + 2cx = 0$$

Solving the above equation, the value for x is given as

$$x = (-b)/(2c)$$

The coefficient values for AGE and AGE^2 are substituted into the above equation, producing the following results:

AGE = (-0.034) / 2(-0.00044) = 38.63 ≈ 39 years

These results suggest that the probability of having life-cycle saving increases with age, reaching a maximum at age 39 (presumably at the 'prime time' of an individual's career), before it starts to decline. Plausibly, other motives become more important at this stage of life.

H_{A5}: Education is related to the probability of having life-cycle saving motives. (+)

Another variable that was significantly related to the probability of having life-cycle motives is EDU, with a positive sign of relationship (z=3.06, p=0.002). This result suggests that, holding other factors constant, individuals with higher education are more likely to have life-cycle motives. Higher levels of

education denote a higher ability to plan for the future, and it is reasonable to expect that individuals with better knowledge and decision-making capabilities are more likely to have life-cycle saving motives.

H_{A2}: COUPLE is related to the probability of having life-cycle saving motives. (+)

As expected, respondents who are married or live with their partners, have higher odds of having life-cycle motives, holding other variables constant. The odds ratio from Table 5.5 reveals that as opposed to single household heads, couples are 38% more likely to have life-cycle motives. The finding suggests that the presence of a significant other results in a higher number of planned life-cycle events occurring over the life time. These results also support the findings from Xiao and Noring (1994) that found that married individuals, as opposed to those who are not married, are more likely to save for retirement (a life-cycle motive).

H_{A9}: Time horizon is related to the probability of having life-cycle saving motives. (+)

Results of the logit regression on LC reveal that, households who have financial planning horizons of five years or more (as opposed to those with planning horizon of less than five years), are more likely to have life-cycle saving motives. The results are significant at the 1% significance level (z=3.95, p=0.000), and confirm earlier predictions. The findings suggest that longer financial planning horizons capture a wider range of the individual's life-cycle, hence, will entail more life-cycle saving motives.

H_{A4}: Income is related to the probability of having life-cycle saving motives. (+)

The relationship between total income (CTOTINC) and the odds of having life-cycle motives is positive and highly significant (z=3.84, p=0.000), suggesting that households with higher income are more compelled to save for life-cycle reasons. This finding is consistent with the life-cycle hypothesis, which postulates that households tend to keep their marginal utility of consumption even throughout the lifetime. Hence, with increases in income, the tendency to smooth out income over the lifespan results in more life-cycle saving. The findings also support the propositions of the permanent income hypothesis (Friedman, 1957) that households with higher current income save more than those with lower income, in order to compensate for lower income in the future.

ii) Precautionary Motive

Table 5.7 summarizes the results of a logit regression on the precautionary saving motive. Five variables are found to have significant relationships with the dependent variable – age, risk tolerance, expectations of income, time horizon and income. Apart from these variables, none of the other independent variables were significantly related with the probability of having precautionary motives.

Table 5.7: Logit Regression on the Precautionary Motive

PREC	Odds Ratio	Robust Std. Err.	z	P>|z|
AGE	1.0065	0.0028	2.31	0.021
MALE	1.1048	0.1448	0.76	0.447
EDU	0.9874	0.0167	-0.75	0.454
PEU	0.9794	0.0391	-0.52	0.602
COUPLE	0.8422	0.1186	-1.22	0.222
BLACK	1.1476	0.1437	1.10	0.272
HISPANIC	0.8655	0.1369	-0.91	0.361
Other_RACE	0.7847	0.1901	-1.00	0.317
RISKTOL	0.8149	0.0942	-1.77	0.077
EXPECON	1.1351	0.0973	1.48	0.140
EXPINT	1.0170	0.1066	0.16	0.872
EXPINC	0.7964	0.0854	-2.12	0.034
TIME_HORIZON	0.7223	0.0665	-3.53	0.000
CTOTINC	0.9901	0.0040	-2.46	0.014
No. of obs = 22520; Wald Chi2 (14) = 75.2; Prob > chi2 = 0.0000; Pseudo R2 = 0.0215 (Std error adjusted for 4510 clusters in household)				

H_{A11}: Age is related to the probability of having precautionary saving motives. (+)

Results of the logit regressions reveal that age is significantly related to the odds of having precautionary motives (z=2.31, p=0.021). The relationship is positive, implying that older households are more likely to have precautionary saving motives. This finding is consistent with prior expectations, which suggest that older individuals display more prudent behaviour, considering that these individuals are more vulnerable to income, health and mortality risks. The results are consistent with prior research studies, which have found that older individuals are more likely to have precautionary saving motives (Kennickell & Lusardi, 2001; Kazarosian, 1997; Lusardi, 1998, 2000).

H_{A17}: Income is related to the probability of having precautionary

saving motives. (-)

According to the literature on precautionary saving, one of the risks that households wish to prepare themselves for is income uncertainty. As noted from Table 5.7, income is negatively related to the probability of having precautionary saving motives (z= -2.36, p=0.014), suggesting that lower income households display more prudent behaviour. Although prior expectations were unclear, the results provide support to the notion that lower income households should be more concerned about uncertainties of income, health and other risks that are likely to occur in the future. Intuitively, poor households are more vulnerable to effects of income loss, and hence, should exhibit more prudence in financial behaviour.

H_{A18}: Risk tolerance is related to the probability of having precautionary saving motives. (-)

From Table 5.7, it can be observed that risk tolerance is significantly related to the probability of having precautionary motives (z= -1.77, p=0.077). The results confirm *a priori* belief that individuals who are more risk tolerant (thus less risk averse) are less prudent and less motivated to save for precautionary motives, supporting prior research (Lusardi, 1998).

H_{A19}: Time horizon is related to the probability of having precautionary saving motives. (-)

The results show that planning horizon is negatively related to the probability of having precautionary saving motives (z= -3.53, p=0.000). These findings contradict the earlier arguments that longer time horizons relate to more uncertainties in regards to health, income or mortality risks. The results suggest that precautionary saving motives (consisting of planning for emergencies, illness, reserves in case of unemployment, or for liquidity purposes) are the desire to plan for uncertainties that the households perceive

could happen in the short run (over the next few months or couple of years). Also, the results suggest that, as opposed to precautionary saving motives, other saving motives are more relevant in the long term.

H_{A20}: Expectations of income are related to the probability of having precautionary saving motives. (-)

There is evidence to suggest that households' expectations of future income are negatively related to the probability of having precautionary motives (z= -2.12, p=0.034). Assuming other factors are held constant, households who have positive expectations of their future income have almost 80% lower odds of having precautionary saving motives. These findings support *a priori* expectations that households will be less prudent when they are optimistic about future income situations, supporting the results of past studies (e.g. Guariglia, 2001; Lusardi, 2000).

iii) Bequest Motive

Table 5.8 illustrates the results of the third logit regression, which was performed on BEQUEST. Results indicate that four variables (AGE, EDU, COUPLE and HISPANIC) are significantly related to the probability of having bequest motives as the most important saving objective.

Table 5.8: Logit Regression on the Bequest Motive

BEQUEST	Odds Ratio	Robust Std. Err.	z	P>|z|
AGE	1.0114	0.0059	1.94	0.052
MALE	1.1802	0.2991	0.65	0.513
EDU	0.8784	0.0227	-5.01	0.000
PEU	1.0174	0.0718	0.24	0.807
COUPLE	0.5669	0.1513	-2.13	0.033
BLACK	0.9609	0.2507	-0.15	0.878
HISPANIC	1.7472	0.4251	2.29	0.022
Other_RACE	0.4254	0.2626	-1.38	0.166
RISKTOL	1.3911	0.3190	1.44	0.150
EXPECON	0.9555	0.1657	-0.26	0.793
EXPINT	0.8853	0.1774	-0.61	0.543
EXPINC	0.8521	0.1758	-0.78	0.438
TIME_HORIZON	1.1578	0.2123	0.80	0.424
CTOTINC	0.9926	0.0085	-0.87	0.387
No. of obs = 22520; Wald Chi2 (14) = 76.36; Prob > chi2 = 0.0000; Pseudo R2 = 0.0571 (Std error adjusted for 4510 clusters in household)				

H_{A21}: Age is related to the probability of having bequest motives. (+)

As can be observed from Table 5.8, age is positively related to the probability of having life-cycle motives (z= 1.94, p=0.052). This finding indicates that, holding other variables constant, older households are more likely to have bequest motives, consistent with prior studies that have found similar relationships between the variables (e.g. Alessie *et al.*, 1997; Hurd, 1987; Kennickell & Lusardi, 2001). As suggested earlier, bequest motives are expected to thrive amongst older individuals, plausibly due to mortality risks that become more imminent with age.

H_{A22}: Marital status (COUPLE) is related to the probability of having bequest motives. (-)

Results indicate that marital status strongly predicts the likelihood of having bequest motives. In particular, respondents who are married or living with partners are less likely to have bequest motives, compared to respondents who had been married or never married before, *ceteris paribus*. This finding contradicts earlier predictions that bequest motives are predicted to prevail amongst couples, as opposed to single respondents. However, a likely reason for the negative relationship could be due to the perception that the presence of a spouse or partner provides an alternative source of income to the family. Hence, families may perceive that the impact of death of the breadwinner is not as severe, since the spouse/partner will still be around to provide for the family (especially if the surviving partner is working – in dual-income families).

H_{A25}: Race is related to the probability of having bequest motives. (+)

Race appears to have some effect on the probability of having bequest motives. Specifically, results show that one of the ethnic groups, Hispanics, are more likely of having bequeathing intentions, as opposed to the reference group (whites). This finding implies that there may be differences in the types of kin support provided by families of different races and cultures.

H_{A27}: Education is related to the probability of having bequest motives. (-)

The relationship between education and the probability of having bequest motives is negative and highly significant (z = -5.01, p=0.000). The findings imply that respondents with lower levels of education are more likely to have bequest motives, holding other factors constant. As articulated earlier, there may be two types of bequest motives that households have. The first pertains

to the desire to provide a continuance of income to surviving dependants in the event of death of the breadwinner. The second type of bequest motives is the desire to leave a certain amount of funds as a legacy to future generations. Based on the assumption that education may be related to the degree of financial status of the household, it can be reasonably assumed that the first type of bequest motive (as income protection for the family) will be more prevalent amongst households with lower education as this may relate to a weaker financial standing of the household.

iv) Profit Motive

The final logit regression was run with PROFIT as the dependent variable, of which results are shown in Table 5.9. Results reveal that *four* variables were statistically significant (BLACK, HISPANIC, EXPINC and CTOTINC) with the probability of having profit motives.

Table 5.9: Logistic Regression on the Profit Motive

PROFIT	Odds Ratio	Robust Std. Err.	z	P>|z|
AGE	0.9853	0.0146	-1.00	0.319
MALE	1.9862	1.0041	1.36	0.175
EDU	1.1136	0.0992	1.21	0.227
PEU	0.8047	0.1553	-1.13	0.260
COUPLE	0.7603	0.5419	-0.38	0.701
BLACK	3.0869	1.3338	2.61	0.009
HISPANIC	4.3547	2.5183	2.54	0.011
Other_RACE	1.6217	1.6732	0.47	0.639
RISKTOL	0.7263	0.3734	-0.62	0.534
EXPECON	1.7865	0.7211	1.44	0.151
EXPINT	2.4055	1.4163	1.49	0.136
EXPINC	3.3735	1.5725	2.61	0.009
TIME_HORIZON	0.8497	0.3728	-0.37	0.710
CTOTINC	0.9597	0.0186	-2.12	0.034
No. of obs = 22520; Wald Chi2 (14) = 82.14; Prob > chi2 = 0.0000; Pseudo R2 = 0.1331 (Std error adjusted for 4510 clusters in household)				

H_{35}: Race is related to the probability of having profit motives. (+)

Two race variables, BLACK and HISPANIC, are significantly related to the probability of having profit motives. This suggests that, vis-à-vis whites, households within these two ethnic groups are more inclined to save with the intentions of making gains, or to invest in a business. The results are statistically significant, at the 1% level (BLACK: z=2.61, p=0.009; HISPANIC: z= 2.54, p=0.011).

H_{A37}: Income is related to the probability of having profit motives. (+)

The last variable that was statistically significant with the likelihood of having profit motives is CTOTINC (z=-2.31, p=0.033). The coefficient for PROFIT suggests a negative relationship between income and profit motives, contradicting the expected sign of relationship. While it was earlier argued that rich households would have a stronger 'buffer' to withstand the effects of potential losses arising from risky investments, and therefore will be more likely of having profit motives, the results suggest otherwise. The evidence instead indicates that higher income individuals place less importance on saving with mere intentions of making more money, as opposed to lower income individuals. A possible reasoning is that poorer households, being in a lower financial status, have a stronger desire to make more money out of their savings as opposed to higher income households.

H_{A40}: Expectations are related to the probability of having profit motives. (+)

One of the expectation variables, EXPINC (expectations of future income), show a positive significant relationship with the probability of having profit motives (z= 2.61, p=0.009). This finding implies that households, who expect their future income to increase higher than prices, are more compelled to save with the objective of gaining more rewards. Plausibly, this suggests that

households are aware of the risks involved in the desire to attain high levels of return on an asset. Hence, it is only when households are certain that their income will surpass inflation that they have more confidence in saving for profit motives.

5.8.2 Determinants of precautionary, bequest and profit motives vis-à-vis life-cycle

The second set of analysis that was run to address saving motives is a multinomial logit regression, explained earlier in Sub-section 5.7.2. Table 5.10 below presents the results. Overall, the results are almost identical to those of the logit models, whereby the same variables showed statistically significant relationships (in terms of values and signs) with the dependent variable. However, it is worthy to note that the main difference between the logit and the MNL model is that the odds in the MNL are made in reference to the base category (the LC motive), while for the logit it is simply the odds of having a particular motive as opposed to not having the motive at all. The results reported in Table 5.10 present the 'relative risk ratio' instead of the coefficients, to simplify interpretation. The interpretation of the relative risk ratios (RRR) is, for a unit change in the independent variable, the relative risk ratio of outcome *m* relative to the base group is expected to change by a factor of the respective parameter estimate (RRR), holding other factors in the model constant (UCLA: Academic Technology Services, Statistical Consulting Group).

Results of the MNL produce similar findings for the probability of having precautionary motives, in comparison to the results of logit regressions presented in Sub-section 5.8.1. As with the results in the logit regressions, the probability of having *precautionary motives* relative to *life-cycle motives*, is negatively related to *risk tolerance* (z=1.63, p=0.10), *expectations of income* (z= -1.99, p=0.046), *time horizon* (z= -3.91, p=0.000), and *income* (z= -3.20, p= 0.001). The probability of having precautionary motives relative to life-

cycle motives, is positively related to *age* (z= 3.53, p=0.000). This suggests that for a one unit change in age, the relative risk of having precautionary motives relative to life-cycle motives, increases by a factor of 1.01, holding other factors in the model constant. These results show that the impact of *age* on the probability of having *precautionary* as opposed to *life-cycle* motives is minimal, although statistically significant.

The only difference noted between results of the MNL as opposed to the logit regressions in Sub-section 5.8.1 is that *two* additional independent variables are statistically significantly related to the dependent variable. These variables are EDU (education) and COUPLE (household heads that are married/cohabiting). Results suggest that when other factors are held constant, households with higher educational attainment are less likely to have *precautionary* motives, relative to *life-cycle* motives. Households in which the heads are married/cohabiting are also less likely to have precautionary motives relative to life-cycle motives, holding other factors constant. This suggests that the presence of a partner or spouse provides a buffer to protect against uncertainties, and hence, reduces the likelihood of having precautionary saving.

Results of the MNL pertaining to *bequest* and *profit* motives are generally the same compared to the results of the logit regressions presented in Sub-section 5.8.1. Results suggest that when *age* increases by one unit, the relative risk (i.e. probability) of having bequest motives relative to life-cycle motives is 1.02 times higher, *ceteris paribus*. Meanwhile, for a one unit change in educational attainment, the probability of having bequest motives relative to life-cycle motives is reduced by a factor of 0.87, *ceteris paribus*. The likelihood of having bequest motives declines when the household head is married/cohabiting, similar to results of the earlier logit regressions. Hispanics are also more likely to have *bequest* motives, relative to *life-cycle* motives, when other factors in the model are held constant.

The last segment of the results from Table 5.10 reveals that the same variables are significantly related to the probability of having *profit* motives, as opposed to *life-cycle* motives. Results suggest that blacks and *Hispanics* are more likely to have profit motives relative to life-cycle motives, holding other variables constant. From Table 5.10, results show that for *blacks*, the relative probability of having profit motives relative to life-cycle motives is higher by a factor of 3.3, holding other factors in the model constant. Meanwhile, for *Hispanics*, the relative probability of having profit motives relative to life-cycle motives, is higher by a factor of 4.3, *ceteris paribus*.

In summary, results of the MNL are equivalent to those of the separate logit regressions conducted in Sub-section 5.8.1, except for two variables (EDU and COUPLE) pertaining to *precautionary* motives, which emerged significant in the MNL model but were not significant in the logit.

Table 5.10: Multinomial Logit Regression

2 (PREC)	RRR	Robust SE	z	p-value
AGE	1.0102	0.0029	3.53	0.000
MALE	1.1505	0.1346	1.04	0.298
EDU	0.9690	0.0180	-1.74	0.081
PEU	0.9781	0.0407	-0.55	0.586
COUPLE	0.7849	0.1438	-1.68	0.092
BLACK	1.1948	0.1291	1.38	0.168
HISPANIC	0.9281	0.1617	-0.46	0.644
Other_RACE	0.8167	0.2438	-0.83	0.406
RISKTOL	0.8252	0.1176	-1.63	0.102
EXPECON	1.1029	0.0879	1.11	0.265
EXPINT	0.9635	0.1067	-0.35	0.728
EXPINC	0.8040	0.1094	-1.99	0.046
TIME_HORIZON	0.6941	0.0934	-3.91	0.000
CTOTINC	0.9864	0.0043	-3.20	0.001
3 (BEQUEST)				
AGE	1.0168	0.0060	2.79	0.005
MALE	1.2435	0.2579	0.84	0.398
EDU	0.8669	0.0271	-5.27	0.000
PEU	1.0073	0.0709	0.10	0.918
COUPLE	0.5327	0.2684	-2.35	0.019
BLACK	1.0571	0.2640	0.21	0.833
HISPANIC	1.7163	0.2500	2.16	0.031
Other_RACE	0.4324	0.6197	-1.35	0.176
RISKTOL	1.3298	0.2304	1.24	0.216
EXPECON	0.9612	0.1761	-0.22	0.822
EXPINT	0.8523	0.2035	-0.79	0.432
EXPINC	0.8211	0.2082	-0.95	0.344
TIME_HORIZON	1.0023	0.1835	0.01	0.990
CTOTINC	0.9862	0.0091	-1.53	0.125
4 (PROFIT)				
AGE	0.9906	0.0151	-0.62	0.533
MALE	2.1259	0.5090	1.48	0.138
EDU	1.0894	0.0908	0.94	0.346
PEU	0.8066	0.1906	-1.13	0.260
COUPLE	0.6747	0.7128	-0.55	0.581
BLACK	3.2784	0.4337	2.74	0.006
HISPANIC	4.2951	0.5830	2.50	0.012
Other_RACE	1.5501	1.0380	0.42	0.673
RISKTOL	0.7025	0.5136	-0.69	0.492
EXPECON	1.7822	0.4039	1.43	0.152
EXPINT	2.3010	0.5894	1.41	0.157
EXPINC	3.1260	0.4627	2.46	0.014
TIME_HORIZON	0.7625	0.4428	-0.61	0.540
CTOTINC	0.9546	0.0195	-2.39	0.017
No. Of obs = 21806; Wald Chi2(42) = 275.28; Prob > chi2 = 0.000; Pseudo R2 = 0.0481(Std error adjusted for 4363 clusters in household) Base outcome = 1 (LC)				

Note: RRR denotes the relative risk ratio, which is derived from exponentiating the multinomial logit coefficients, e^{coef}. In STATA, this is performed by specifying the 'rrr' option after the MNL command. (UCLA: Academic Technology Services, Statistical Consulting Group.).

5.9 DISCUSSION OF RESULTS

The main purpose of this study is to identify the observable and unobservable characteristics of households that shape their saving motivations. In particular, the chapter sought to answer the first research question, given as: *What is the relationship between the posited antecedents of savings and the household's saving motives?* This chapter forms the first main component of this thesis, which is viewed as a preliminary yet imperative part of the study. This chapter provides the basic understanding of saving motives, specifically, by identifying the characteristics of the household that influence the formation of saving motives, prior to subsequent investigations on the impact of these motives on saving behaviour.

The results of the analysis reveal that several demographic and behavioural characteristics significantly influence household's saving motives. Findings reported in Section 5.8 suggest that, among the important determinants of saving motives in terms of socio-demographic variables are *age*, *income*, *education* level, and *marital* status. In terms of behavioural factors, the significant predictors of saving motivations are financial *planning horizon*, *risk tolerance* and *expectations* of income.

Age appears to be significantly related to three saving motives, namely, *life-cycle*, *precautionary* and *bequest* motives. The relationship between age and life-cycle motives is hump-shaped, supporting propositions of the life-cycle hypothesis (Modigliani & Brumberg, 1954) that households are forward-looking and wish to optimize the use of the life time resources over their remaining life expectancy. The results suggest that the increase in life-cycle motives peaks at age 39, before declining in later stages of life.

Age is positively related to *precautionary* motives, therefore suggesting that older households are more prudent and more apprehensive of forthcoming uncertainties associated with income, health and mortality. Thus, older households are more inclined to report precautionary motives as their most

important saving motive, supporting prior research (Kennickell & Lusardi, 2001; Lusardi, 1998, 2000; Kazarosian, 1997). Similarly, older households are also more likely of displaying *bequeathing* intentions, which is reasonable to expect given the fact that mortality becomes more imminent as age increases. These findings are also consistent with past empirical research (Alessie *et al.*, 1997; Hurd, 1987; Kennickell & Lusardi, 2001). The results suggest that *precautionary* and *bequest* motives may possibly explain the deviations of the life-cycle theory where the elderly have been found to accumulate more wealth as they age, rather than to dissave (Lusardi, 2000; Jappelli & Modigliani, 2003).

Another important variable which determines the likelihood of having particular saving motives is *income*. The income variable, CTOTINC, is statistically significant with the probability of having *life-cycle* and *precautionary* motives and *profit* motives. Results reveal that income *positively* predicts the likelihood of having life-cycle motives, supporting the propositions of the life-cycle/permanent-income theory that households tend to smooth-out consumption over the life time, in preparation for likely depletion in income during retirement. Meanwhile, the relationship between *income* and *precautionary* motives is significant and *negative*, implying that precautionary motives are more prevalent amongst poor households. These results are inconsistent with Hubbard *et al.* (1994) that revealed that low income households continued having low levels of precautionary wealth, in the presence of income uncertainty. However, the results in this study seem logical as poor households are more susceptible to life's adversities that may affect income. Nonetheless, results also reveal that *income* and the probability of having *profit* motives is *negative*, suggesting that lower income households aspire to make more out of their savings, in hope of improving their financial situation.

Education significantly predicts the likelihood of having *life-cycle* and *bequest* motives, whereby results are significant at the 1% level. Individuals with

higher educational attainment are *more* likely of having *life-cycle* motives, but are *less* likely of having *bequest* motives. The results reflect a possible correlation between education and human capital – higher education indicates higher human capital and income, hence, there is a greater tendency to smooth out income to later periods in life (life-cycle saving motives). On the other hand, the results show that bequest motives are more prevalent amongst households with lower education because lower education implies lower income and wealth levels, thus, resulting in a greater sense of motivation to ensure that surviving dependants are left with a continuance of income in the event of the breadwinner's death.

Results also reveal that *marital status* is an important predictor of saving motives. Respondents with a spouse or partner are *more* likely of having *life-cycle* motives, but are *less* likely to have *bequest* motives. The latter results can be explained by the fact that a there is an alternative source of income (from the spouse or partner), which reduces the need to bequeath. Meanwhile, the presence of a significant other results in more plans over the life-cycle, resulting in a stronger desire to smooth out income to future periods.

Race appears to have some effect on the probability of having certain saving motives. For instance, compared to white households, *African-American* and *Hispanic* households are more likely to have *profit* motives. This suggests that households of these race groups save with the desire to gain more returns, and perhaps, to improve their current financial positions. This finding may likely be related to the fact that African-American households are less privileged compared to whites in terms of financial status (Cancio, Ecans & Maume, 1996, cited in Keister, 2000), hence, the strong desire to save for profit reasons. Results also suggest that African-American households, as opposed to white households, are *less* likely to have *life-cycle* motives. This suggests that these households are not preparing themselves to be financially sound, during retirement.

Households of *Hispanic* origins are more likely to have *bequest* motives, as opposed to whites. Presumably, this is a result of differences in customs, values, and cultural upbringing, contributing toward the importance of intergenerational transfers amongst Hispanic households.

Financial *planning horizon* significantly predicts the probability of having *life-cycle* motives, and also *precautionary* motives. Results of the latter are consistent with Lusardi (1998). In particular, when the financial planning horizon of households is five years or more, households are more likely to have life-cycle motives; however, they are less likely to have precautionary motives. This suggests that in the short-term, households are more concerned of liquidity needs in the event of unexpected emergencies; but in the long-run, financing of planned life-cycle events are of more importance. *Expectations of income* have some explanatory power on the probability of having saving motives, particularly on *profit* motives, and on *life-cycle* motives.

The results of this study, which draw attention to the factors that influence household saving motives, can be viewed as a preliminary stage in efforts to understand household saving. As noted in Chapter One, the declining levels of personal saving across countries have raised concerns that individuals are not preparing themselves for their future retirement, and that they are unprepared to face possible disruptions in income that may occur in the future. From a macroeconomic perspective, declining levels of national personal saving rates imply that nations may be increasingly dependent on foreign borrowing, which may lead to current account deficits. From the perspective of households, these trends imply that there may be problems sustaining income in the future, particularly during retirement. The phenomenon of low personal saving rates suggests that households may need to downgrade their future life-style, and that there may be a shift in dependency toward social security and other government-sponsored benefits, possibly resulting in further burgeoning of government spending.

Hence, findings of this study have important implications for policy-makers and financial services providers in attempts to understand and encourage household saving. Young households appear to have life-cycle saving motives; however, the importance of this motive diminishes beyond age 39. This suggests that individuals 40 years and above, do not view life-cycle savings as the most important saving motive, and that other saving motives are more relevant (plausibly, precautionary and bequest motives, as the findings suggest). The fact that life-cycle motives decrease in importance after age 39 is a cause for worry, since retirement does not usually occur until approximately 20 years later, and hence, this implies that households are not making full use of their income-generating periods to save for retirement. Furthermore, this suggests that households may be at risk of not reaching the optimal wealth required to sustain their lifestyle during retirement.

With this information, financial planners should help households formulate their retirement plans so that contributions to the pension funds continue throughout the entire working lifespan. Penalties for early withdrawals should rigorously be enforced, to ensure that households adhere to their retirement plans. According to Shefrin and Thaler (1988), problems of self-control are likely to deter individuals from keeping to long-term saving plans, hence, require various devices to help them cope with the difficulties associated with such long-term saving.

Households of different ethnic backgrounds are inclined toward different saving motives. African-American households are less likely (as opposed to white households) to have life-cycle motives, but are more likely to have profit saving motives. Profit motives are also prevalent amongst Hispanic households. This suggests that the primary driving force encouraging these households to save is the returns to be attained from deferring consumption to the future, and not for life-cycle or precautionary reasons. Such saving motive needs to be treated with caution, as the desire to make profits suggests that these households may seek risky assets in attempts of acquiring short-term

gains. There appears to be a need to educate these households on the importance of saving for retirement, and to protect against future life uncertainties. Financial services providers should target households of these ethnic groups, for example, by approaching community groups and offering financial seminars to educate these households on the benefits of planning for retirement, and also on the consequences of being unprepared for life uncertainties.

It can be inferred from the results that *household size* does not affect the probability of having any of the saving motives. This is not a good indication, since larger households (which reflect the presence of more children) should ideally be more concerned about the risks that may affect their earning ability (precautionary motives), and should be concerned about the welfare of the children in the event of death of the breadwinner (bequest motives). In view of this finding, financial practitioners and policy makers must increase awareness amongst families with children, and to encourage saving amongst these households with the aim to preserve wealth and protect the family against possible risks that may result in income loss. There is a need to educate household heads regarding the importance of being prudent and to protect themselves against the income risks, by promoting the appropriate saving plans, including life insurance programs.

Low income households are more inclined toward having profit motives. Reasonably, this is because these households wish to improve their financial positions by ensuring that wealth accumulates more efficiently and quickly. Having the intentions to gain more rewards out of saving suggests that there may be a tendency to favour risky investments. Households of low income should be cautious in their investments and should educate themselves on the costs and benefits of the various financial products in the market that best fit their needs. Saving institutions must also be transparent in providing information to the public regarding the risks and returns of the products they offer, to assist customers in choosing the right products.

The results of this study indicate that neither *age* nor *time horizon* is important in the determination of *profit* motives. Reasonably, it would be ideal to have profit motives prevail amongst younger households and also amongst households with a longer financial planning horizon. This is because longer time periods will enable the returns on savings to build up. Financial services providers should increase efforts to market products that can give long-term gains to younger households, to help them achieve their financial goals. As the study has revealed, young households tend to have life-cycle saving motives, and hence, by promoting products that offer higher potential gains over the long-run, it is hoped that younger households and those with longer time horizons will be more motivated to save.

The issue of low saving rates is an important concern not only for households, but for financial institutions, policy-makers, the government, and the nation as a whole. As such, the results of this study can be viewed crucial in efforts of policy-makers and the financial services industry to promote household saving. The results of this chapter can be used as a basis to encourage household saving, as it provides a description of the profile of savers according to their saving motives, which is summarized in Table 5.11 below. Such information may be useful to financial practitioners in improving their understanding of households' motivations, and the factors that encourage households to save. Recognizing the attributes of savers and how these attributes relate to their motives will assist financial institutions promote financial products on a more targeted basis.

Table 5.11: Profile of savers according to saving motives

SAVING MOTIVES			
Life-cycle	Precautionary	Bequest	Profit
Young; High income; More educated; Couples; Positive expectations of income; Financial planning horizons more than five years.	Older; Low income. More risk averse; Financial planning horizons less than five years;	Older; Less educated; Single households; Hispanics.	Black & Hispanics; Low income; Positive expectations of income

The results have revealed that *income* is one of the main determinants of saving motives. Thus, understanding the motivations of households of different income groups (or quartiles) can assist financial institutions target each of these groups according to the objectives that mean the most to them. Furthermore, understanding the motives that compel household saving will assist in the development of products that help meet these goals. Income has also been found to be an important determinant of saving motives and is positively related to the *profit* and *life-cycle* motives. High income households will hence appreciate financial products that allow them to meet life-cycle objectives, such as retirement plans, while low income households will appreciate financial products that allow them to gain more, such as mutual funds. Information on income will assist financial planners assess their clients and recommend suitable financial products that meet the needs of their customers.

5.10 CONCLUSION

The purpose of this chapter was to determine the factors that influence saving motives, and specifically, to address the first research question: *What is the relationship between the characteristics of a household and the household's saving motives?* The postulated relationship between households' characteristics and their motivations to save were made on the basis of Keynes' (1936) statement that the intensity of saving motives depends on habits acquired through cultural upbringing, educational attainments, religions, morals, hopes and experiences, amongst other factors.

After a close examination of the literature pertaining to the subject matter and identifying the gaps that exists, the chapter proceeded by explaining how the dependent variable (saving motives) and independent variables (household socio-demographic characteristics and behavioural factors) were measured. The hypotheses pertaining to the four saving motives were also explained and tested.

The chapter then reported results of descriptive and univariate tests, followed by the model specification for the multivariate analyses that were to be conducted. The analytical tools that were used were logit regressions on the four saving motives, separately, and a multinomial logit regression on all the motives simultaneously, with *life-cycle* motives as a base group. Since the results from the two methods were virtually the same, only results of the first analysis (logit regressions) were discussed.

Results reveal that household characteristics are indeed important predictors of saving motives. In particular, *age* and *income* significantly determined *three* out of *four* of the saving motives. Older households were more likely to have precautionary and bequest motives, while younger households were more likely to have life-cycle motives. Households with high income tended to have life-cycle motives, while those with lower income were more inclined to have precautionary and profit motives. Other variables that revealed significant

relationships were time horizon, education, expectations of future income, race and marital status.

Having established the factors that shape households' saving motives, the following chapter will next determine whether these motives have an impact on actual saving.

Chapter Six

THE PROPENSITY TO SAVE

6.1 INTRODUCTION

Chapter Five addressed the first research question (RQ1) by investigating the factors influencing a household's saving motives. This chapter deals with the second research question (RQ2) and proceeds to investigate the determinants of households' saving propensity, with a specific interest in saving motives. The investigation was motivated by the debates and gaps in knowledge identified in the literature, particularly in regards to the importance of each motive on saving behaviour. The factors that are hypothesized to influence the household's propensity to save include socio-demographic characteristics, income, and saving motives.

The organization of this chapter is as follows. Section 6.2 discusses the research issues regarding household saving behaviour, and provides the setting in which the research framework is based. Section 6.3 will explain the conceptualization of the study, by justifying the linkages between the independent variables and dependent variables. This will be followed by an explanation of how the variables were measured, in Section 6.4. The predicted signs of relationships between the explanatory variables and the outcome variable are discussed in Section 6.5, followed by descriptive statistics in Section 6.6. The chapter then proceeds with Section 6.7, which presents the results of univariate analyses. Section 6.8 describes the model specification, and Section 6.9 presents the results of the multivariate analyses. The overall results of the chapter are discussed in Section 6.10, and finally, the chapter concludes with Section 6.11.

6.2 HOUSEHOLD SAVING BEHAVIOUR: RESEARCH ISSUES

The life-cycle theory, as discussed in Chapter Two (Sub-section 2.4.1), has been an important theoretical basis for work on saving behaviour for more than six decades. The basic notion of the theory is that individuals save a portion of their income during their earning years to allow real levels of consumption to be maintained during future retirement periods. Although the theory has provided the essential foundation to much of our understanding regarding consumption and saving behaviour, it has also attracted considerable dispute and disagreement due to its inability to explain the heterogeneity in saving behaviour observed in the data. Baranzini (2005, p.109) summarized four main reasons why the theory has "come under attack": (i) the existence of inter-generational wealth transfers, derived from other motives distinct to the life-cycle model; (ii) there is growing evidence indicating that the rich continue to save more than the less fortunate; (iii) the data in certain countries show that young families save positive amounts and do not dissave as the life-cycle theory suggests; and (iv) empirical evidence clearly reveals that retired households continue to save high proportions of their income, which may be closely linked to the first observation.

In addition to the four observations highlighted by Baranzini (2005), the data raise concerns that people are not saving enough to finance their retirement years, as reflected in the Savings Gap of many countries. In the U.K., particularly, research has shown that in 2006, more than half of the working population were not saving at all or were saving insufficient amounts for retirement (Association of British Insurers, 2007). Nonetheless, this phenomenon is not exclusive to the U.K.; declining personal saving rates is a global issue that has persisted for more than two decades, and is an issue even in countries with high saving rates such as Japan (see for example, Katayama, 2006). Similar problems abound in the U.S. where personal saving rates dipped to negative values in 2005 – an occurrence that has been described as

breaking the low-level records of the Great Depression's bleakest year in 1933 (Guidolin & La Jeunesse, 2007).

From a macroeconomic perspective, low saving rates are worrisome because of their implications for the financing of national investments. Low levels of national personal saving rate can result in high dependence of the economy on saving derived from foreign individuals and firms, in the form of current account deficits. Meanwhile, from a microeconomic perspective, deteriorating levels of personal saving are also viewed as critical as they reflect a "spendthrift nation" and a population that is not prepared for the future. Negative saving suggests that individuals' wealth levels are being depleted and that people are living beyond their current means. As a consequence, future standards of living will need to be substantially reduced in accordance with households' wealth levels.

Numerous investigations have been conducted to provide explanations to the issue of declining saving rates, and to shed light on the disparities observed in saving behaviour. An extensive literature offers various contributing factors from an economic angle, such as income growth (Modigliani, 1970), interest rates (Bosworth, 1993), the effect of capital gains from corporate equities (Juster, Lupton, Smith & Stafford, 2005; Lusardi *et al.*, 2001), improvements in credit markets (Carroll, 1997), existence of social security and other government-sponsored benefits (Huggett & Ventura, 2000), increasing annuitization of retirement income (Gokhale, Kotlikoff, & Sabelhaus, 1996), and shifts in demographic structure of the population (Lusardi *et al.*, 2001).

While macro-level research studies offer useful insights to resolve some of the issues in regards to personal saving, these studies are not comprehensive because the hypothesized variables affecting saving are externally linked to the household and therefore do not capture the underlying determinants of saving behaviour. Hence, investigations that focus on fundamental household characteristics can prove beneficial in understanding macro-level statistics.

The importance of comprehending household saving behaviour is affirmed by Wärneyrd (1999, p.344), who stressed that it is imperative to study micro-level household behaviour in order to elevate the understanding of macro-level policy measures and other factors affecting national saving.

Undeniably, there is ample literature in regards to saving behaviour at the household level, which contributes to our understanding of saving. Some of the variables that have been suggested to influence household saving are *socio-demographic characteristics* such as age of the household head, stage in the family life-cycle, education level, presence of children, marital status, and race, as well as socio-economic factors such as income, net worth and type of residence (see for example, Lindqvist, 1981, Rha, *et al.*, 2006; Hogarth & Anguelov, 2003). Worthy of note is the literature devoted to *behavioural factors* influencing saving decisions such as saving motives (Loundes, 1999; Hogarth & Anguelov, 2003; Rha *et al.*, 2006; Fisher & Montalto, 2010), self-control (Thaler & Shefrin, 1981; Laibson, Repetto & Tobacman, 1998; Rha *et al.*, 2006; Thaler & Bernatzi, 2004), expectations (Wärneryd, 1997; Lindqvist, 1981; Rha *et al.*, 2006; Hogarth & Anguelov, 2003), saving habits (Alessie & Lusardi, 1997; Furnham, 1999), and risk aversion and prudence (Kimball, 1989; Guiso, Jappelli & Terlizzese, 1994). As previously discussed in Chapter Two (Sub-section 2.4.1), some of these behavioural factors pose compelling challenges to the standard life-cycle hypothesis, which fails to acknowledge the "limitations" of human nature such as bounded rationality (Simon, 1957) and problems of self-control (Thaler & Shefrin, 1981). In what Shefrin and Thaler (1988, p.636) term as the Behavioural Life-Cycle Hypothesis, individuals are recognized as having "human limitations" and "use simple rules of thumb, which are by nature, second best." In this sense, humans are not as 'rational' as the life-cycle theory assumes. According to Jones (1999), decision makers are affected by cognitive and emotional factors, which will sometimes lead to failure in making optimal decisions.

This study is particularly interested in discovering how *saving motives* influence the household's propensity to save. The categories of saving motives, as explained in Chapter Five, consist of four groups: *life-cycle*, *precautionary*, *bequest* and *profit* motives. According to Xiao & Noring (1994), one of the limitations noted in past research is that only one saving motive is considered at a single time. However, as argued in Chapter Three (Sub-section 3.3.1), the incorporation of various saving motives into a single framework is viewed necessary, as it has been suggested in the literature that saving motives are "complementary" (Browning & Lusardi, 1996, p.1798), are "not mutually exclusive" (Wärneryd, 1999, p.265), and may in fact "overlap" with each other in a single period of time (Dynan *et al.*, 2002).

As discussed in Chapter Two (Sub-section 2.4.3), the significance of different saving motives has long been disputed in the literature, as noted from the vigorous debates between Kotlikoff and Summers (1981) and Modigliani (1988). While Kotlikoff and Summers (1981) propose that wealth accumulation in the U.S. is mainly derived from intergenerational transfers and hence, underscoring the importance of bequest motives, Modigliani and his colleagues maintained that life-cycle saving was more relevant and was the key contributor of private wealth. According to Dynan *et al.* (2002), subsequent explorations regarding this matter have failed to reach agreement.

In response to the above mentioned disputes, Dynan *et al.* (2002) propose a model in which saving is simultaneously driven by two objectives. The first objective is to protect against possible future contingencies such as income uncertainties and mortality risks. This objective is akin to precautionary motives, although it functions within a life-cycle model. The second objective is to leave an inheritance to the next of kin. Bequest motives become effective only when the first motive fails to materialize. In other words, the risks that were initially anticipated, do not occur, hence, accumulated funds are spilled over as bequests to the next generation. Dynan *et al.* (2002) propose that these objectives overlap with each other, and suggest that the presence of bequest

motives will have minimal effect on the magnitude of wealth accumulation, since dollar amount allocations into saving serve both objectives simultaneously.

To date, the issue of household saving behaviour remains inconclusive. The life-cycle theory, although central to our understanding of saving behaviour, requires further enrichment to explain the divergences observed in the data, as well as the implications of other saving motives that may operationalize simultaneously over the life time. Having discussed the key issues in the literature, the following section will explain the conceptualization of the research question pertaining to this chapter.

6.3 CONCEPTUALIZATION OF THE RESEARCH QUESTION

The unresolved issues surrounding saving behaviour, as discussed in the preceding section, has prompted the current study to reinvestigate the drivers of households' saving. The research question to be answered in this chapter is: "*What is the relationship between saving antecedents and motives, and the household's propensity to save?*" The relationships under investigation are depicted as the arrows labelled RQ2a and RQ2b in Figure 6.1 below. These two arrows indicate that two groups of independent variables are posited to influence the propensity to save: (i) household characteristics, and (ii) saving motives.

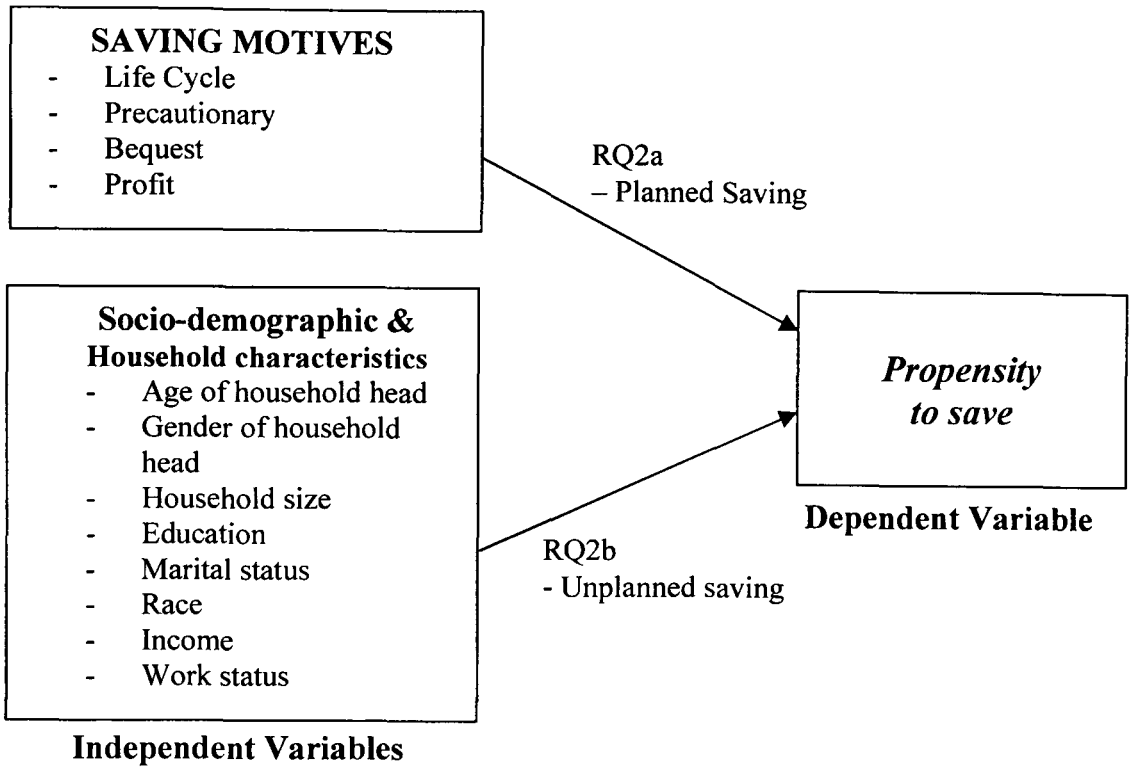


Figure 6.1: Postulated relationship between antecedents and the propensity to save

Arrow RQ2a from the figure above connects saving motives and the propensity to save. This linkage denotes a relationship between intentions to save, with actual saving propensities. As hypothesized by the Theory of Planned Behaviour in Chapter Two (Sub-section 2.3.2), favourable intentions that positively influence the performance of action are considered *planned behaviour*. Hence, in the diagram above, the link between saving motives and saving propensity (RQ2a) signifies *planned saving*. Nonetheless, despite having the motivations or intentions to save, there are other factors that may either impede or encourage the performance of saving, which need to be accounted for. These factors relate to capabilities and opportunities to save, which operate through characteristics of the household. These factors will lead to saving outcomes that are *unplanned*, and is depicted by arrow RQ2b. The following sub-sections will discuss these hypothesized relationships.

6.3.1 The link between saving motives and the propensity to save (RQ2a)

In Chapter Five (Section 5.2), the relationship between household characteristics (socio-demographic, income and behavioural factors) and saving motives, was explored. This chapter extends the investigation to examine the impact of saving motives on the propensity to save. This postulation is depicted by arrow RQ2a in Figure 6.1, which connects saving motives and the propensity to save. Arguably, if a person has a particular saving motive, he or she will have a higher propensity to save, since motives reflect a person's intentions and will drive the performance of certain behaviour. This conception has been emphasized in behavioural theories such as the Theory of Reasoned Action (Ajzen & Fishbein, 1975) and the Theory of Planned Behaviour (Ajzen, 1985), as discussed in Chapter Two (Sub-section 2.3.2). The Theory of Planned Behaviour postulates that favourable intentions precede successful behaviour, subject to sufficient levels of behavioural control. Therefore, arrow RQ2a denotes a process of converting intentions into successful outcomes, and can be viewed as *planned saving*. By examining the impact of saving motives on saving propensity, the investigation will potentially reveal whether saving motives ultimately lead to positive saving, or merely remain as pure intentions.

The present study incorporates the various categories of saving motives in a single framework. As noted from Figure 6.1, the four saving motive categories are: life-cycle, precautionary, bequest and profit motives, which may concurrently exist over the life-cycle. However, the relative impact of these motives on saving behaviour is still unresolved, as noted from the debate between Modigliani (1988) and Kotlikoff and Summers (1981). The present study aims to uncover the relative importance of each saving motivations, by incorporating the four categories of motives into a single framework.

6.3.2 The link between household characteristics and the propensity to save (RQ2b)

This sub-section will discuss the posited relationship between household characteristics and the propensity to save, as depicted by arrow RQ2b in Figure 6.1. The variables detailed in the lower left-hand side box include socio-demographic characteristics of the household such as the age of the household head, marital status, household size, income level, education, race, and gender of the head of the household.

As discussed in the preceding sub-section, the Theory of Planned Behaviour postulates that favourable intentions precede successful behaviour, subject to sufficient levels of perceived behavioural control. Hence, the implication behind this notion is that lack of behavioural control results in unsuccessful or unplanned behaviour. In other words, despite having the motive or intention to perform an action, actual behaviour may not reflect inherent motivations. Actual behaviour may transpire quite differently, resulting from other factors that either promote or discourage the performance of behaviour. This study postulates that these other factors will play a role through demographic characteristics of the household. Hence, while arrow RQ2a denotes an intention transpiring into action, arrow RQ2b suggests that there is an 'unmediated' and 'unintentional' effect between demographic variables and saving.

Broadly, two main factors can be offered to explain the 'non-motivated' relationship between household characteristics and saving propensity. The first explanation can be viewed as a demand-side factor, stemming from savers' capability to implement their saving motives. For instance, even if there was a certain motive to save, the non-performance of saving could be the result of lacking the capability to do so from the perspective of the saver. Meanwhile, the second factor relates to the saving industry's supply decision, where the power of granting customers' access to certain financial products lies in the

hands of financial institutions. A similar argument stands for this – although individuals may have a particular saving motive, they may not have the opportunity to save due to eligibility or accessibility restrictions enforced by financial institutions. These issues will be further discussed below.

1) Demand-side capability to save

The capability to conduct saving is determined by several key aspects such as the competency to seek for and understand financial information, the capacity to make informed decisions regarding personal finances, and also, the ability to access and deal with financial institutions. Demographic characteristics of individuals can affect these abilities, such as age, educational factors, and gender. With age come greater experience and understanding of financial affairs, suggesting that older individuals have superior knowledge over their younger counterparts in making financial decisions. Meanwhile, educational levels of individuals can be perceived to be an indication of knowledge, confidence, exposure and competence, implying that more highly educated individuals have greater information-seeking and decision-making abilities. Having these proficiencies heightens the prospects of participating in a wider range of investment and saving products, and hence, increases the propensity to save.

Another factor that can affect an individual's capability to save is the extent of the individual's willpower and self-control. Shefrin and Thaler (1988) suggest that savers will use various devices (such as automatic salary deductions, rules of thumb, pension plans) to help them stick to their saving plans and to avoid the temptations of consuming the funds that were originally kept aside. Lack of self-control may result in failure to accomplish saving plans, and eventually leading to low saving propensities.

In addition, there is another factor that can influence the propensity to save that does not arise from motives or intentions. Clearly, the ultimate determining feature of saving is income levels. A household may have motives to save, but if household income is low or if consumption is high (relative to each other), then evidently there is nothing left to save. In contrast, households with relatively high levels of income may not have a motive to save, but will save by default simply because there is no capacity to spend the entire amount of income at a single time. This relates back to the Permanent Income Hypothesis discussed in Chapter Two (Sub-section 2.2.2), which asserts that individuals strive to level out their expenditures although income may vary over time. Hence, any excess of income over consumption will be saved, and can be viewed as 'unplanned' saving (designated by arrow RQ2b of Figure 6.1).

2) Supply-side opportunities to save

Household saving is also largely determined by opportunities to access financial services, as governed by saving institutions. Often, there will be constraints arising from business and operational practices of the saving industry that affect households' accessibility into the financial system. An argument that can help illustrate this point is the concept of "financial exclusion", which refers to "those processes that serve to prevent certain social groups and individuals from gaining access to the financial system" (Leyshon & Thrift, 1995, p.314). The idea behind 'financial exclusion' is that certain people, especially the poor and disadvantaged groups, have difficulty in accessing certain financial products due to geographic constraints, or restrictions imposed by banks. This is not surprising given that financial institutions, as profit-maximizing business entities adopting certain risk-management strategies, customarily tend to prefer dealing with more socially powerful and affluent individuals. Kempson and Whyley (1999, cited in

Devlin, 2009) suggest that financial exclusion comprises several aspects. Briefly, the features of financial exclusion are: *access exclusion* (due to geographical constraints and unfavourable risk assessments); *conditional exclusion* (due to conditions attached to a product offering); *price exclusion* (arising when individuals cannot afford to pay for certain financial products); *marketing exclusion* (due to the neglect by financial services providers to market their products to certain groups); *self-exclusion* (as a result of deliberate choices by individuals not to hold certain financial products); and *resource exclusion* (for example, lacking discretionary income to conduct saving).

As argued by Leyshon and Thrift (1995), there is a strong relationship between the economic power of individuals and the ease with which they gain access to the financial system. Geographical concentrations of the population according to income and wealth will tend to determine the geography of financial system accessibility, leading to undue discrimination of the lower income communities. There are also other groups of people who are likely to be financially excluded, and these include the elderly population and minority ethnic groups. Certain financial products such as premium bank accounts, credit facilities and insurance usually have age restrictions due to high mortality risk involved, leaving the elderly groups deprived of such financial products. Similarly, minority ethnic groups tend to be excluded from certain financial services as reflected in a statement by Altonji and Doraszelski (2005, p.27) claiming that "25-30 percent of black households [in the U.S.] are unbanked, meaning they have no direct access to a financial institution." This phenomenon can be explained by the racial imbalances that occur in capital accumulation and in the use of financial services. As argued by Brimmer (1988, p.153), African-American families have had less opportunities to accumulate wealth due to a long history of deprivation in terms of opportunities to earn, save or to inherit wealth. This historical legacy has thus resulted in this minority ethnic group having fewer opportunities to accumulate wealth and save.

The two factors discussed above suggest that saving behaviour will not only be influenced by saving motives, but by individuals' capabilities as well as opportunities that are presented to them. These capabilities and opportunities are by and large shaped by demographic characteristics of individuals, and may perhaps have a stronger effect on saving behaviour as opposed to saving motives. To illustrate this point, consider age as a demographic variable and how age can be related to a person's capability to perform saving. An elderly person may have a bequest motive to save, but may not be able to implement this saving motive due to inaccessibility to the insurance market. As we know, insurance companies tend to impose high premiums and/or may restrict participation due to age or health conditions. Another scenario to exemplify this argument is the income level of an individual and the capability to conduct saving. An individual with a modest take-home salary may be concerned about future income uncertainties and hence, have a precautionary motive to save, but because income is low relative to expenditure, he or she may not be able to save. These examples demonstrate that despite having saving motives, translating these motives into actual behaviour rests on the individual's capability to save and to access saving markets, of which is also determined by supply-side factors. Having discussed the research issues and conceptualization of the study, the following section explains how the variables in the study were measured.

6.4 MEASUREMENT OF VARIABLES

This section will explain the dependent and independent variables included in the study. Section 6.4.1 will discuss the dependent variable and how it was measured, while section 6.4.2 will explain the inclusion of the independent variables and their measurement methods.

6.4.1 Dependent variable: The propensity to save

The dependent variable being examined in this chapter is the propensity to save, which reflects the household's extent of saving. Usually, a financial measure of saving is obtained using either one of two methods: by subtracting consumption from income, or, by taking the first differences of wealth. However, difficulties arise in employing these two approaches. Generally, respondents may have different interpretations of income, consumption, and wealth (Browning & Lusardi, 1996), and different measurements for each construct will arise according to the context in which the research is undertaken, hence, resulting in dissimilar saving estimates. Past research has noted that saving derived from either of these methods show great variability (Avery & Kennickell, 1991; Bosworth, Burtless & Sabelhaus, 1991; Browning & Lusardi, 1996) and thus, large measurement error (Avery & Kennickell, 1991).

In relation to the first method of measuring saving (income minus consumption), computation of saving may be challenging because respondents rarely keep precise records of expenses, and even if they do, eliciting such information can be very tedious, time-consuming and burdensome on the respondent. Meanwhile, the first difference of wealth method may also be problematic due to the possibility of incomplete and erroneous reports of assets and liabilities leading to spurious estimates of saving (Alessie *et al.*, 1999). Surveys on wealth data have been acknowledged as being afflicted with high rates of non-response (Juster & Smith, 1997) creating complexities in non-response correction methods such as imputation. Furthermore, in using the first difference of wealth method to compute saving, researchers are faced with problems associated with panel data collection, such as reporting errors associated with changes in market value of assets and liabilities, as well as structural changes to the unit of analysis in panel surveys (Kennickell, 1995).

Fortunately, the SCF acknowledges the difficulties in using these measures and hence includes several qualitative questions that are more straightforward and simpler to comprehend (Kennickell, 1995). Although these questions are qualitative in nature, they are viewed to be effective indicators of household saving behaviour (Bucks, Kennickell & Moore, 2006; Kennickell, 1995) compared to quantitative measures. The simplicity of these questions is believed to be able to alleviate the burden of respondents, reduce survey response time, and cut down non-response rates. The SCF question on saving propensity asks about the respondent's previous year's saving, which will be employed in this study to measure saving, is worded as follows:

> *Over the past year, would you say that (you/your family's) spending exceeded (your/your family's) income, that it was about the same as your income, or that you spent less than your income? (spending does not include any investments you have made.)*
>
> (1) *Spending exceeded income*
>
> (2) *Spending equaled income*
>
> (3) *Spending was less than income*

The responses to the above question indicate three levels of saving propensity. If the respondent answered "spending exceeded income", this meant that he or she had negative saving and was a non-saver and also a dissaver. If the answer given was "spending equaled income", this implied that the respondent had zero saving and was neither a dissaver nor a saver. If the respondent answered "spending was less than income", this meant that he or she was a saver and had positive saving. The dependent variable is labelled as "SVGPROPENSITY" and is ordinal in nature as it reflects three ordered categories of saving.

Similar qualitative questions measuring saving have been included in other household surveys such as the Australian *Melbourne Institute Household*

Survey (MIHS) (see Harris, Loundes & Webster, 2002) and the Dutch CentER*data*-Panel (see Alessie *et al.*, 1999). The MIHS survey asks the respondent to indicate which statement best describes the present situation of the respondent households and to choose one of four answers: running into debit, managing to make ends meet, saving a little, and saving a lot. Meanwhile, the CentERdata-Panel asks the respondent whether they had saved or not in the past and if they had, the respondent was to choose among eight different categories of saving amounts. In terms of data analysis, studies that used these surveys employed ordered probit regressions models (e.g. Harris, *et al.*, 2002; Alessie *et al.*, 1999), or binary logit regressions (e.g. Fisher & Montalto, 2010)

6.4.2 Independent variables

The measurement of independent variables is the same as discussed in Chapter Five (Sub-section 5.3.2). However, the only difference is the measurement for saving motives. In Chapter Five, saving motives were measured as the "first-mentioned" motive because saving motives were the outcome variables that were being investigated. Hence, in determining the factors that influence these motives, it was necessary to assume "mutual exclusiveness" of these constructs. In doing so, only the *first* mentioned motive was considered, as these were assumed to be the most important saving motive perceived by the respondents. However, in the present chapter, saving motives play the role of an explanatory variable. As suggested by previous authors, saving motives are not mutually exclusive and may co-exist in a single period of time. Thus, this chapter takes into consideration *all* the six motives provided by the respondent (wherever applicable). Recall from Chapter Five (Sub-section 5.3.1) that respondents in the SCF may provide up to six saving motives. Hence, for the analysis of this chapter, saving motives are re-defined as "any-mentioned" motive, and are re-labelled as New_LC (life-cycle motives), New_PREC

(precautionary motives), New_BEQ (bequest motives) and New_PROFIT (profit motives). These variables are in the form of binary dummy variables, which take on a value of 1 if the respondent reported having one of the four saving motive categories in any of the six responses, or zero if not mentioned at all. The idea of co-existing motives suggests that households may have more than one type of saving motive, concurrently.

In addition to the independent variables included in Chapter Five, two additional variables will be included, to control for differences in employment status. These variables are EMPLOYED, to indicate that the respondent is working and employed by someone else; and OWNBIZ, to indicate that that respondent is self-employed (has a business practice, is a partner in a business, or owns a professional practice). The base group is OTHER_WORK which includes unemployed individuals, home-makers, students and pensioners. Each of the occupational groups is a binary dummy variable, which takes on the value of 1 if the respondent falls into that particular occupation category, or zero if otherwise.

Although the analysis in Chapter Five included several behavioural factors such as expectations and risk tolerance, these variables are not included in the present analysis. This is because these variables are posited to be meditated and operate via saving motivations, as per analysis in Chapter Five. In view of the above discussion, the independent variables that are included in the present analysis are demographic factors (age, gender, household size, education, race, and marital status), income, work status, time horizon, and saving motives.

6.5 DETERMINANTS OF THE PROPENSITY TO SAVE

This section discusses the anticipated signs of relationships between the dependent variable (saving propensity) and the explanatory variables. As

explained in Chapter Three (Sub-section 3.3.3), the main hypotheses pertaining to the investigation in this chapter are:

H_B: The characteristics of the household significantly impact household saving

H_C: Saving motives significantly impact the household's propensity to save.

6.5.1 Household characteristics

As articulated in Sub-section 6.2.2, household characteristics are posited to be indicative of the capabilities and opportunities of households to conduct saving. Therefore, the hypotheses in relation to each variable are discussed in accordance to the strength of the capabilities and opportunities to save.

Age: According to Lusardi & Mitchell (2007), there is evidence suggesting that more financially knowledgeable individuals are more likely to have given thought about retirement saving, hence, implying that these individuals are more likely to save. Age can be reasonably viewed as an indication of knowledge levels and experience, as well as the ability to understand financial affairs and make financial decisions. Based on the argument that age denotes financial literacy and knowledge, age is expected to be positively related to saving propensity.

However, the effect of age on the propensity to save is less clear when the concept of financial exclusion is taken into consideration. Although older individuals may have a better understanding of financial affairs and are more capable of making financial decisions, certain groups of the elderly may self-exclude themselves from obtaining certain financial services due to inability to keep up with rapid developments in banking services, such as online-banking facilities and other self-service technologies. Furthermore, older individuals may be excluded from financial services due to accessibility issues (for

instance, having a disability), or restrictions related to product offering. The evidence in regards to the effect of age on financial exclusion appears to be mixed. Devlin (2005, 2009) in the context of U.K. households found that younger individuals were more likely to be excluded, while a report by the Financial Services Authority (2000, cited in Devlin, 2009) revealed that age was not a significant predictor of financial exclusion. In view of the above counter-arguments and mixed evidence, the predicted relationship between age and the propensity to save is, *a priori*, ambiguous.

H_{B1}: Age is related to the household's propensity to save. (?)

Gender: Gender differences are expected to have an impact on saving behaviour, due to the divergences in gender-based roles of household heads, as well as variations in consumption habits, attitudes, preferences and the level of financial knowledge. Past research has shown that women usually know less about financial management as opposed to men (Chen & Volpe, 2002; Volpe, *et al.*, 1996; Goldsmith & Goldsmith, 1997). This is partly due to the greater responsibilities held by women in raising the family, lower earnings, longer life expectancy, and lower saving, which ultimately lead to greater challenges in financial management (Anthes & Most, 2000 and Timmermann, 2000, cited in Chen & Volpe, 2002). In addition, there is also evidence indicating that men and women vary in their financial risk-taking behaviour and willingness to commit in long-term saving (Philips, Haynes & Helms, 1992). Lusardi (2006) found that women are less financially literate than men, and hence, were more likely to face difficulties in saving for retirement. Overall, prior studies demonstrate an overwhelming amount of evidence that men have higher levels of financial literacy (Chen & Volpe, 2002; Lusardi, 2006), and are more likely to have a higher propensity to save compared to females (Harris *et al.*, 2002; Alessie *et al.*, 1995). Based on the notion that males are more financially knowledgeable and more risk tolerant compared to women,

the relationship between the MALE dummy variable and SVGPROPENSITY is predicted to be positive.

H_{B2}: Gender (MALE) is related to the household's propensity to save. (+)

Income: Prior studies have demonstrated that income and saving are positively related (Alessie *et al.*, 1995, 1999; Banks & Tanner, 1996; Browning & Lusardi, 1996). In the U.S., a large proportion of total savings has been found to be attributed to families in the top decile of income distribution (Avery & Kennickell, 1991). As argued in Sub-section 6.3.2 (Part *i*), income may influence saving directly (un-mediated by motives), because high or low levels of income results in 'default' saving capabilities. As suggested by the life-cycle / permanent income hypothesis, households tend to keep consumption constant despite variations in income. Assuming other factors including consumption are held constant, an increase in income will result in higher saving simply because there is no capacity to spend the entire amount at a single time. Likewise, having too little income will result in negligible amounts of saving as there are no left-over income after consumption has taken place.

Studies on financial exclusion reveal that income significantly influences the probability of being financially excluded (Devlin, 2005, 2009; Kempson & Whyley, 1999). The evidence shows that low income individuals have higher tendency of being excluded of financial services, since this group of people have lower resources and are highly likely to face difficulties in accessing certain financial products. In view of the above, the sign of relationship between CTOTINC and SVGPROPENSITY is predicted to be positive and significant.

H_{B3}: Income is related to the household's propensity to save. (+)

Education: The capability and competency in making financial decisions are likely to be indicated by individuals' educational backgrounds. Educational attainment reflects a person's level of knowledge, confidence, capability to seek information, and hence, the ability to make decisions regarding the household's finances. Having these proficiencies increases the likelihood of performing saving. In a recent study, Lusardi and Mitchell (2007) found that individuals with lower educational attainment were more likely to be financially illiterate. Past researches have noted a positive relationship existing between the level of education and saving (e.g. Alessie *et al.*, 1995; Avery & Kennickell, 1991; Douglas, Bernheim & Scholz, 1993; Anttanasio, 1993; Lusardi, 2000). In addition, studies have also found that education negatively influenced the likelihood of being financially excluded (Devlin, 2009), hence, implying that saving may be more prevalent amongst individuals who have higher educational attainments. In view of the above, this study posits that education and the propensity to save are positively related.

H_{B4}: Education is related to the household's propensity to save. (+)

Marital status: There is evidence to suggest that marital status is significantly related to the propensity to save. Past research has noted that married individuals were more likely to have higher saving (Alessie *et al.*, 1999), especially families without children (Bosworth *et al.*, 1991). Similarly, single parents were noted to have lower saving rates (Bosworth *et al.*, 1991; Avery & Kennickell, 1991). Plausibly, the likelihood of conducting higher saving may be attributed to the joint process of decision-making and the sharing of knowledge between spouses/partners, which lead to higher saving propensities. The presence of a significant other may also positively contribute toward saving decisions, due to encouragement, cooperation and support from a loved one. In regards to financial exclusion, Devlin (2005) found that married/cohabiting couples were less likely to be excluded, plausibly as a result of being targeted more heavily by marketers of financial services

companies. Based on the evidence noted in the literature, the relationship between COUPLE and SVGPROPENSITY is expected to be positive.

H_{B5}: Marital status (COUPLE) is related to the household's propensity to save. (+)

Household size: It is reasonable to expect that family size is indicative of saving capabilities of the household. Larger households (e.g. those with more children) are more likely to incur higher levels of family expenditures to support all members in the family. When expenditure is high, the propensity to save will therefore be lower. This notion is supported by the evidence from past research, which has revealed lower saving rates amongst households with children (Lusardi, 2000; Bosworth *et al.*, 1991; Avery & Kennickell, 1991). There is also evidence exhibiting a positive relationship between household size and financial exclusion (Hogart & O'Donnell, 2000; Devlin, 2005), which Devlin (2005) suggests is reflective of resource exclusion (i.e. larger households have a higher tendency to channel resources to spending, hence are more likely to be financially excluded). Based on the evidence noted in the literature, the relationship between household size and the propensity to save is predicted to be negative.

H_{B6}: Household size (PEU) is related to the household's propensity to save. (-)

Race: Financial capability and literacy, which is posited to have an impact on saving, have been found to differ according to households of different races. In a study of retirement preparedness of U.S. households, Lusardi and Mitchell (2007) found that blacks and Hispanics were more financially illiterate compared to whites. Differences in ethnic backgrounds denote diverse culture, values, and preferences of households, which may lead to divergences in financial attitudes and behaviour. Indeed, the divergences in financial

capability are evident through the data regarding wealth holdings amongst households of different races. In particular, research has indicated that blacks are less privileged compared to whites in terms of earnings and wealth (Cancio, Ecans & Maume, 1996, cited in Keister, 2000). For instance, Menchik and Jianakoplos (1997) report that the average income of black households was approximately half, and the wealth level approximately one-fifth, of the income and wealth levels of white households in the U.S.

In regards to accessibility to financial services, the evidence regarding the effects of race is ambiguous. Devlin (2005, 2009) found that ethnic differences were not a significant determinant of being financially excluded in the U.K., while Hogarth and O'Donnell (2000) found that racial background was an important determinant of financial exclusion in the U.S. Based on the aforesaid, race is posited to have an impact on household's propensity to save.

H_{B7}: Race is related to the household's propensity to save. (?)

Occupational status: Saving behaviour of individuals of different employment status can also be expected to differ. Compared to individuals who are working (either employed or self-employed), non-working individuals (students, retirees, or unemployed individuals) are more likely to face financial exclusion problems. In relation to the discussion on financial exclusion in Section 6.3.2, non-working individuals may experience access exclusion due to unfavourable risk assessments by financial institutions, or, may face marketing exclusion due to the neglect by financial services providers in targeting these market segments. Individuals who are not in the labour force may also be resource excluded, as they lack the discretionary income to conduct saving. Hence, work status is hypothesized to be related to the propensity to save.

H_{B8}: Occupational status (EMPLOYED & OWNBIZ) is related to the household's propensity to save. (+)

6.5.2 Saving motives

As discussed in Chapter Two (Sub-section 2.3.2), Ajzen's (1985) Theory of Planned Behaviour posits that *intentions*, which are formed by attitude, subjective norm, and perceived behavioural control, precede the performance of actual *behaviour*. Intentions are synonymous to motives, whereby both terms reflect goals and desires that individuals wish to achieve. In the context of saving behaviour, Wärneryd (1999) suggests that saving motives are linked to goals and the desire to accomplish certain objectives. Based on these notions, the present study posits that saving motives are the underlying intentions that drive saving behaviour, and hence, it is expected that each of the saving motives will positively influence the propensity to save.

According to Xiao and Noring (1994), saving motives have usually been examined in isolation, whereby research has tended to focus on one saving motive at a time. However, as discussed in Section 6.2, saving motives are not mutually exclusive and are complementary (Wärneryd, 1999; Browning & Lusardi, 1996; Dynan *et al.*, 2002). This study aims to establish the relative significance of each saving motive and the inclusion of all four motives in a single framework will create a stronger basis for more comparable analysis of the importance of each saving motive. Based on the argument that having a motive to save will strengthen the drive to actually conduct saving, it is postulated that each of the saving motives will have a positive impact on saving propensity. However, the relative importance of each of these motives is yet to be determined.

H_{C1}: Life-cycle motives significantly impact the household's propensity to save. (+)

H_{C2}: Precautionary motives significantly impact the household's propensity to save. (+)

H_{C3}: Bequest motives significantly impact the household's propensity to save. (+)

H_{C4}: Profit motives significantly impact the household's propensity to save. (+)

Table 6.1 provides a summary of the meanings of the independent variables and provides the signs of predicted relationships between SVGPROPENSITY and the independent variables.

Table 6.1: Expected signs of relationships between SVGPROPENSITY and explanatory variables

INDEPENDENT VARIABLES		**DEPENDENT VARIABLE**
Demographic variables		**SVGPROPENSITY**
AGE	Age of the respondent in years	?
MALE	1 if the respondent is male, 0 if female	+
EDU	Years of education attended by respondent (1-17 years)	+
Marital status: COUPLE	(Base group is NVRMAR & PRVMAR) 1 if respondent has a spouse/partner, 0 if otherwise	+
PEU	Number of people in the Primary Economic Unit	-
Race: BLACK HISP OTHER_RACE	(Base is WHITE) 1 if respondent is Black, 0 if otherwise 1 if respondent is Hispanic, 0 if otherwise 1 if respondents are not in any of the other race categories, 0 if otherwise	?
Occupation EMPLOYED OWNBIZ	(Base group is OTHER_WORK) 1 if respondent is employed, 0 if otherwise 1 if respondent is self-employed or has a partnership or business, 0 if otherwise	+ +
CTOTINC	Cube root of total income	+
Behavioural Factors		
New_LC	1 if Life-cycle motives were mentioned at all, 0 if not mentioned	+
New_PREC	1 if Precautionary motives were mentioned at all, 0 if not mentioned	+
New_BEQ	1 if Bequest motives were mentioned at all, 0 if not mentioned	+
New_PROFIT	1 if Profit motives were mentioned at all, 0 if not mentioned	+

6.6 ANALYSES OF DESCRIPTIVE STATISTICS

This section provides analyses of the descriptive statistics of the sample according to their saving propensities. As discussed in Section 6.4, saving propensity is measured as a qualitative ordered variable indicating three levels of saving: negative saving (spending more than income), zero saving (spending equals income), and positive saving (spending less than income); and are labelled as NEGSVG, ZEROSVG an POSITVSVG, respectively. Figure 6.2 illustrates a breakdown of the sample according to their saving propensities.

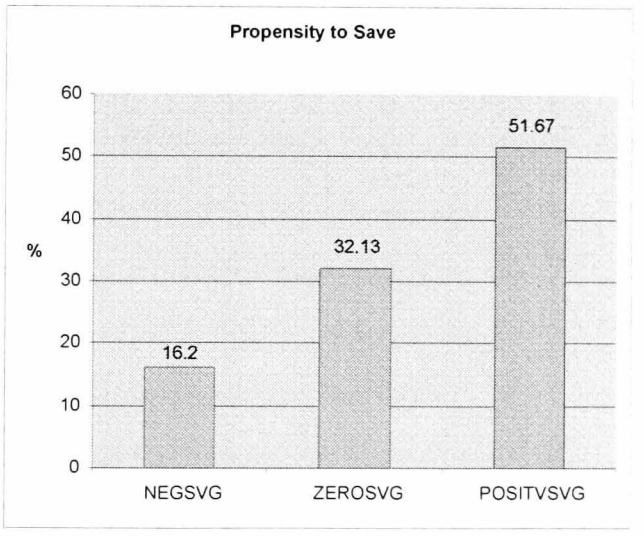


Figure 6.2: Breakdown of sample according to their propensities to save

As noted from the figure above, slightly more than fifty percent of the respondents reported spending less than income (POSITVSVG), 32% reported spending the same amount as income (ZEROSVG), and about 16% of the sample reported negative saving spending more than income (POSITVSVG). These figures suggest that about half the sample is unable to save, and in fact, dissave. To further identify who amongst the sample fall into each saving category, tabulation on saving propensities according to demographic characteristics of the sample, are performed and shown in Table 6.2 to Table 6.5 below.

Generally, the descriptive statistics show that households who reported having a saving motive tend to have positive saving. This can be noted from column (4) of Table 6.2 below, which carries the highest percentages for all categories of saving motives. For these descriptive statistics, the above motives are measured as the first-mentioned motive (see Chapter Five, Sub-section 5.3.1 for an account of the measurement of first-mentioned motives). The above results show that for households with life-cycle motives, 53% have positive saving; for households with precautionary motives, half of these households have positive saving; for families with bequest motives, 52% have positive saving, and for households with profit motives, three-quarters of them have positive saving. The results generally suggest that families who report having saving motives (regardless of which category), are inclined to have saving. However, the univariate tests indicate that households who report having saving motives are also likely to have negative or zero saving, implying that these saving motives are not implemented into actual saving actions. The above table also shows that respondents without any saving motives (as they claim not having money to save, hence have no motives) tend to have negative or zero saving, which can be expected. However, 26% of these household have positive saving, which appear counterintuitive. This finding suggests that these families have unplanned saving, or in other words, they have saving that is not a result of any saving objective.

Table 6.2: Saving propensity according to saving motives

(1)		(2)	(3)	(4)	(5)
VARIABLES		NEGSVG	ZEROSVG	POSITVSVG	TOTAL
SAVING MOTIVES	LC	475 15.80%	935 31.10%	1,596 53.09%	3,006 100.00%
	PREC	180 16.98%	350 33.02%	530 50.00%	1,060 100.00%
	BEQ	40 16.39%	78 31.97%	126 51.64%	244 100.00%
	PROFIT	3 5.08%	12 20.34%	44 74.58%	59 100.00%
	OTHER	34 22.67%	77 51.33%	39 26.00%	150 100.00%

Table 6.3 below describes saving propensity amongst gender groups and marital status categories. The table shows that men were more likely to have positive saving, as opposed to women. About two-thirds of women from the sample, report having negative or zero saving. This contrasts men, where 57% of men in the sample claim to have positive saving. On the surface, it appears that men are thriftier than women. The descriptive statistics also show that married/cohabiting couples are more inclined to save. As noted from Table 6.3, almost 60% of these households have positive saving. Households that fall into the other two categories (previously married or never married), are more likely to have negative or zero saving.

Table 6.3: Saving propensity according to gender and marital status

(1)		(2)	(3)	(4)	(5)
VARIABLES		NEGSVG	ZEROSVG	POSITVSVG	TOTAL
GENDER	Female	231 23.67%	430 44.06%	315 32.27%	976 100.00%
	Male	501 14.14%	1,022 28.85%	2,020 57.01%	3,543 100.00%
MARITAL STATUS	Couples	407 13.63%	826 27.66%	1,753 58.71%	2,986 100.00%
	Previously married	197 20.14%	404 41.31%	377 38.55%	978 100.00%
	Never married	128 23.06%	222 40.00%	205 36.94%	555 100.00%

In terms of age, older households are more likely to have positive saving. This is indicated in Column (4) of Table 6.4. The proportion of households from the upper two age groups (50-64 and 65 & above) are approximately 60% for each age category. In contrast, households in the younger age groups who report having positive saving, range between 34% and 49%. The results indicate that younger households were more likely to fall within the negative saving or zero saving categories.

Table 6.4: Saving propensity according to age groups

(1)		(2)	(3)	(4)	(5)
VARIABLES		NEGSVG	ZEROSVG	POSITVSVG	TOTAL
AGE	Below 20 yrs	2 15.38%	6 46.15%	5 38.46%	13 100.00%
	20-34	165 22.24%	327 44.07%	250 33.69%	742 100.00%
	35-49	263 18.47%	460 32.30%	701 49.23%	1,424 100.00%
	50-64	190 13.00%	394 26.97%	877 60.03%	1,461 100.00%
	65 & above	112 12.74%	265 30.15%	502 57.11%	879 100.00%

Table 6.5 presents the descriptive statistics for households in different work status and race categories. Evidently, more than 70% of self-employed individuals have positive saving, compared to 46% and 43% of individuals who are employed or of other work status, respectively. In terms of race, more than 50% of whites have positive saving. Similar results are noted for households in the 'other' race category. In contrast, only 32% of black households, and 33% of Hispanic households, have positive saving.

Table 6.5: Saving propensity according to employment and race categories

(1)		(2)	(3)	(4)	(5)
VARIABLES		NEGSVG	ZEROSVG	POSITVSVG	TOTAL
WORK STATUS	Employed	417 18.08%	835 36.19%	1055 45.73%	2307 100.00%
	Self-employed	109 9.31%	230 19.64%	832 71.05%	1171 100.00%
	Other work	206 19.79%	387 37.18%	448 43.04%	1041 100.00%
RACE	Other	30 18.07%	43 25.90%	93 56.02%	166 100.00%
	White	490 13.92%	1057 30.02%	1974 56.06%	3521 100.00%
	Black	130 26.86%	200 41.32%	154 31.82%	484 100.00%
	Hispanic	82 23.56%	152 43.68%	114 32.76%	348 100.00%

6.7 UNIVARIATE TESTS

This section presents the results of univariate tests on the propensity of saving. Following the analyses performed in Chapter Five, two-sample tests of proportions were performed for independent variables with only two categories (dichotomous) and ANOVA for independent variables with three or more categories. In addition to the standard ANOVA test, the Kruskal-Wallis nonparametric test, which relaxes the assumptions of normality of distribution and equality of variance, was also conducted. The Kruskal-Wallis rank test compares the median score across the outcome variable, and because there are only three possible outcome variables, the outcome values would have ties, thus 'chi-squared with ties' values were used in the analyses.

Two-sample tests of proportions were performed to compare the proportions of two subgroups within a particular saving propensity group. Generally, the two-sample test of proportions examines whether the two subgroups have statistically significant differences in proportions. The null hypothesis of the test stipulates that within each group of saving propensity, there is no significant difference between the proportions of subgroups while the alternative hypothesis suggests differences in the proportions of subgroups (H_0: $p_1 = p_2$ against H_a: $p_1 \neq p_2$).

Table 6.6a and Table 6.6b summarize the results of the tests of different proportions. As noted from row (1) in Table 6.6a, the results show that among gender groups, the proportion of females with positive saving is 32%, while the proportion of males with positive saving is 57%. Similarly, there appears to be a larger percentage of women, as opposed to men, in the negative saving and zero saving categories. Specifically, 24% of women, compared to 14% of men in the sample, have negative saving. The proportion of women with zero saving is 44%, while the proportion of men having zero saving is 28%. The differences in these proportions are statistically significant, hence, rejecting the

null hypothesis that the proportions of men and women within each saving propensity category are equal. Generally, these results suggest that between the two genders, men are more likely to save.

Table 6.6a: Results of univariate tests (1)

	VARIABLE	OBS	POSITVSVG				ZEROSVG				NEGSVG			
1	GENDER		Mean	SE	z	p-value	Mean	SE	z	p-value	Mean	SE	z	p-value
	Female	976	0.3227	0.0150			0.4406	0.0159			0.2367	0.0136		
	Male	3543	0.5701	0.0083	-13.69	0.0000	0.2885	0.0076	9.01	0.0000	0.1414	0.0059	7.15	0.0000
2	MARITAL	OBS	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value
	COUPLE	2986	0.5871	0.4924			0.2766	0.4474			0.1363	0.3431		
	PRVMAR	978	0.3855	0.4870			0.4131	0.4926			0.2014	0.4012		
	NVRMAR	555	0.3694	0.4831	174.9	0.0001	0.4000	0.4903	80.86	0.0001	0.2306	0.4216	44.98	0.0001
3	AGE	OBS	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value
	Less than 20	13	0.3846	0.5064			0.4615	0.5189			0.1538	0.3755		
	20-34	742	0.3369	0.4730			0.4407	0.4968			0.2224	0.4161		
	35-49	1424	0.4923	0.5001			0.3230	0.4678			0.1847	0.3882		
	50-64	1461	0.6003	0.4900			0.2697	0.4439			0.1300	0.3365		
	65 & above	879	0.5711	0.4952	151.6	0.0001	0.3015	0.4592	69.12	0.0001	0.1274	0.3336	44.05	0.0001
4	RACE	OBS	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value
	White	3521	0.5606	0.4964			0.3002	0.4584			0.1392	0.3462		
	Black	484	0.3182	0.4663			0.4132	0.4929			0.2686	0.4437		
	Hispanic	348	0.3276	0.4700			0.4368	0.4967			0.2356	0.4250		
	Other	166	0.5602	0.4979	154.7	0.0001	0.2590	0.4394	50.16	0.0001	0.1807	0.3860	68.35	0.0001
5	WORK STATUS	OBS	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value	Mean	StdDev	χ^2	p-value
	Employed	2307	0.4573	0.4983			0.3619	0.4807			0.1808	0.3849		
	Self-employed	1171	0.7105	0.4537			0.1964	0.3975			0.0931	0.2907		
	Other	1041	0.4304	0.4954	239.8	0.0001	0.3718	0.4835	113.4	0.0001	0.1979	0.3986	56.81	0.0001

Note: These two-sample tests of proportions are run on the first implicate and without weights, as these options are not allowed for this test on STATA.

Table 6.6b: Results of univariate tests (2)

	VARIABLE	OBS	POSITVSVG				ZEROSVG				NEGSVG			
6	INCOME	OBS	Mean	StdDev	χ^2	*p*-value	Mean	StdDev	χ^2	*p*-value	Mean	StdDev	χ^2	*p*-value
	<$10,000	315	0.2349	0.4246			0.4889	0.5007			0.2762	0.4478		
	$10k – 24,999	666	0.2628	0.4405			0.4955	0.5004			0.2417	0.4285		
	$25k – 49,999	977	0.3429	0.4749			0.4289	0.4952			0.2282	0.4199		
	$50k – 99,999	952	0.5326	0.4992			0.3120	0.4635			0.1555	0.3625		
	$100,000-199,999	572	0.6276	0.4839			0.2640	0.4412			0.1084	0.3111		
	$200,000-499,999	366	0.7678	0.4228			0.1448	0.3524			0.0874	0.2829		
	$500,000-999,999	168	0.8571	0.3510			0.0952	0.2944			0.0476	0.2136		
	$1000k & more	503	0.9145	0.2799	908.4	0.0001	0.0636	0.2443	438.8	0.0001	0.0219	0.1464	209.4	0.0001
7	SAVING MOTIVES	OBS	Mean	SE	χ^2	*p*-value	Mean	SE	χ^2	*p*-value	Mean	SE	χ^2	*p*-value
	LC	3006	0.5309	0.4991			0.3110	0.4630			0.1580	0.3648		
	PREC	1060	0.5000	0.5002			0.3302	0.4705			0.1698	0.3756		
	BEQ	244	0.5164	0.5008			0.3197	0.4673			0.1639	0.3710		
	PROFIT	59	0.7458	0.4392			0.2034	0.4060			0.0508	0.2216		
	OTHER	150	0.2600	0.4401	55.59	0.0001	0.5133	0.5015	30.96	0.0001	0.2267	0.4201	10.82	0.0286

Note: Two-sample tests of proportions were performed for independent variables with only two categories (dichotomous), while ANOVA and Kruskal-Wallis tests were conducted for independent variables with three or more categories.

In terms of marital status, row (2) of the Table 6.6a indicates that the proportion of married/cohabiting couples with positive saving is close to 60%. This compares starkly with the proportion of households who are single. The proportion of household heads that are divorced, widowed or separated with positive saving is 39%, while the proportion of those who have never been married with positive saving is 40%. These results show significant differences between the households of different marital status, who have positive saving. Overall, the percentage of married/cohabiting households with zero or negative saving is significantly lower compared to 'single'-headed households. The results suggest that couples are more likely to have positive saving.

Results of the univariate tests also indicate significant differences in the proportion of households in various age groups and their saving propensities. This can be seen from row (3) of Table 6.6a. The proportion of households in the two highest age groups ('50-64' and '65 & above') with positive saving, is highest compared to other households in the other age groups. The proportion of households with zero saving is highest amongst the youngest age category (less than 20). Meanwhile, the proportion of households in the negative saving category is highest for those in the 20-34 age group. Overall, the results indicate significant differences in the proportion of households within each saving propensity category.

As noted from row (4) of Table 6.6a, the proportion of African-American and Hispanic households appears to be concentrated in the zero saving category and results indicate that these proportions are significantly higher compared to the other races (whites and other races). Meanwhile, the proportion of white households and those of other race category appear to be concentrated in the positive saving category, and least concentrated in the negative saving category. The results suggest that white households and 'other' race households are more likely to have higher saving propensities.

The univariate tests also show statistically significant differences between the proportion of households of different employment categories and the various saving propensity groups. Row (5) of Table 6.6a shows that the proportion of self-employed individuals with positive saving is 71%, the proportion of

employed individuals with positive saving is 46%, and the proportion of other work status categories with positive saving is 43%. This suggests that positive saving is more prevalent amongst households who are self-employed, compared to households in other work status categories. Likewise, the percentage of self-employed households with zero or negative saving is also the lowest compared to the other work status categories.

The proportion of households in various income groups and different saving propensities are significantly different, suggesting that income is an important indication of the ability to save. Results of the ANOVA and Kruskal Wallis tests (as shown in row (6) of Table 6.6b) suggest that the proportion of households with positive saving increases with income. For instance, the proportion of households in the lowest income category (below $10,000) with positive saving is 23%, while the proportion of households in the highest income category ($1 million and above) with positive saving is 91%. Comparatively, the proportion of low income households (below $10,000) with negative saving is 28%, while the proportion of high income households ($1 million and above) is only 2%. Clearly, the results imply that as income rises, the propensity to save also increases.

In terms of saving motives, the univariate tests reveal significant difference in the proportion of households having different saving motives, and their saving propensities. This is shown in row (8) of Table 6.6b. The proportion of households with profit motives as their first most important motive is the highest in the positive saving motive category. Specifically, the proportion of households with profit motives as their most important saving objective and have positive saving, is 75%. This compares to 53% for households with life-cycle motives, 50% for precautionary motives, and 52% for bequest motives. Households that do not report any specific reason to save, have the lowest proportion in the positive saving category. Ironically, the results show that 26% of households who do not have any motives to save (either because they do not have any money or simply could not save) have positive saving. This group of households has the highest percentage in the negative and zero saving categories, which is expected given that they do not have any saving motive.

Overall, the results indicate that the proportion of households who reported having a saving motive, are likely to have positive saving. Figure 6.5 below illustrates the saving propensities of respondents within each type of saving motives. The histogram illustrates the observations mentioned earlier.

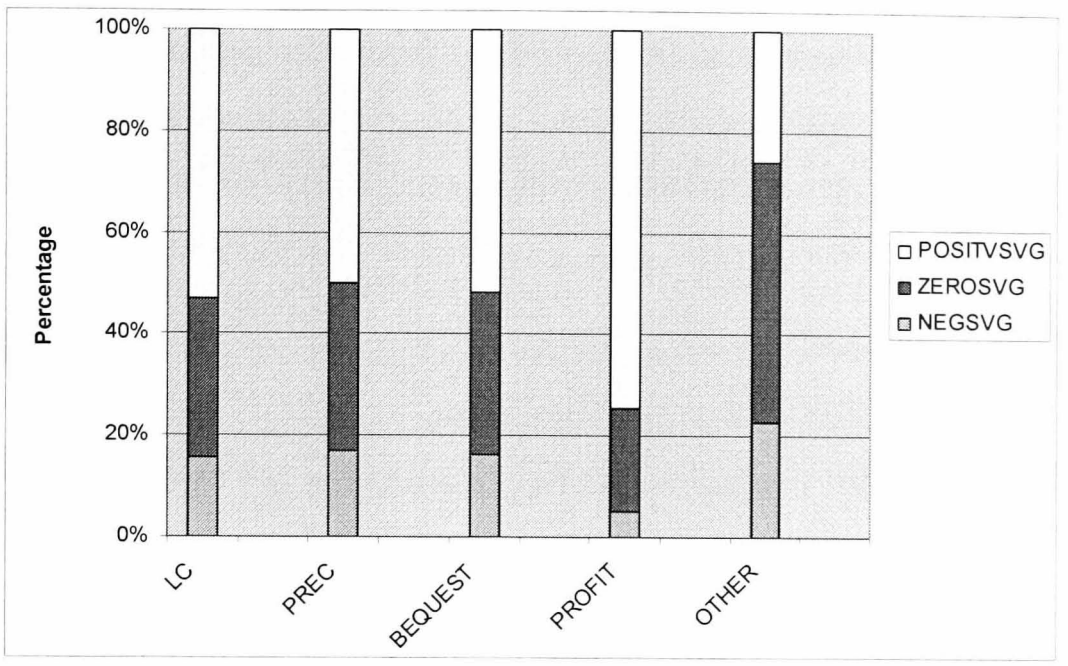


Figure 6.3: Saving Propensity by Saving Motives

This section has presented univariate tests on saving propensity. The following section continues with the model specification for the multivariate tests.

6.8 MODEL SPECIFICATION: ORDERED LOGISTIC REGRESSION

This section presents the model specification for the research question in hand. To analyze the impact of the independent variables on the propensity to save, an ordered logit was deemed appropriate for analysis. The choice of analysis is guided by the fact that the dependent variable is ordinal in nature, to reflect the levels of saving propensities (refer back to Sub-section 6.4.1 for a discussion on the measurement of saving). The main references for the rest of this section are Menard (2002), Verbeek (2004) and Borooah (2001).

An ordered logistic regression (OLR) is a statistical technique that is used when the dependent variable is categorical and at the same time reflects an ordinal nature (from low to high), although the exact distances between the levels are unclear. The OLR is also known as the proportional odds model

which assumes that the likelihood ratio for being in a particular category or higher in relation to being in a lower category is the same regardless of which category is chosen. To perform the OLR, the dependent variable can take on any number as long as the values are in the correct order. A positive coefficient reflects an increased probability that a respondent with a higher score on the explanatory variable will be in a higher category of the dependent variable. For the research question under investigation, the dependent variable is ordinal whereby three levels of saving are assumed. The levels indicate negative, zero and positive saving, and are coded as 1, 2 and 3, respectively.

In the ordered logistic model, y is the observed ordinal dependent variable, and is a function of an unobserved latent variable, y^*. Assuming that there are M alternatives, numbered 1 to M, the function of the latent variable is expressed as

$$y_i^* = \boldsymbol{x_i'}\boldsymbol{\beta} + \varepsilon_i$$

and $$y_i^* = j \text{ if } \delta j\text{-}1 \leq y_i^* \leq \delta_j,$$

where $\boldsymbol{x_i}$ is a vector of independent variables and $\boldsymbol{\beta}$ is the set of parameters to be estimated. The probability that alternative j is chosen is the probability that the latent variable y_i^* is between the two threshold points $\delta j\text{-}1$ and δ_j. For the present study, there are three levels of saving propensities, coded as 1, 2 and 3. Hence, the value of the observed variable y (saving propensity) depends on whether a particular threshold has been crossed. When M=3 as in this study, the ordered response model can be written as

$$y_i^* = \boldsymbol{x_i'}\boldsymbol{\beta} + \varepsilon_i$$
$$y_i = 1 \text{ if } y_i^* \leq 0$$
$$y_i = 2 \text{ if } 0 \leq y_i^* \leq \delta$$
$$y_i = 3 \text{ if } y_i^* > \delta,$$

where $\boldsymbol{x_i'}$ is a group of independent variables comprising demographic characteristics of the household (AGE, MALE, EDU, PEU, COUPLE, BLACK, HISPANIC, OTHER_RACE, EMPLOYED, OWNBIZ) and "any-mentioned" saving motive (New_LC, New_PREC, New_BEQ,

New_PROFIT), $\boldsymbol{\beta}$ are the set of parameters to be estimated, and ε is the error term, and The probabilities of y_i taking values of 1, 2 and 3, are given by

$$P\{y_i = 1 \mid x_i\} = P\{y_i^* \leq 0 \mid x_i\} = \Phi\,(-x_i'\beta)$$

$$P\{y_i = 3 \mid x_i\} = P\,\{y_i^* > \delta \mid x_i\} = 1 - \Phi(\delta - x_i'\beta)$$

and $$P\{y_i = 2 \mid x_i\} = \Phi(\delta - x_i'\beta) - \Phi\,(-x_i'\beta)\,,$$

where δ is an unknown parameter that is estimated jointly with $\boldsymbol{\beta}$. The estimation is a maximum likelihood estimation, in which the probabilities shown above enter the likelihood function. The $\boldsymbol{\beta}$ coefficients are interpreted in terms of the underlying latent variable in the model. A positive value of $\boldsymbol{\beta}$ suggests that the corresponding independent variable increases the probability of being in a higher saving propensity category.

Having discussed the model specification and briefly explaining about the choice of analysis, the following section presents the results of the multivariate analysis.

6.9 RESULTS OF MULTIVARIATE ANALYSIS

This section provides the results of the multivariate tests that were conducted on saving propensity. The section comprises two sub-sections: Sub-section 6.9.1 presents the results of the analysis for the total sample, while Sub-section 6.9.2 provides the results of the analysis according to income quartiles.

6.9.1 The propensity to save for the overall sample

To test the impact of the explanatory variables as explained in Section 6.8, an ordered logit regression was run on SVGPROPENSITY as the dependent variable, using the total number of observations in the sample. The results are shown in Table 6.7 below.

Table 6.7: Ordered Logit Regression on SVGPROPENSITY for the total sample

Independent Variables	Coef.	Odds Ratio	Robust SE	*z*	*p*>|*z*|
AGE	0.0089	1.0090	0.0026	3.42	0.001
MALE	0.2963	1.3449	0.1065	2.78	0.005
EDU	0.0215	1.0217	0.0137	1.57	0.117
PEU	-0.2528	0.7766	0.0332	-7.61	0.000
COUPLE	0.1221	1.1298	0.1152	1.06	0.289
BLACK	-0.1410	0.8685	0.1048	-1.35	0.179
HISPANIC	-0.0414	0.9595	0.1252	-0.33	0.741
OTHER_RACE	0.0590	1.0607	0.2023	0.29	0.771
EMPLOYED	0.1061	1.1119	0.0992	1.07	0.285
OWNBIZ	0.1872	1.2059	0.1338	1.40	0.162
CTOTINC	0.0476	1.0488	0.0042	11.32	0.000
New_LC	0.4560	1.5778	0.1523	2.99	0.003
New_PREC	0.5792	1.7846	0.1530	3.79	0.000
New_BEQ	0.3121	1.3662	0.1817	1.72	0.086
New_PROFIT	0.9266	2.5258	0.3414	2.71	0.007
No. of Obs=22550; Wald Chi2(16) = 417.25; Prob > chi2 = 0.0000; Pseudo R2=0.063; Std. Err. adjusted for 4510 clusters in HOUSEHOLD					

H_{B1}: Age is related to the household's propensity to save (+)

As can be observed from Table 6.7, results indicate that age is a significant determinant of the propensity to save. The positive relationship between the age and saving propensity implies that older individuals are more likely to have higher saving, as opposed to their younger counterparts, when all other factors in the model are held constant (z = 3.42; p=0.001). This finding provides support to the earlier discussion in Sub-section 6.5.1 that age is reflective of financial knowledge and literacy, as suggested by Lusardi and Mitchell (2007). In addition, the results show that younger individuals are more likely to have lower saving propensities, and therefore, are consistent with the evidence that younger households are more likely to be financially excluded (Devlin, 2005, 2009).

The findings support the proposition that age is an indication of experience, knowledge, and financial literacy. The saving decision entails not only the simple act of deciding whether to save or not to save but also proper planning, which involves estimating required amounts to save to achieve financial goals,

evaluation of financial risk and returns, as well as implementation and monitoring of saving plans after the strategies have been laid out. The positive relationship between age and saving propensity implies that older individuals are more competent and financially knowledgeable in managing their financial affairs, and therefore, have higher propensities to save.

H_{B2}: Gender (MALE) is related to the household's propensity to save (+)

The results in Table 6.7 reveal that households who are headed by men (in contrast to those headed by women) have higher saving propensities, holding other factors constant (z=2.65, p=0.008). This finding supports prior research that have revealed varying financial behaviour between men and women, plausibly due to differences in financial literacy (e.g. Chen & Volpe, 2002, Volpe *et al.*, 1996; Goldsmith & Goldsmith, 1997). As discussed in Sub-section 6.5.1, women (as opposed to men) have been found to be more risk averse, less financially knowledgeable, less willing to commit in long-term saving plans, and therefore, have lower propensities to save. The results are consistent with past research that shows higher saving among men, as opposed to women (Harris *et al.*, 2002; Alessie *et al.*, 1995).

H_{B6}: Household size (PEU) is related to the household's propensity to save (-)

As noted in Table 6.7, household size significantly affects the propensity to save (z= -7.50; p=0.000). The negative relationship between PEU and SVGPROPENSITY implies that larger households are less capable of deferring consumption to future periods, possibly as a result of having lower discretionary saving. The results are consistent with previous studies that have revealed a negative relationship between the number of children in the household and saving rates (Lusardi, 2000; Bosworth *et al.*, 1991; Avery & Kennickell, 1991). In addition, the findings from the present study are reflective of Devlin's (2005) argument that *resource exclusion* is more widespread amongst larger households (i.e. when families are larger, resources

tend to be channeled to other expenditure, as opposed to being kept in saving instruments), resulting in a higher probability of being financially excluded.

H_{B3}: Income is related to the household's propensity to save (+)

Income significantly impacts the households' propensity to save ($z = 11.32$, $p = 0.000$), supporting the results of past studies that have shown a positive relationship between income and saving. In the U.S., for example, a large portion of total saving is attributed to families in the top decile of the income contribution (Avery & Kennickell, 1991), while in Australia, the top percentile of households hold more than fifty percent of Australian wealth (Dilnot, 1990). The results of the present study render support to the propositions of the life-cycle/permanent income hypothesis positing that households tend to maintain a constant level of consumption throughout life, and will save the residual amounts of their income, if any.

The results clearly indicate that poor households have lower saving propensities, and are more likely to be in the lower two saving propensity categories of this study (having zero or negative saving). Past research studies have similarly shown negative saving rates in the lower income group (Bosworth *et al.*, 1991). Hubbard *et al.* (1995) suggest that the low saving rates amongst poor households are a result of the receipt of social insurance. Furthermore, the results are consistent with past research (Devlin, 2005, 2009; Kempson & Whyley, 1999) that suggests that low income households are more likely to be financially excluded.

H_C: Saving motives are related to the household's propensity to save (+)

Results from Table 6.5 reveal that all four saving motives significantly impact on the propensity to save. Although the results indicate the relative statistical significance of the variables, evaluation of the relative *strength* of the impact is performed using marginal effects tests. Results of the test reveal that the

marginal effect is largest for profit motives (z=2.89, p=0.004), followed by precautionary motives (z=3.79, p=0.000), life-cycle motives (z=3.02, p=0.003), and lastly, bequest motives (z=1.70, p=0.089) (full results are shown in Table 6a in the Appendix).

This study provides evidence that saving motives concurrently exist at a single point in time, as emphasized in the literature (e.g. Wärneryd, 1999; Browning & Lusardi, 1996; Dynan *et al.*, 2002). In this case, all four saving motives emerge as significant drivers of household saving. When present, saving to achieve returns or profits is the strongest motive driving saving decisions, as noted from the significant relationship between profit motives and saving propensity, and results of the marginal effects test. *Prudence* (Kimball, 1990) also appears to be a compelling behaviour directing positive influence on the propensities to save, as reflected in the high significance of precautionary motives on household saving. At the same time, the results also suggest that households strive to maintain constant levels of real expenditure, in preparation for the stages in life in which income will be depleted (e.g. during retirement). Bequest motives appear to be the least important saving motive driving saving propensity, relative to the other saving motives.

The findings of this study reinforce the argument by Dynan *et al.* (2002) asserting that saving motives concurrently exist and overlap each other. As discussed in Section 6.2, Dynan *et al.* (2002) propose that saving is an outcome of two main objectives: precautionary motives (which function in a life-cycle model), and also bequest motives. Households save primarily as a protection against possible adverse events that may occur in the future, but in the fortunate circumstance that these adversities do not happen, bequest motives become operative. Results of this study allow the construction of a ranking of motives (when all motives are present), in which bequest motives emerge as the least important saving motive. This finding renders support to Dynan *et al.*'s (2002) proposition that bequest motives produce a residual effect only after the other motives are operationalized.

In summary, the multivariate analyses suggest that both *planned* and *unplanned* saving behaviour affect the household's propensity to save. As

conceptualized in Section 6.3, unplanned saving is reflected in characteristics of the household, while planned saving is denoted by the intentions or motives to save. Results of the multivariate analysis, as shown above, reveal that all saving motives and several household demographic characteristics, affect the propensity to save. A joint significance test on saving motives suggests that all motives, collectively, have considerable impact on household saving. Similarly, a joint test on all the other variables (income and demographic variables) indicate that unplanned saving significantly affects the propensity to save.

To determine whether planned or unplanned saving more significantly affects household saving, the specification model was re-run twice, (i) with all explanatory variables except for the four saving motives, and (ii) with all saving motives but excluding all the other variables. The log pseudo-likelihoods of these two alternative specifications were then compared with the log pseudo-likelihood of the original specification to gauge the magnitude of differences. It appears that the variables classified under *unplanned saving* have a greater impact on saving. It can thus be inferred that although both planned and unplanned saving behaviour give rise to actual saving, unplanned saving provides a greater impact on the propensity to save.

6.9.2 The propensity to save amongst households of different income quartiles

To further analyze the effect of saving motives on the propensity to save, the sample is divided into four groups, according to income quartiles. This analysis is viewed imperative as the earlier results show that income is one of the most significant determinants of the propensity to save, and hence, further evaluation is deemed necessary to allow for the fact that motives may vary by income quartile. The cut-off points of quartiles are based on the value of total income, which Chapter Four (Sub-section 4.8.2) explains as the sum of investment income and non-capital income. The quartiles of income are indicated below:

Quartile 1: $21,500 and under

Quartile 2: $21,001 – 42,000

Quartile 3: $42,001 – 75,000

Quartile 4: $75,001 and over

To perform the analysis, ordered logit regressions were re-run using the same independent variables as in the previous model, although excluding the income variable (CTOTINC). The results are discussed in the following parts (Part 1-4).

1) Quartile 1

Results of the ordered logit regression for households in the first income quartile are shown in Table 6.8 below. Overall, the results are rather similar to those of the total sample, although with several differences. The first observed difference is that gender no longer predicts saving propensity for poor households. In addition, two additional variables are notably significant for these poor households, these being education level and marital status.

Table 6.8: Ordered Logit Regressions on SVGPROPENSITY (Quartile 1)

Independent Variables	Coef.	Odds Ratio	Robust Std. Err.	*z*	*p*>|*z*|
AGE	0.0097	1.0097	0.0046	2.11	0.035
MALE	-0.0738	0.9288	0.1728	-0.43	0.669
EDU	0.0479	1.0491	0.0253	1.90	0.058
PEU	-0.2885	0.7494	0.0715	-4.03	0.000
COUPLE	0.5542	1.7405	0.2429	2.28	0.023
BLACK	0.0289	1.0293	0.1791	0.16	0.872
HISPANIC	0.1174	1.1245	0.2231	0.53	0.599
OTHER_RACE	-0.0762	0.9266	0.4302	-0.18	0.859
EMPLOYED	0.0322	1.0327	0.1778	0.18	0.856
OWNBIZ	0.3150	1.3702	0.3282	0.96	0.337
New_LC	0.4401	1.5529	0.2236	1.97	0.049
New_PREC	0.4888	1.6303	0.2209	2.21	0.027
New_BEQ	0.4714	1.6023	0.2828	1.67	0.096
New_PROFIT	1.9951	7.3529	0.6193	3.22	0.001
No. of obs=4210; Wald Chi2(14) = 40.45; Prob > chi2 = 0.0000; Pseudo R2=0.0299; Std. Err. adjusted for 881 clusters in HOUSEHOLD					

As can be noted from the above table, educational attainment significantly predicts saving propensities amongst low income families. The results suggest that assuming all factors are constant, household heads that are more educated are also more able to save. The evidence from the present study does support results of prior research, which also showed positive relationships between education and saving (Alessie *et al.*, 1995; Avery & Kennickell, 1991; Douglas *et al.*, 1993).

In addition, this finding is indicative of higher levels of financial knowledge and decision-making capabilities amongst household with higher education, hence, promoting saving amongst these households. The results are in line with the findings by Lusardi and Mitchell (2007) that reveal a positive relationship between financial literacy and educational attainment. Furthermore, the results of this study reinforce the findings of Devlin (2009) indicating that people with low education levels are more likely to be financially excluded, and therefore, have lower saving.

The results indicate that married/cohabiting couples in the first quartile are more likely to save, supporting the results of prior research (e.g. Alessie *et al.*, 1999; Bosworth *et al.*, 1991; Avery & Kennickell, 1991). As suggested by Devlin (2005), couples are less likely to be financially excluded, and therefore more likely to conduct saving. The results also substantiate the notion from Sub-section 6.5.1 that the presence of a significant other contributes positively to saving decisions.

In terms of saving motives, the results are similar to those of the overall sample, whereby all motives are relevant to saving propensity. An analysis on the marginal effects of explanatory variables on SVGPROPENSITY reveal that profit motives appear to be the most significant ($z=3.57$, $p=0.000$), followed by precautionary ($z=2.13$, $p=0.03$), life-cycle ($z=1.92$,$p=0.06$), and bequest motives ($z=1.54$, $p=0.122$).The relative importance of these motives indicates that poor households are highly driven by the objective of achieving high returns from saving. Meanwhile, bequest motives are the least important saving motive driving saving behaviour, similar to the results of the overall sample.

2) Quartile 2

The results of the ordered logit regression for households in the second income quartile category are shown in Table 6.9 below.

Table 6.9: Ordered Logit Regressions on SVGPROPENSITY (Quartile 2)

Independent Variables	Coef.	Odds Ratio	Robust SE	z	P>|z|
AGE	0.0132	1.0133	0.0051	2.58	0.010
MALE	0.5146	1.6730	0.1917	2.68	0.007
EDU	0.0497	1.0509	0.0260	1.91	0.056
PEU	-0.2790	0.7566	0.0698	-4.00	0.000
COUPLE	0.2384	1.2693	0.2075	1.15	0.250
BLACK	-0.0200	0.9802	0.1881	-0.11	0.915
HISPANIC	0.0376	1.0383	0.2261	0.17	0.868
OTHER_RACE	-0.2826	0.7538	0.4651	-0.61	0.543
EMPLOYED	0.2320	1.2611	0.1985	1.17	0.243
OWNBIZ	0.0317	1.0322	0.2795	0.11	0.910
New_LC	0.3088	1.3619	0.2649	1.17	0.244
New_PREC	0.6035	1.8286	0.2645	2.28	0.023
New_BEQ	0.0693	1.0718	0.3260	0.21	0.832
New_PROFIT	0.4836	1.6220	0.5838	0.83	0.407
No. Of obs=4348; Wald Chi2(14) = 61.78; Prob > chi2 = 0.0000; Pseudo R2=0.0348 Std. Err. adjusted for 951 clusters in HOUSEHOLD					

For this group of households, age, gender, education and household size appear to be highly relevant to the propensity to save. These results are more or less equivalent to the results for the total sample, with the exception of education. As with households in the first quartile, results imply that individuals who have higher levels of education are more likely to save. Generally, the findings suggest that for households in the lower income quartiles, having the financial knowledge is an added advantage that can positively impact on saving behaviour.

For households in the second quartile, only one motive significantly influences saving, that is, the precautionary motive. The results imply that these households are prudent and are concerned about the household's financial well-being in the event of life's uncertainties that may affect earning ability. None of the other motives are significantly related to saving propensity for these households.

3) Quartile 3

Table 6.10 below presents the results of the ordered logit regression on Quartile 3. Compared to the overall sample, more variables are significantly related to the propensity to save. These are, gender, household size, marital status, race, employment status, and two saving motives (precautionary and life-cycle motives).

Table 6.10: Ordered Logit Regression on SVGPROPENSITY (Quartile 3)

Independent Variables	Coef.	Odds Ratio	Robust SE	z	P>|z|
AGE	0.0190	1.0192	0.0054	3.51	0.000
MALE	0.8641	2.3729	0.2854	3.03	0.002
EDU	-0.0165	0.9837	0.0322	-0.51	0.609
PEU	-0.2533	0.7763	0.0604	-4.20	0.000
COUPLE	-0.4761	0.6212	0.2610	-1.82	0.068
BLACK	-0.5075	0.6020	0.2379	-2.13	0.033
HISPANIC	-0.2807	0.7553	0.2896	-0.97	0.332
OTHER_RACE	0.2537	1.2888	0.4095	0.62	0.535
EMPLOYED	0.6026	1.8269	0.2037	2.96	0.003
OWNBIZ	0.5597	1.7502	0.2665	2.10	0.036
New_LC	0.9380	2.5550	0.5046	1.86	0.063
New_PREC	1.1381	3.1209	0.5106	2.23	0.026
New_BEQ	0.5312	1.7009	0.5604	0.95	0.343
New_PROFIT	0.9991	2.7159	0.7237	1.38	0.167
No. Of obs=4274; Wald Chi2(15) = 89.16; Prob > chi2 = 0.000; Pseudo R2=0.0491 Std. Err. adjusted for 936 clusters in HOUSEHOLD					

The results, as shown in the above table, indicate that men are more likely to have higher saving propensity, as with older heads of households. Similar to previous results in regards to quartiles 1 and 2, larger households have lower propensities to save. In addition, couples have lower saving propensities as opposed to individuals who are single. This result is rather puzzling and contradicts past research (Alessie *et al.*, 1999; Avery & Kennickell, 1991). A likely explanation is that it may be due to higher consumption levels amongst couples, as opposed to single-headed households.

For households in the third income quartile, African-American households appear to have lower saving propensities as opposed to white households. This finding supports the argument in Sub-section 6.5.1 that minority ethnic groups

(blacks and Hispanics) are more likely to be financially illiterate (Lusardi & Mitchell, 2007) and hence, conduct less saving. Furthermore, the results are consistent with Cancio *et al.* (1996) indicating that blacks are less financially privileged as opposed to whites, and therefore, are less able to save.

The evidence indicates that respondents, who are employed and self-employed, are more likely to be in a higher saving propensity category, as opposed to individuals from the other employment category (students, retirees, and unemployed individuals). These results are intuitive and can be explained by the fact that employed and self-employed individuals are more likely to have a regular and reliable income stream, compared to individuals in the base group.

Two saving motives (i.e. life-cycle and precautionary motives) positively help to predict saving propensity for households in the third quartile. The effect of precautionary motives appears to be stronger compared to life-cycle motives, as reflected in the marginal effects for precautionary motives (z=2.36, p=0.018) and life-cycle motives (z=1.94, p=0.053). The findings indicate that the intentions to save are driven by the uncertainty of future income, as well as other risks that affect earning ability. Life-cycle motives are also important in the decision to save, although to a lesser extent. The other two saving motives (profit and bequest) do not affect the propensity to save for households in this quartile.

4) Quartile 4

Lastly, an ordered logit regression was conducted on the fourth income quartile of which results are shown in Table 6.11 below. As opposed to the overall sample, fewer variables showed statistical significance with the dependent variables.

Table 6.11: Ordered Logit Regression on SVGPROPENSITY (Quartile 4)

Independent Variables	Coef.	Odds Ratio	Robust SE	z	P>|z|
AGE	-0.0012	0.9989	0.0069	-0.17	0.868
MALE	0.2745	1.3159	0.3897	0.70	0.481
EDU	0.0566	1.0582	0.0335	1.69	0.091
PEU	-0.1910	0.8261	0.0587	-3.25	0.001
COUPLE	0.2025	1.2244	0.2842	0.71	0.476
BLACK	-0.4958	0.6091	0.3210	-1.54	0.122
HISPANIC	0.1197	1.1272	0.3777	0.32	0.751
OTHER_RACE	-0.1201	0.8868	0.3262	-0.37	0.713
EMPLOYED	-0.1106	0.8953	0.2483	-0.45	0.656
OWNBIZ	0.1935	1.2135	0.2617	0.74	0.460
New_LC	0.5073	1.6608	0.5525	0.92	0.359
New_PREC	0.4586	1.5818	0.5594	0.82	0.412
New_BEQ	0.9174	2.5027	0.6107	1.50	0.133
New_PROFIT	0.1338	1.1431	0.7294	0.18	0.854
No. Of obs=9763; Wald Chi2(14) = 22.91; Prob > chi2 = 0.062; Pseudo R2=0.0151 Std. Err. adjusted for 1986 clusters in HOUSEHOLD					

Generally, the results from Table 6.11 indicate that the propensity to save amongst households in the highest income quartile is least affected by household characteristics and saving motives. Only two variables, i.e. PEU (household size) and EDU (education) appear to be significantly related to saving. The results show that larger households have lower propensities to save, supporting earlier predictions that larger families have lower discretionary saving as a result of higher expenditure levels.

A key difference observed in the results is that saving motives are unrelated to the propensity to save for rich households. As discussed in Sub-section 6.3.2, having excessive levels of income may result in unplanned saving, as these households are not in the habit of spending the entire amount of residual income. Saving arises by default, when there is excess of income over consumption. These results strongly support the proposition that income is a significant determinant of saving propensity, to the extent that practically none of the other variables in the model are relevant in the saving decision of rich households.

6.10 DISCUSSION

This chapter explored the underlying determinants of saving behaviour, with a focus on the role of saving motives. Specifically, the chapter sought to find answers to the second research question, given as: *What is the relationship between saving antecedents and motives, and the household's propensity to save?* Two broad groups of explanatory variables were examined, that is, saving motives, and socio-demographic characteristics of the household. The rationale for studying these two groups of independent variables was based on the idea that households have *planned* and *unplanned* saving. Planned saving is derived from *saving motives*, which are posited to positively impact on saving propensity. Unplanned saving arises due to capabilities and opportunities to save, which are inherent characteristics of the household. Capabilities to save are considered demand-side abilities to save attributed to idiosyncrasies specific to the household, such as age, household size, ethnic background, education, income, gender, and employment status. Opportunities to save are viewed to originate from the supply-side of the saving market, whereby saving institutions have the power to determine accessibility of population groups into the financial system. Restrictions arising from operational practices of the saving industry may consequentially lead to exclusion of certain groups from gaining access to financial services.

The overall results suggest that saving motives are indeed significant drivers of household saving. Findings from Sub-section 6.9.1 indicate that all saving motives are significant determinants of the propensity to save. In particular, the profit saving motive appears to have the strongest effect, as reflected in results of the marginal effects test. This finding suggests that, when present, the intentions to derive gains or returns from saving most compellingly drive actual implementation of these motive. The second most important motive is the precautionary motive, suggesting that households are typically concerned about uncertainties that occur in the future. Life-cycle motives are the third most important saving motive, followed by profit motives, and lastly, bequest motives. These findings strongly support the argument by Dynan *et al.* (2002) that several motives exist at a single point in time and overlap each other. In the aforementioned study, it was suggested that households save to prepare for

uncertainties in life, but at the same time, households have intentions to bequeath wealth to the next generation. The bequest motive operates only when precautionary motives become redundant in the event that future developments in life are not as grave as households expect them to be.

Households appear to display compellingly prudent behaviour, based on the observation that precautionary motives are prevalent amongst households in the first three quartiles. The importance of precautionary motives supports prior works that have found strong evidence of the motive (e.g. Kennickell & Lusardi, 2001, Carroll *et al.*, 2003; Lusardi, 2000). This is an indication that households are concerned about the well-being of their families, in the event that life adversities take a toll on the main breadwinner. Nonetheless, profit motives seem to be the most vital motive influencing saving for households in the first quartile, implying that poor households save with the intention to make more returns on their savings.

Bequest motives emerged significant only for households in the first quartile, and as with the overall sample, is the least important motive. For households in the upper three quartiles, bequest motives were insignificant. This implies that bequest motives may be an afterthought and are unintended, supporting the argument by Abel (1985) that individuals are selfish and bequests are 'accidentally' left behind to the family.

A striking observation is that saving motives are not relevant for wealthy households. As noted from the results, none of the motives significantly determined saving propensity for households in the top quartile. This finding supports the notion put forth in Sub-section 6.3.2 whereby it is suggested that saving for these households is likely to be unplanned, and occur only as a result of having excess of income after consumptions are made.

In terms of household characteristics, several variables are notably important in household's ability to save. Household size appears to be significantly relevant for all households, regardless of income level. The negative relationship between PEU and SVGPROPENSITY clearly indicates that larger households face difficulty in saving. This finding is intuitive and supports the argument by

Devlin (2005) that larger households are financially excluded as a result of having limited resources. The results are also in line with prior evidence that reveal lower saving rates amongst family with children (Lusardi, 2000; Bosworth *et al.*, 1991; Avery & Kennickell, 1991).

Age appears to be another important determinant of saving for all households, except for those in the top income quartile. Older individuals seem to be more capable in managing their money, and have higher propensities to save. The results imply that financial literacy is more prevalent amongst older individuals, and leads to higher saving propensities. The evidence substantiates the observations noted in Chapter Two (Sub-section 2.4.1) that the elderly continue to save even during retirement (Lusardi, 2000; Japelli & Modigliani, 2003) and that relatively younger households (those who are still working) are not saving for retirement (Association of British Insurers, 2007). Furthermore, the findings render support to the results of Devlin (2005, 2009) that younger individuals are more likely to be financially excluded, and therefore, are likely to have lower propensities to save.

Education appears to be a highly significant factor that impacts on saving propensity. The results are applicable to all households, except for those in the third quartile. The positive relationship between educational attainment and saving propensity clearly supports the suggestion that education is closely related to financial literacy, supporting the ideas of Lusardi and Mitchell (2007). The results are also consistent with prior research studies that have shown a positive relationship between education and saving (Alessie *et al.*, 1995; Avery & Kennickell, 1991; Douglas, Bernheim & Scholz, 1993; Anttanasio, 1993; Lusardi, 2000). Plausibly, higher saving propensity amongst higher educated individuals indicates that they do not face problems of financial exclusion (Devlin, 2009).

The evidence suggests that men are more capable of saving, and is consistent with the literature showing that women are less financially knowledgeable compared to men (Chen & Volpe, 2002; Volpe, *et al.*, 1996; Goldsmith & Goldsmith, 1997). The difference in financial knowledge between men and women is possibly due to differences in gender-based roles assumed in the

family, and due to general perceptions that financial management is a 'masculine' job that is usually handled by men. Plausibly, differences in financial risk-taking attitudes and willingness to commit in long-term saving (Philips, Haynes & Helms, 1992) contribute to differences in saving propensities.

Income is one of the most significant drivers of saving, as noted from the analysis of the total sample. This finding strongly supports past research that has shown a positive relationship between income and saving (Alessie *et al.*, 1995, 1999; Banks & Tanner, 1996; Browning & Lusardi, 1996). Results provide a strong indication that income influences saving directly, and that high levels of income result in 'default' saving capabilities that are not driven by motives. Saving among high income households occur simply because there is no capacity to spend the entire amount at a single time. In addition, households who are poor are more likely to be financially excluded (Devlin, 2005, 2009; Kempson & Whyley, 1999), and hence, have lower saving propensities. The fact that poor households are entitled to welfare benefits implies complacency amongst these households and suggests that they are not putting much effort to save on their own. Having limited resources poses difficulties for these households in managing their finances, and therefore, will likely lead to adverse consequences in sustaining their future standard of living.

These results have important implications for policy-makers and financial institutions. It can be inferred from the findings that young people are less likely to save compared to their older counterparts, hence, suggesting that younger individuals are less thrifty and are not forward-looking. There is therefore a need to promote saving amongst younger households in preparation for the future, and to educate these households on the problems associated with procrastination in planning for retirement. Saving institutions can collaborate with employers to target the working population (especially younger ones who have just started their careers) by providing free educational seminars on personal financial planning, and to promote voluntary saving programs that would help employees save for retirement or other reasons. Enrolment into

these programs, although voluntary, can be aided by automatic salary deductions, which will psychologically be less burdensome to savers. Furthermore, automatic deductions from payroll alleviate the problems of self-control, which Thaler and Shefrin (1988) suggest have adverse effects on saving behaviour.

The results of this study substantiate prior works that have demonstrated that women are typically less knowledgeable in regards to personal finance (Chen & Volpe, 2002). This finding implies that there is a need for financial services providers to focus on women in their marketing strategies, not only by educating them on the importance of saving, but also on ways to manage their finances. One of the reasons why women are less financial knowledgeable and hence are less inclined to save, may be due to the fact that they focus more on other issues pertaining to the family, and tend to pay less attention to family financial affairs. In view of this tendency, financial practitioners must increase marketing efforts on women, by first educating them on the benefits of saving for the family, and secondly, by providing tools that can assist women manage their finances, and help to implement their saving goals. For example, financial practitioners can offer various user-friendly software or other tools that can assist women and other users to create spreadsheets of their cash flows and net worth positions, which can help them track their finances and implement saving plans. One of the ways to encourage saving amongst women is by highlighting the importance of saving for their children, and also for protection (precautionary) purposes.

The results imply that larger households face difficulties in saving. Plausibly, this is a consequence of having higher expenditure levels, which leave low amounts of income residues to be saved. Financial services providers should thus help these families better manage their finances, not only by providing the tools to help them manage their finances, but also by using the appropriate distribution channels to target these households. Using poster campaigns and brochure advertising at schools and supermarkets may be a suitable method to capture this market. Considering that these families may have higher levels of

spending, promoting small yet regular sums of saving may appear attractive and less taxing for these households.

Low saving propensities amongst poor households have undesirable implications that policy makers need to consider. Over-reliance on social security and government benefits can adversely affect government spending and may have grave consequences to the economy as a whole. Hence, there is an urgent need to encourage and increase saving amongst the financially deprived classes in society. The results indicate that saving propensities of low income households are driven by all motives, particularly profit and precautionary motives. Clearly, this suggests that low income households are concerned about the consequences of health and income risks, which may further place them in a less favourable financial position. To promote saving amongst poor households, there is a need to educate these households on the availability and mechanisms of riskier financial products, such as mutual funds or private pension accounts, which are able to provide higher returns over time. Marketers of these financial products need to consider the appropriate distribution channels in promoting the products that appeal to low income households, such as television advertisement, brochure campaigns located at shopping complexes and financial planning seminars provided through the workplace. There is also a need for saving institutions to develop products that can meet both precautionary and profit saving motives, targeted at these households.

Generally, precautionary motives significantly influence the propensity to save. This information allows more concentrated efforts in promoting financial products that address the issue of income uncertainties and other life adversities, since households tend to be concerned about this issue the most. Insurance companies should leverage on this finding, by promoting insurance packages that simultaneously address the various motives. The evidence clearly indicates that all motives are relevant in saving decisions, hence, there is a need to offer saving programs that serve to meet precautionary, life-cycle, bequest, and also profit motives. Investment-linked programs offered by

insurance companies, are an example of such product that may be able to address the various saving objectives.

Saving propensities of rich households appear to be least affected by saving motives. This is an indication that saving is unplanned for these households. Saving without intentions, although desirable, imply that saving is not purposeful, and hence, may give rise to inconsistent and unpredictable saving behaviour. To encourage more consistency in saving amongst rich households, policy-makers should concentrate on promoting more attractive tax incentives so that saving is more directed and consciously performed. Financial planners can also step in to offer their services to these wealthy households, by providing assistance in wealth management, and to ensure that concrete saving objectives and plans are in place.

6.11 CONCLUSION

The present chapter evaluated the significance of household characteristics and saving motives, on household's propensity to save. In particular, it sought to answer the second research question: *"What is the relationship between saving antecedents and motives, and the household's propensity to save?"* This postulation was motivated by the inconsistencies noted in the literature on the relative importance of various saving motives. As discussed earlier, there have been disputes amongst scholars on the importance of life-cycle saving and bequest motives, which to date, appear to be unresolved. Hence, the current study viewed that it was imperative to incorporate the four saving motives (life-cycle, precautionary, bequest and profit motives), to gauge and compare the significance of each motive on the household's propensity to save.

Using a qualitative ordered measurement of saving provided in the 2004 Survey of Consumer Finances, ordered logistic regressions were performed. Results revealed that all saving motives appeared to be highly relevant to the propensity to save, in the following order of importance: (1) precautionary, (2) life-cycle, (3) profit, and (4) bequest motives. The findings are consistent with

Dynan *et al.*'s (2002) proposition that saving motives simultaneously exist over the life-cycle, and may in fact overlap each other.

Household characteristics were also found to be important determinants of saving, particularly age, gender, household size, and income. The significance of these variables suggests that saving capabilities are governed by these factors. For instance, older individuals were found to have higher saving propensities, plausibly due to superior financial knowledge and experience levels of the elderly. Households that were headed by males were also found to be more capable of saving, potentially as a result of higher financial literacy and competency amongst these individuals.

This chapter provides insights on the drivers of saving. The following chapter is the last *empirical* chapter of this thesis, which further develops the analysis on saving behaviour by examining the portfolio allocation choices of households.

Chapter Seven

PORTFOLIO ALLOCATION CHOICE

7.1 INTRODUCTION

Theoretical developments and empirical interest on the subject of portfolio allocation have been ongoing since at least the 1950s (e.g. Markowitz, 1952; Roy, 1952; Sharpe, 1964). However, despite the voluminous amount of research pertaining to portfolio allocation choice, precise answers to the puzzles surrounding the issue remain elusive. As discussed in the literature review chapter, the striking observations noted amongst household portfolios which contradict theory are the issues of under-diversification, lack of participation in the stock market, and heterogeneity in portfolio composition. What exactly determines the portfolio allocation choice? How do households decide on which assets to hold in the portfolio? How do investors determine how much to allocate in their assets of choice?

The purpose of this chapter is to extend the investigation on household saving behaviour as conducted in the previous two chapters by incorporating an exploration of household portfolio allocation decisions. This issue is viewed imperative since the decision of the form of saving necessarily follows the decision to save. Of particular interest is the role of saving motives on the portfolio allocation decision, conceptualized based on the tenets of the Behavioural Portfolio Theory (Shefrin & Statman, 2000).

The rest of this chapter will be structured as follows: section 7.2 will first discuss the research issues pertaining to portfolio allocation choice which form the basis of the research in hand. This will be followed by an explanation of the measurement of variables to be employed in the investigation (Section 7.3), and thereafter some analyses of the descriptive statistics derived from SCF data on portfolio allocation (Section 7.4). Next, the chapter will discuss and justify the hypotheses to be tested (Section 7.5), to be followed by results of univariate tests (Section 7.7). The following section presents the multivariate

analyses and discusses the results; and finally, a conclusion to the chapter will be given in Section 7.9.

7.2 THE PORTFOLIO ALLOCATION DECISION

7.2.1 Research Issues

The issue of wealth allocation across asset categories has been recognized as one of the major themes in portfolio allocation research (Miniaci & Weber, 2002). As may be recalled from Chapter Two, early theories such as the Modern Portfolio Theory (Markowitz, 1952) suggest that the main criterion considered by investors in the portfolio allocation decision is the trade-off between expected return and riskiness of assets in the portfolio. For a certain level of expected return, investors will choose a portfolio that minimizes their risk exposure, or, for a certain level of exposure to risk, investors will select a portfolio that gives the highest level of expected return. In addition, diversification of assets is a key to reduce the riskiness of the portfolio.

Eeckhoudt *et al.* (2005) demonstrate that in a portfolio of two assets comprising one risky and one risk-free asset, risk-averse agents will choose to hold positive amounts in the risky asset only if they are compensated with positive excess returns. In other words, if excess returns are non-positive, it is not worthwhile to hold the risky asset and investors will be better off holding the risk-free asset. Furthermore, the amount held in the risky asset is determined by the risk aversion level of the investor. In a situation where the excess returns from holding the risky asset is positive, a lower level of risk aversion will induce higher amounts invested in the risky asset. Likewise, higher levels of risk aversion will result in lower amounts invested in risky assets. These propositions have been mathematically validated by Eeckhoudt *et al.* (2005), as previously discussed in detail in Sub-section 2.5.1 (Part iii)

Empirically, however, tenets of portfolio theory have often been challenged. Research findings have demonstrated vast contradictions over the theoretical propositions, such as under-diversification of portfolios (Kelly, 1995; Sprudzs, 1998, Goetzman & Kumar, 2008), non-participation in the stock market (Heaton & Lucas, 2000; McCarthy, 2004), and heterogeneity of portfolios

(Shum & Faig, 2006, Curcuru *et al.*, 2005). As discussed in the literature review chapter, there are numerous other factors influencing the portfolio allocation choice apart from the mean-variance aspect, such as uninsurable labour income risks (Guiso *et al.*, 1996; Heaton & Lucas, 2000), tax factors (Poterba, 2002; Bergstresser & Poterba, 2004), transaction costs (Gomes & Michaelides, 2005), life-cycle factors (Poterba & Samwick, 2000), and household financial needs (Xiao & Anderson, 1997).

It is evident from the literature that a range of factors affect portfolio choice. Gollier (2002) summarizes the key determining factors of a household's portfolio into three categories. The first category entails intrinsic factors such as risk aversion which are highly likely to be heterogeneous amongst individuals, thus leading to distinct portfolio choices. The second category relates to the objectives of the households, for example, retirement or other life-cycle factors. The third category involves external factors which are out of control of the decision-maker, such as taxes and access to credit. These categories imply that portfolio allocation decisions are endogenously as well as exogenously determined.

A relatively new theoretical development in the literature of portfolio allocation stems from a behavioural perspective. The Behavioural Portfolio Theory (BPT) (Shefrin & Statman, 2000) serves to provide an unorthodox explanation to the inconsistencies observed in empirical data in regards to portfolio allocation. Apart from the tradeoff between expected return and risks, Shefrin and Statman (2000) suggest that emotions, particularly *hope*, *fear* and *aspirations,* are important in the portfolio allocation decision. This is because emotions affect risk tolerance, which is a crucial factor influencing portfolio decisions. However, Statman (2004, p.44) argue that "whereas 'mean-variance investors' consider their portfolios as a whole and are always risk averse, 'behavioral investors' do not consider their portfolios as a whole and are not always risk averse." The BPT explains that *hope* relates to the positive anticipation to achieve financial success, while *fear* relates to the apprehension of falling into low levels of wealth. *Hope* and *fear* operate in conjunction with *aspirations*, which reflect the goals that investors aim for. According to the BPT, investors divide wealth into separate layers of a 'portfolio pyramid'

which relate to these different goals or aspirations. The lower level represents a protection base to prevent against poverty, and the higher level corresponds to an upside potential to become rich (Statman, 2004).

The primary contribution of this chapter is that it seeks to determine the role of saving motives on the portfolio allocation decision. The exploration of this relationship is evidently sparse in the literature, with the exception of a study by Shum and Faig (2006) investigating the factors determining household stock holdings. However, there are limitations of the aforesaid study which the current chapter aims to improve on. For example, Shum and Faig's study specifically looked at stock holdings and did not consider other types of assets in the portfolio. Furthermore, the study grouped saving motives into eight categories, which mostly represented life-cycle motives. The current study is more holistic as it incorporates various assets making up the portfolio and it includes categories of saving motives delineated from the literature on saving behaviour.

7.2.2 The link between saving motives and portfolio allocation choice

As the literature review section (in Chapter Two) revealed, the divergence between theory and actual data has left the issue of portfolio allocation unresolved. This study attempts to provide a deeper understanding regarding the portfolio allocation decision from the perspective of household's saving motivations. Earlier in Chapter Six, saving motives were postulated to impact the decision to save. Specifically, the four saving motives – life-cycle, precautionary, bequest and profit motives – were posited to have an impact on saving propensity. This chapter extends the analysis on saving behaviour to explore the relationship between saving motives and the choice of saving vehicles. In other words, saving motives should plausibly also have an impact on the portfolio allocation decision since the decision of *where* to save inevitably follows the saving decision. This study postulates that the motives which compel households to save are common underlying factors which also determine portfolio decisions.

The portfolio allocation choice entails a choice amongst risky alternatives. According to the expected utility theory (von Neumann & Morgenstern, 1944), when selecting among risky choices, the optimal selection is based on the alternative that maximizes expected utility. This proposition is based on the assumption that agents are fully rational. Advocates of behavioural economic theory, however, contend that behavioural aspects are key determinants in risky decision making. A relevant example in the context of this study is the Behavioural Portfolio Theory (BPT), as earlier discussed. The BPT suggests that in addition to expected return and risk considerations, emotions and aspirations are key factors in the asset selection process. Shefrin and Statman (2000) propose that the emotions of *hope* and *fear* will influence the investor's decision in allocating wealth into separate accounts representing different degrees of aspiration levels.

In this chapter, motives to save are hypothesized to impact the portfolio allocation choice. From standard portfolio theories, the link between saving motives and portfolio allocation choice seems to be non-existent. However, behavioural theories provide support to this hypothesized relationship, as can be inferred from propositions of the Behavioural Portfolio Theory (BPT) which was earlier discussed in Chapter Two. The BPT, as illustrated in Figure 7.1 below, argues that the emotions of *hope* and *fear,* along with *aspirations*, drive individuals toward their portfolio allocation decisions. Aspirations can either be the desire for security (reflecting the emotions of *fear*), or for potential (indicating the emotions of *hope*). In the context of this study, it is posited that aspirations reflect desired goals or objectives, and corresponds to the motives that impel individuals toward their actions. As such, it is argued that saving motives (shown in the dotted boxed in Figure 7.1 below) are the underlying representation of *aspirations*, and that each saving motive is a manifestation of the emotions of *hope* and *fear* suggested by the BPT as significant predictors of the portfolio allocation choice. The posited links between saving motives and emotions, aspirations and portfolio allocation choice, are illustrated as the dotted lines the figure below.

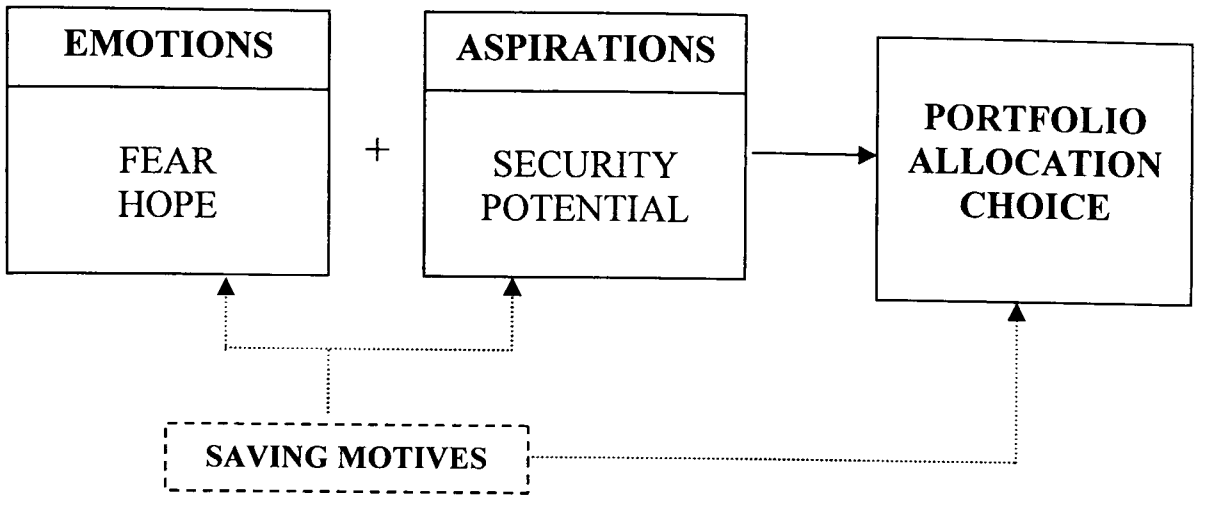


Figure 7.1: Illustration of the Behavioural Portfolio Theory & postulated link between saving motives and portfolio choice

The main objective of this chapter is to investigate the final research question of this thesis: *What is the relationship between saving antecedents and motives, and the household's portfolio allocation choice?* These relationships are depicted by the solid arrows labelled RQ3a and RQ3b in Figure 7.2 below. From Figure 7.2, the box on the far left consists of demographic and behavioural characteristics of the households. These factors are posited to influence the formation of saving motives, as depicted by the dotted arrow labeled RQ1 (previously examined in Chapter Five). In Chapter Five, the analyses focused on the first-mentioned motive, since it was reasonably assumed that the first one that came to respondent's mind was the most important; hence, the investigation on the determinants of motives focused on one exclusive motive. However, to acknowledge the fact that households may have multiple motives (Fisher & Montalto, 2010), this chapter will use the re-defined saving motive variables, as used in Chapter Six[8]. The use of 'any-mentioned' motive acknowledges that households may have more than one saving motive at a given time, which is predicted to influence household financial decisions. In relation to Figure 7.2, this chapter extends the investigation on saving behaviour by investigating how saving motives impact

[8] Recall that these re-defined motives were to allow for the fact that the SCF records up to six responses for the question on saving motives.

the composition of the household's financial portfolio, shown by arrow RQ3a. Behavioural characteristics of the household, such as risk aversion, expectations and time horizon, are also posited to have a direct impact on portfolio allocation choices, shown by arrow RQ3b. The second research question is omitted from the figure as this was previously addressed in Chapter Six.

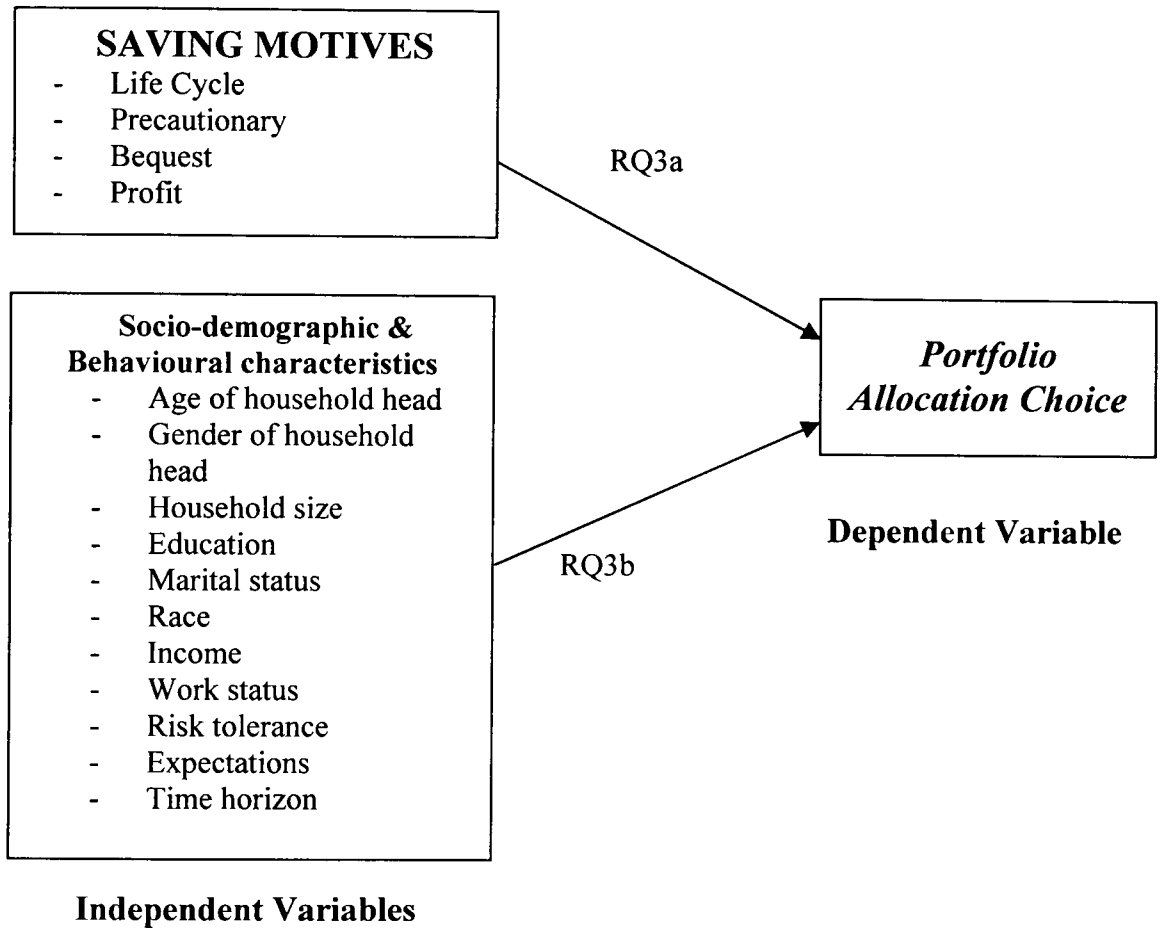


Figure 7.2: Postulated relationship between antecedents of saving and portfolio allocation choice.

Before outlining the specific hypotheses in regards to the posited relationships, section 7.3 will first explain how portfolio allocation is defined and measured in this study.

7.3 MEASUREMENT OF PORTFOLIO ALLOCATION CHOICE

The purpose of this section is to discuss the 'measurement' of the dependent variable, which is portfolio allocation, specifically, how and why these assets

will be grouped to form suitable classifications in the portfolio. Sub-section 7.3.1 provides a brief summary of several other relevant studies that had examined the methods of asset categorization, followed by a discussion on how this study will categorize the groups of assets. Sub-section 7.3.2 provides a table summarizing the asset classes and the specific assets constituting each class, based on data in the SCF.

7.3.1 Categorization of Financial Assets

The SCF contains extensive data on assets held by respondents, which include: checking accounts; IRA/Keogh accounts; certificate of deposits; savings/money market accounts; mutual funds (differentiates between stock and bond mutual funds); saving bonds; other bonds (corporate, municipal, government or others); publicly traded stocks; brokerage accounts; annuities, trusts and managed investment accounts, life insurance; miscellaneous assets and debts; and accounts in foreign currency. To examine the portfolio allocation choice of households, these assets will be grouped into broader categories to reflect the hypothesized relationships between saving motives and portfolio allocation. From the literature, there appears to be no specific rule in constructing asset categories. Nonetheless, past research will serve as a guide to facilitate the process of asset categorization for the current study. For this purpose, seven relevant papers were shortlisted for analysis, as shown in the following table.

Table 7.1: Categories of assets employed by previous researchers

Author(s)	Categorization of assets
Alessie, Hochguertel & van Soest (2002). "Household Portfolios in the Netherlands." In Guiso, *et al.* (eds). *Household Portfolios*. Cambridge, MA: MIT Press.	(i) Clearly safe financial assets – transaction and saving accounts, certificate of deposit (ii) Fairly safe financial assets – defined-contribution plans, cash value of life insurance, employer-sponsored savings plans, growth plans, other financial assets. (iii) Risky financial assets – Stocks, bonds, mutual funds or mutual fund accounts.
Bertaut, C.C. & Haliassos, M. (1997). "Precautionary Portfolio Behaviour from a Life-cycle perspective." *Journal of Economic Dynamics and Control*. 21. 1511-1542.	(i) Risky stocks (publicly traded stocks, shares in stock mutual funds, stocks in IRAs and Keogh plans. A broader definition includes stocks held in trusts, managed investment accounts, and defined-contribution pension plans). (ii) Riskless assets (checking, saving, money market, call accounts, certificate of deposits, saving and other bonds, and cash value life insurance), minus credit card balances, consumer loans, and other nonreal estate loans.
Bertaut & Starr-McCluer (2002). "Household Portfolios in the United States." In Guiso, *et al.* (eds). *Household Portfolios*. Cambridge, MA: MIT Press.	(i) "Safe" financial assets (checking, saving, money market and call accounts; certificates of deposits; US savings bonds.) (ii) "Fairly safe" financial assets (other government bonds, tax-free bonds, cash-value life insurance, amounts in mutual funds, retirement accounts, trusts and other managed assets that are not invested in stock) (iii) "Fairly risky" assets, including stocks held directly or through mutual funds, retirement accounts, trusts and other managed assets, and corporate, foreign and mortgage-backed bonds.
Eymann, A. & Borsch-Supan (2002). "Household Portfolios in Germany." In Guiso *et al.* (eds). *Household Portfolios*. Cambridge, MA: MIT Press.	(i) Clearly safe financial assets – transaction and saving accounts (ii) Fairly safe financial assets – building society savings contracts, life insurance, bonds (government bonds, saving certificates and other domestic bonds), and other financial assets (deposit accounts, options, futures, and tax-preferred financial investments. (iii) Risky financial assets – foreign bonds, mutual funds (on stocks), stocks.
Friend, I. & Blume, M.E. (1975). "The Demand for Risky Assets", *American Economic Review*. 65(5). 900-922.	(i) Risk-free Assets - checking accounts, other cash balances (checking & other commercial bank accounts, savings and loan savings accounts, credit union savings accounts and mutual savings accounts), savings bonds, cash value life insurance, other risk-free assets (Treasury bills, notes and certificates, withdrawal value of profit sharing & retirement plans, credit balances in brokerage accounts, and risk-free assets held in trust accounts). (ii) Mixed-risk Assets - state and local bonds, other mixed-risk assets (long term corporate, state and local and US government bonds). (iii) Risky Assets - common and preferred stock, equity in unincorporated business, other risky assets (investment real estate assets and miscellaneous assets such as patents, etc)
Guiso, L. Jappelli, T, & Terlizzese, D. (1996). "Income Risk, Borrowing Constraints, and Portfolio Choice." *American Economic Review*. 86(1). 158-172.	(i) Risky Assets (narrow definition) - Long-term government bonds, corporate bonds, investment fund units, equities. ii) Risky Assets (broad definition) - savings accounts, postal bonds, government paper, corporate bonds, investment fund units, equities. ii) Safe assets (defined residually) – Cash, checking accounts, certificate of deposits, postal deposits, Treasury bills up to one year maturity, floating treasury credit certificates, savings accounts*, postal bonds* (*Not included if risky assets follow the broad definition)
Hochguertel et. al (1997). "Saving Accounts versus Stocks & Bonds in Household Portfolio Allocation." *Scandinavian Journal of Economics*. 99(1). 81-97.	(i) Risky financial assets (shares in domestic and foreign companies, mutual funds, options, bonds and mortgage bonds). (ii) Risk-free financial assets (saving accounts, time deposit accounts, saving certificates and certificates of deposits)

A main observation that can be noted from Table 7.1 is that assets are normally grouped into categories that reflect different risk magnitudes. Usually, theoretical models and empirical analyses differentiate between two extremes,

risky and risk-free assets (see Bertaut & Haliassos, 1997; Hochguertel *et al.*, 1997; Guiso, *et al.*, 1996). Some other studies use a three-group approach by including an intermediate category to further refine the extent of risk. This can be seen from the Table 7.1, where this additional category is often labelled as "mixed-risk" or "fairly safe" (see Bertaut & Starr-McCluer, 2002; Friend & Blume, 1975; Alessie *et al.*, 2002; Eyman & Borsch-Supan, 2002).

Considering the various dimensions of risks that financial assets are subjected to (such as liquidity risk, default risk, inflation risk and capital yield risk), the process of categorizing assets into the two or three risk categories can be very subjective and challenging. This is reflected in a remark by Guiso *et al.* (2002, p.5) stating that "whereas in theoretical models it is customary to partition assets into risky and risk-free, in practice this is difficult and to some extent arbitrary." Carroll (2002, p.400) commented that although some financial assets are clearly safe (such as saving, checking, and money market accounts) and some are clearly risky (for example, stocks), the categorization of other financial assets are more problematic due to ambiguity in its exposure to different types of risk. For example, saving accounts are highly susceptible to inflation risk but are normally less exposed to capital risk or liquidity risk, while stocks are highly exposed to capital risk and liquidity risk but are less likely susceptible to inflation risk. Another problem in defining the risk level of an asset is due to its composition which make its overall risk-level exposure ambiguous. Examples of financial assets which have mixed composition are mutual funds and retirement accounts which may contain both stocks and interest-bearing assets.

Given the difficulties mentioned above regarding the determination of appropriate risk categories, it is useful to review actual historical mean-variance performance of assets to give a clearer indication of assets' riskiness. The following table presents the mean annual returns and standard deviations for five asset classes in the US over twenty-four years (between 1970 and 1994).

Table 7.2: Mean annual returns and standard deviations for five asset classes

	Foreign Stocks (EAFE)	Small US Stocks (CRSP 6-10)	Large US Stocks (S&P 500)	Bonds (5-year Treasury bonds)	Cash (30-day Treasury bills)
Mean annual returns (%)	15.48	14.19	12.13	9.23	7.05
Std Dev (%)	23.35	24.09	15.90	6.98	2.79

Source: Fisher & Statman (1997)

Table 7.2 shows that foreign stocks yield the highest mean (15.48%), but also the second highest standard deviation (23.35%). This is followed by small US stocks, which have a lower mean annual return (14.19%) compared to foreign stocks, but with the highest standard deviation (24.09%). Large US stocks yields lower mean (12.13%) compared to foreign stocks and small US stocks, and also a lower standard deviation (15.90%). Five-year Treasury bonds yield yet lower means (9.23%) and standard deviation (6.98%), followed by cash and short term Treasury bills, which have the lowest mean annual returns (7.05%) and standard deviation (2.79%). Although slightly outdated (1997), the above data are useful indicators of the riskiness of various asset classes by way of the standard deviation measures, which will assist in the classification of low-risk and risky assets.

Based on the literature, actual historical data, and in consideration of the various risk dimensions assets are exposed to, this study defines low-risk assets as financial assets with relatively low standard deviation, which are held for liquidity and security purposes, and have low probability of default and capital risk. However, low yields on low-risk assets make these assets highly subject to inflation risk. Risky assets are defined residually; however, it may be useful to point out that risky assets are defined as assets with relatively high standard deviation (thus, have uncertain returns), held in anticipation of high yields, and are highly subject to liquidity, default and capital risk. Contrary to low-risk assets, high earnings potential makes risky assets less susceptible to inflation risk. Thus, in reference to the SCF data, the following assets will be classified

as LOWRISK: checking account, saving accounts and money market accounts (MMA), call accounts, and U.S. government savings bonds. It would be more ideal to differentiate between long term and short term government savings bonds in view of the varying degrees of exposure to default risk; unfortunately, this information is not available in the dataset. The remaining assets will be classified as RISKY assets, which include the following: publicly traded stock, mutual funds, retirement accounts, bonds other than savings bonds, and annuities, trusts and managed investment accounts. Although this categorization is to some extent subjective, other authors have found that as long as liquid assets are classified as "safe" and stocks are categorized as "risky", results have remained robust to minor changes in categorization (Bertaut & Starr-McCluer, 2002, p. 194).

Thus far, no mention has been made of life insurance and its appropriate placement in either one of the two asset groups. Some studies have included life insurance in the low-risk category (e.g. Bertaut & Haliassos, 1997; Friend & Blume, 1975) and some have categorized life insurance in the intermediate category, i.e. "fairly risky" (e.g. Bertaut & Starr-McCluer, 2002). This study will take a slightly different approach and will not include it in either the risky or low-risk category but to regard it as an exclusive category, for reasons that will be further explained in the following paragraphs.

Beck and Webb (2003) define life insurance as financial products that encompass two main provisions: (i) income replacement in the event of premature death, and (ii) long-term savings. Due to these dual-benefits, there appears to be two differing approaches in regards to the role of insurance on portfolio decisions. On one hand, most studies tend to totally isolate the demand for life insurance from portfolio decisions (Mayers & Smith, 1983, Chen *et al.*, 2006). This is evident in capital market frameworks (e.g. Fama & Miller, 1972) which ignore the existence of insurance albeit the assumptions regarding risk aversion and uncertain future income (Mayers & Smith, 1983). However, the assumption that human capital risk and portfolio risk are independent has been regarded as "unrealistic" (Gollier, 2002. p.36), and financial planners have also long recognized the importance of human capital in the determination of individual's optimal portfolios (Chen *et al.*, 2006). Given that human capital is subject to mortality risks, the role of life insurance

as part of the household's portfolio is thus essential, since life insurance acts as a hedge against mortality risks (Chen *et al.*, 2006). Therefore, the alternative view is that life insurance decisions should be integrated with portfolio allocation decisions (Chen *et al.*, 2006; Mayers & Smith, 1983), a notion which is supported by the current study.

Another reason for creating an exclusive category for life insurance is that life insurance cannot be clearly defined in the same way as other "low-risk" assets since life insurance is normally not held for liquidity purposes, and nor can it be classified as a "risky" asset, since it is not purchased in the anticipation of gaining rewards.Life insurance is a tool that is meant to protect against *pure risk*, which is defined as a chance of loss but no chance of gain. This is in contrast to the holdings of risky assets which are held usually in definite exposure to *speculative risk*, which is defined as a chance of gain and also a chance of loss. The fact that life insurance is held for protection against mortality risk makes it distinguishable from other financial assets, and it is very likely that life insurance holdings are driven by specific saving motives and deserves to be examined in exclusion, although within the same framework of portfolio allocation choice.

In view of the preceding arguments, this study will categorize life insurance as a separate category of financial assets. The measurement for life insurance will be the cash value of life insurance policies, consistent with other researchers (e.g. Bertaut & Haliassos, 1997; Bertaut & Starr-McCluer, 2002; Friend & Blume, 1975; Alessie *et al.*, 2002).

7.3.2 Measurement of asset categories

As discussed in the previous sub-section, the categories of financial assets in the portfolio allocation are (i) low-risk financial assets (LOWRISK); (ii) risky financial assets (RISKY); and (iii) life insurance (INSURANCE). LOWRISK consists of checking accounts, saving accounts and money market accounts (MMA), call accounts, and U.S. government savings bonds; RISKY consists of publicly traded stock, mutual funds, retirement accounts, bonds other than savings bonds, and annuities, trusts and managed investment accounts: and

INSURANCE consists of the cash value of life insurance. The following table summarizes this information, and details out the SCF variable codes which make up each asset class.

Table 7.3: Composition of asset classes and corresponding SCF variable codes

(1) **Asset class**	(2) **Variable name (asset type)**	(3) **Description**	(4) **SCF variable codes (composition formula)**
LOW-RISK	CHECKACC	Checking account	X3506 + X3510 + X3514 + X3518 + X3522 + X3526 + X3529
	SVGMMA	Savings / Money market accounts	X3730 + X3736 + X3742 + X3748 + X3754 + X3760 + X3765
	CD	Certificate of Deposits	X3721
	BOND_GOV	US government bonds/T-bills	X7636
		State/municipal/tax-free bonds	X7637
	CALL_ACC	Cash/call account	X3930
RISKY	STOCK_PUBLIC	Publicly traded stock	X3915 + X3922
	MUTUAL_FUND	Stock Mutual funds	X3822
		Combination funds	X3830
		Other mutual fund (hedge funds)	X7787
		Tax-free bond mutual funds	X3824
		Govt.-backed bond mutual funds	X3826
		Other bond mutual funds	X3828
	IRA	Retirement accounts invested in stocks & interest-bearing accounts	[(X6551 + X6552 + X6553 + X6554)] + [(X6559 + X6560 + X6561 + X6562)] + [(X6567 + X6568 + X6569 + X6570)]
	ANNUITY	Annuities in stocks & interest-bearing accounts	X6577
		Other managed accounts held in stocks & interest-bearing accounts	X6587
	RISKY_BONDS	Corporate bonds/commercial papers/ junk bonds	X7639
		Foreign bonds	X7638
		Mortgaged-backed bonds	X3765
INSURANCE	INSURANCE	Cash-value life insurance	X4006

The above variables are in the form of dollar amounts saved in each asset category. As previously noted, the dollar-valued variables on income and wealth in the SCF dataset are highly skewed, thus necessitating logarithm transformations of values for each asset category. However, the data show that a sizeable proportion of households have zero-holdings in at least one of the groups, despite the aggregated values. To deal with the problem of zero-holdings, the value 'one' is added to the total amounts to avoid undefined log conversions[9]. Hence, the dependent variables for portfolio allocation are given as:

i) log_LOWRISK = log(LOWRISK+1)

ii) log_RISKY = log(RISKY+1)

iii) log_INSURANCE = log(INSURANCE+1)

In addition to this, the percentages of assets held in each category were also computed to give a better representation in regards to the proportionate allocation of wealth in each asset class. For this purpose, the dollar amount of total assets was first computed, given as: TOTAL_ASSET = LOWRISK + RISKY + INSURANCE. Thereafter, the percentage amounts for each asset class were computed pre-conditioned on households with positive total assets, as follows:

i) LOWRISK_percentage = LOWRISK / TOTAL_ASSET

ii) RISKY_percentage = RISKY/ TOTAL_ASSET

iii) INSURANCE_percentage = INSURANCE / TOTAL_ASSET

A third method of measuring the dependent variable is a simple binary measurement indicating whether positive amounts are held in each asset category. A value of one indicates positive amounts in the particular asset category, or zero if otherwise. The three binary variables are as follows:

[9] Other studies have done the same, for example, Perraudin & Sorensen (2000) and Hochguertel *et al.* (1997).

i) POSITV_LOWRISK (equals 1 if positive amounts are held in low-risk assets, 0 if otherwise)

ii) POSITIV_RISKY (equals 1 if positive amounts are held in risky assets, 0 if otherwise)

iii) POSITV_INSURANCE (equals 1 if the cash value of life insurance is positive, 0 if otherwise)

The following section provides brief analyses on descriptive statistics on the three asset categories (low risk assets, risky assets, and life insurance holdings).

7.4 ANALYSIS OF DESCRIPTIVE STATISTICS

Analyses of various descriptive statistics of portfolio allocation are shown in the table below. These analyses were conducted using only the first implicate[10] and were weighted using the weight variables included in the SCF dataset[11]. From the table, more than 90% of the sample owned some form of low-risk asset, 43% of the sample owned some form of risky asset, while only 24% of the sample owned life insurance. The mean values for the three asset classes was the highest for risky assets ($111,600), followed by low-risk assets ($38,800), and life insurance ($5,500). The median values for risky assets and insurance were zero, indicating a skewed ownership distribution for these two categories of assets. For life insurance, the 75th percentile of the sample owned zero holdings. The 99th percentile for risky assets showed the highest value at about $1.6 million, followed by more than $535,000 for low-risk assets, and only $100,000 for insurance.

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[10] No major differences were noted when all implicates were used for analysis (recall that as a result of multiple imputation (which is a treatment of missing data), the SCF dataset contains five implicates which are aggregated into a single dataset).

[11] Recall that weights are used to correct for the fact that the SCF over-samples wealthy households.

Table 7.4: Descriptive statistics of Asset Holdings

	LOWRISK	RISKY	INSURANCE
Ownership (%)	90.53	43.43	24.25
Mean ($)	38,799.98	111,582.4	5,513.5
50th percentile ($)	3,200	0	0
75th percentile ($)	17,000	25,000	0
90th percentile ($)	62,050	195,900	9,500
95th percentile ($)	124,800	440,000	20,000
99th percentile ($)	534,960	1,560,000	100,000

Figures 7.3, 7.4 and 7.5 provide an illustration of the distribution of low-risk assets, risky assets, and life insurance, respectively. These histograms are shown in terms of the log value of the asset classes, to deal with the extreme values of outliers. Due to the high proportion of the sample who do not own any RISKY assets (about 57%) and INSURANCE (76%), the histograms show an extremely high value on the left which indicates the sample proportion having zero-values for these asset classes.

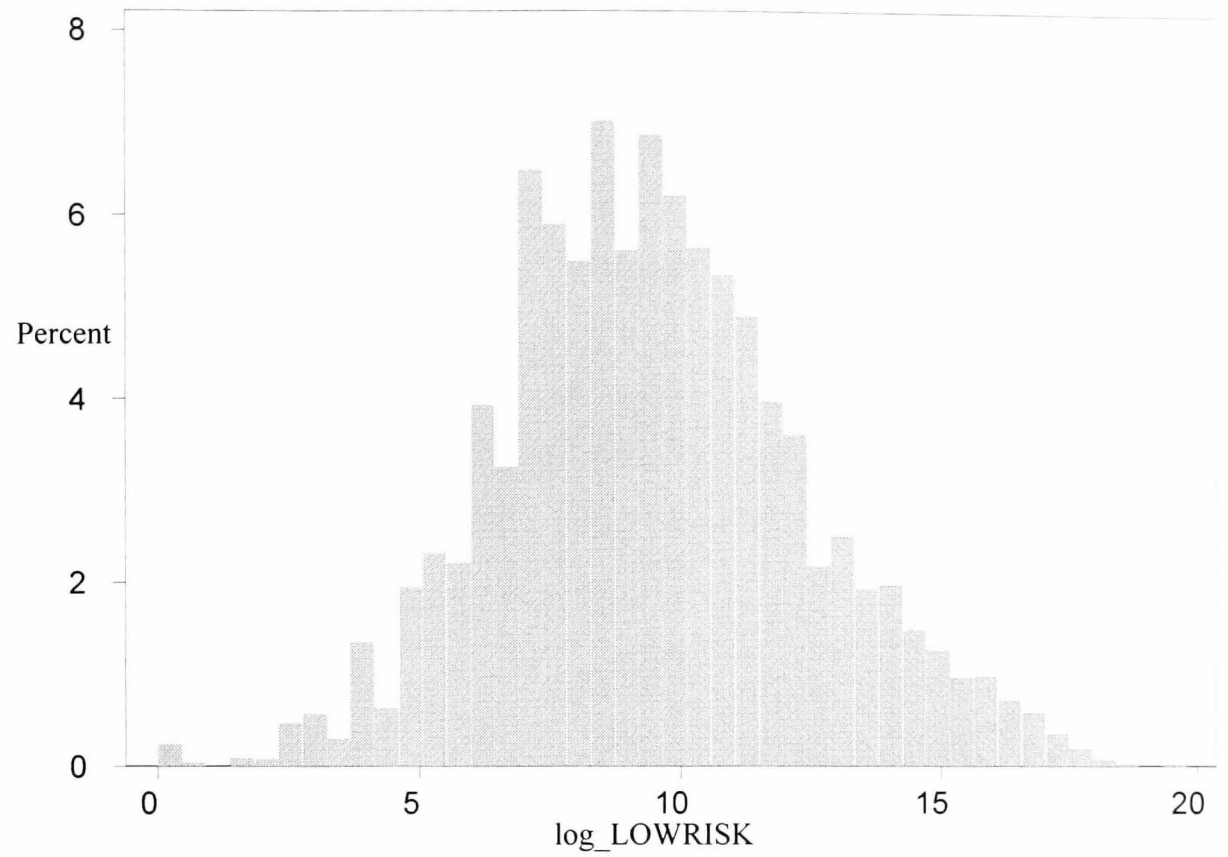

Figure 7.3: Distribution of log_LOWRISK

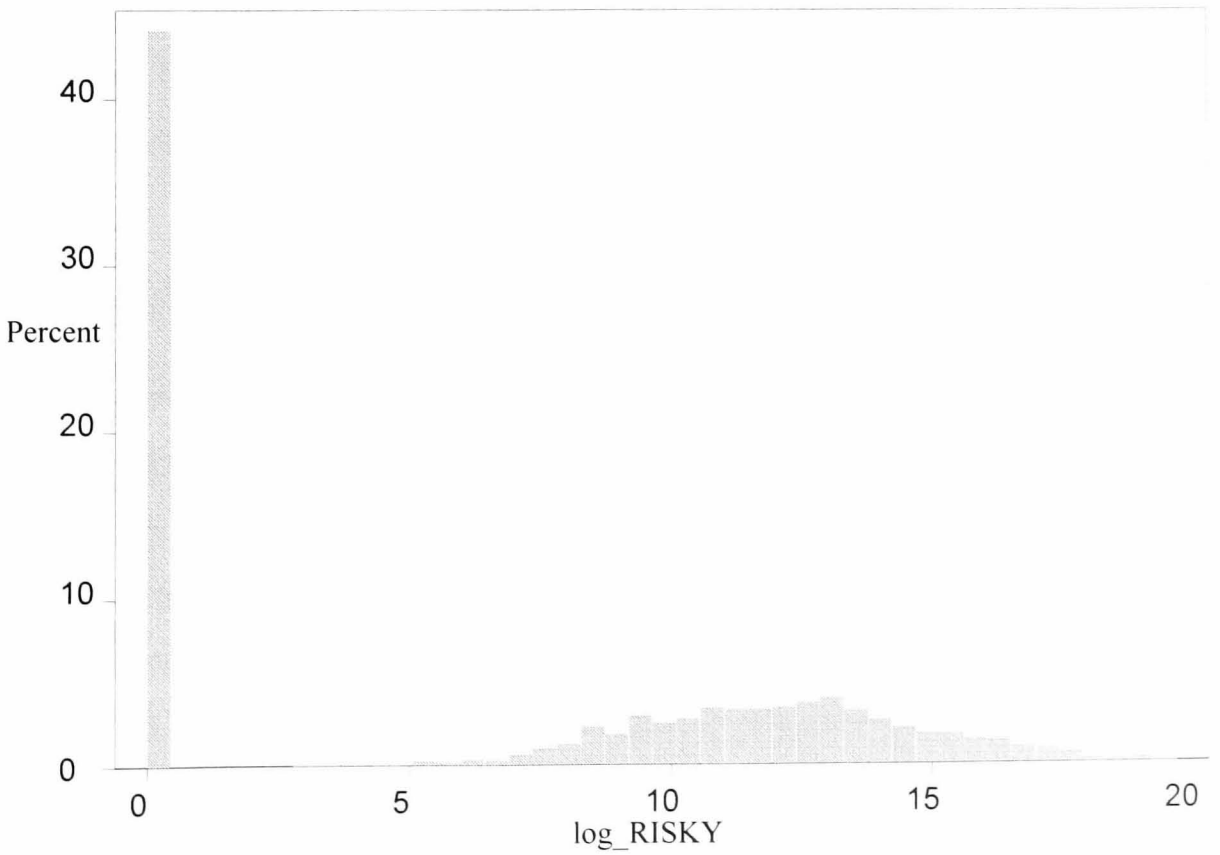

Figure 7.4: Distribution of log_RISKY

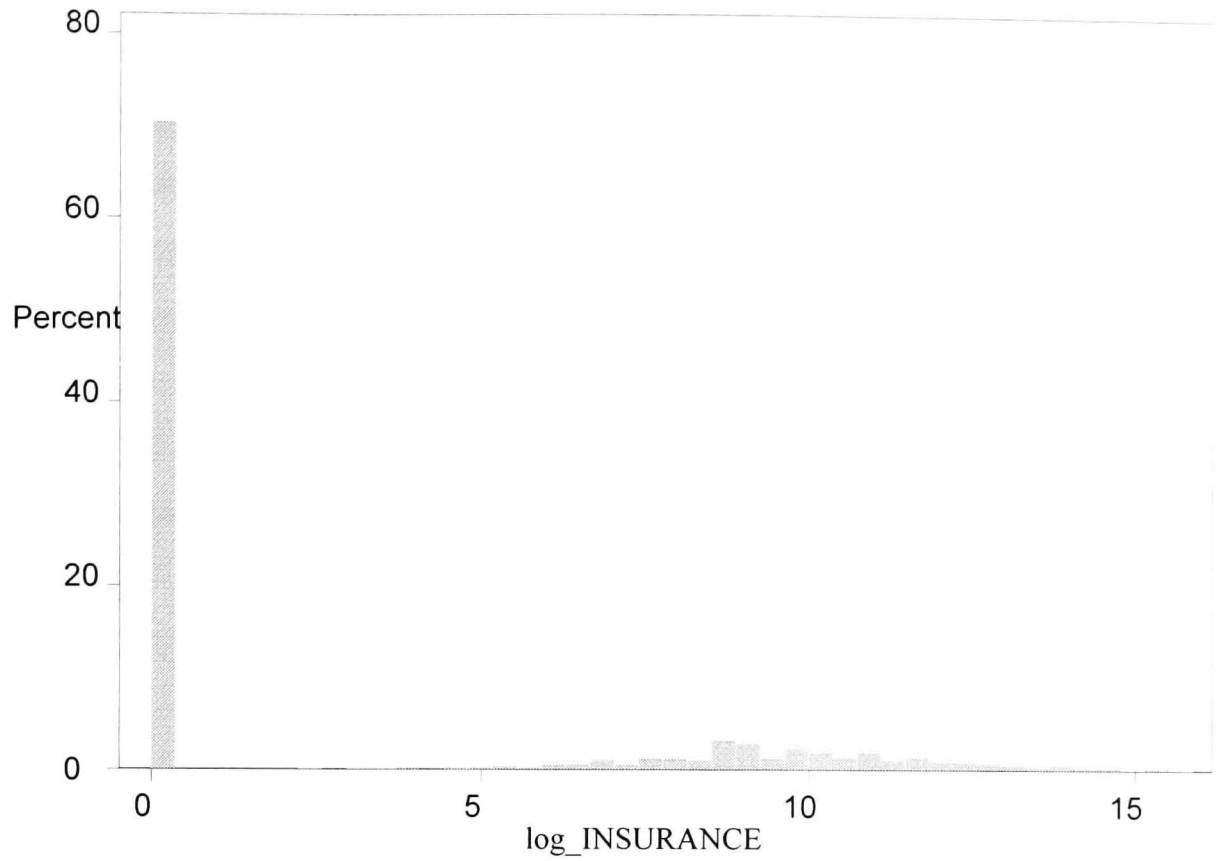

Figure 7.5: Distribution of log_INSURANCE

Having provided a brief analysis of the descriptive statistics of the three asset categories held in the portfolio, the following section presents a discussion of the hypotheses pertaining to the third research question of this study.

7.5 DETERMINANTS OF PORTFOLIO ALLOCATION CHOICE

The purpose of this section is to justify the posited relationship between the independent and dependent variables. Sub-section 7.5.1 will deal with the hypotheses linking saving motives and portfolio allocation choice. This will be followed by an explanation of the posited relationships between demographic variables and the assets in the portfolio (Sub-section 7.5.2). Finally, sub-section 7.5.3 hypothesizes the linkage between behavioural factors and asset choice.

7.5.1 Saving motives

The literature suggests that there are four major saving motives which influence saving behaviour. These are the life-cycle motive, the precautionary motive, bequest motive, and the profit motive (Warneryd, 1999). According to prior researchers (e.g. Dynan *et al.*, 2004; Fisher & Montalto, 2010; Warneryd, 1999), saving motives are not "mutually exclusive", which suggests that households may have more than one saving motive at a single time. Hence, this chapter takes into consideration all of the motives reported by respondents in the survey, as per analysis in Chapter Six. Each of the four saving motive variables (New_LC, New_PREC, New_BEQUEST and New_PROFIT) takes on the value of 1 if the motive was mentioned in any of the six possible responses, or zero if it was not mentioned at all.

To establish the theoretical relationship between these motives and the portfolio allocation choice, the basic theories underlying each motive will be revisited to examine plausible implications on the choice of assets in the portfolio. In addition, it will be argued that rooted within these motives are the emotions of *hope* and *fear* which the Behavioural Portfolio Theory suggests are prominent features driving the portfolio decisions of investors. These motives reflect certain levels of aspiration – particularly *security* and *potential* – which have been hypothesized as important determinants of the portfolio allocation choice (Shefrin & Statman, 2000). Recall from Chapter Three that the first main hypothesis for the chapter is:

H_D: Saving motives are significant predictors of the portfolio allocation choice.

More specific hypotheses pertaining to the above are discussed below.

Life-cycle motive: The life-cycle saving motive concerns the desire to smooth out imbalances between income and expenditures over the lifetime (Modigliani & Brumberg, 1954) which typically occur as a result of evolving life-cycle events such as marriage, purchasing a home, children's education, or retirement. In regards to propositions of the BPT (Shefrin & Statman, 2000), life-cycle saving motives reflect the fear of falling into low levels of wealth when extra funding is required for these life-cycle events, and hence a desire

for future financial security (for example, during retirement). However, it can also be argued that life-cycle motives reflect a desire to advance in life (in the instances of purchasing a home, or furthering education), implying aspirations for *potential*. Aiming for a secure and stable future relates to a *fear* of reaching low levels of wealth, while striving for betterment in life indicates a *hope* for a better future. Hence, it can be argued that the life-cycle motive captures both strives for *security*, and also *potential* (see Figure 7.1). In relation to portfolio allocation choice, the desire for *security* suggests a positive demand for low-risk assets and life insurance, and at the same time, the desire for upside *potential* suggests that risky assets will be favoured.

In addition to the above, the type of life-cycle motive also depends on the structure of the household as well as current stage of the life-cycle the household is in. Households with young children are likely to plan for the children's future, including their education, or possibly for improvements in living conditions. Other households without any children or with grown-up children may have other life-cycle motives such as retirement or travel. Hence the differences in the types of life-cycle motives will also have differing impacts on the types of assets held. Low-risk assets are likely held to meet short-term life-cycle goals, risky assets are possibly held to meet longer term life-cycle targets, while life insurance policies (particularly endowment policies with fixed maturity periods) may be held in anticipation of fixed-period saving targets (such as children's education). In view of the possibility that all three asset types may be held for life-cycle motives, it is hypothesized that the life-cycle motive will be positively related to all three asset categories.

H_{D1}: The life-cycle motive is related to the probability of holding / holdings in: low-risk assets (+), risky assets (+), life insurance (+)

Precautionary motive: The theory underlying the precautionary saving motive suggests that individuals are preparing for uncertainties over the life time arising from income risks, health risks, or longevity risks (Abel, 1985; Kotlikoff, 1988). In the event of the occurrence of such risks, there may be a need for the use of additional funds to cover unexpected expenses (for example, medical funding), apart from the usual consumption needs incurred for living. These risks will also lead to possible disruptions to the flow of an

individual's current and future income stream, and hence through precautionary motives, the preference for liquidity and a buffer stock of funds will arise. Consequently, there will be an impact on the type of assets held. This notion is supported by research on precautionary motives which have found that multiple sources of risk (such as labour income risk) depress holdings in risky assets (Guiso *et al.*, 1996) but increase the likelihood of holdings in safe assets (Hochguertel, 2003). The results of these studies imply that there are precautionary reasons for saving, which influence the types of assets held in the portfolio. Hence, it is postulated that the demand for low-risk assets will increase as a result of precautionary motives, since low-risk assets provide the liquidity needed to buffer against unexpected costs. In contrast, it is expected that risky assets will be avoided if precautionary motives are present. However, the effect of having precautionary motives on life insurance is uncertain. This is because although life insurance is designed to pay out against mortality risks, life insurance savings are illiquid. Based on these arguments, the following relationships are predicted:

H_{D2}: The precautionary motive is related to the probability of holding / holdings in: low-risk assets (+), risky assets (-), life insurance (?)

Bequest motive: The bequest motive for saving refers to the intention of leaving accumulated wealth as inheritance to the next-of-kin. Yaari (1965) showed that uncertainty regarding the length of one's life resulted in positive demand for life insurance since individuals will not want to face the risk of death and leaving dependants without any provisions. Therefore, under general conditions of a life-cycle model with uncertain length of life, bequests are assumed to be an important motive for saving. As discussed in Chapter Five (Sub-section 5.3.1), it is essential to differentiate between two types of bequest motives. The first is the intention to bequeath as income replacement, and second, the desire to leave a bequest as a transfer of savings or as a legacy with the desire of making future generations better off in the future. The differences in these two types of bequest motive suggest that there may be variations in the types of assets held to meet these objectives. Amongst the three asset categories, insurance provides the most direct means of protection against

mortality risk and allows continuity of income to surviving beneficiaries. Meanwhile, bequeathing for intergenerational transfers suggests that other forms of assets may be held apart from life insurance. Since bequest motives of this nature are usually of a longer time-scale concern, it is reasonable to expect that both low-risk and risky assets may be held. Based on these arguments, the following relationships are predicted:

H_{D3}: The bequest motive is related to the probability of holding / holdings in: low-risk assets (+) risky assets (+), life insurance (+)

Profit motive: The profit saving motive relates to the desire of attaining higher levels of wealth through the interest earned or investment income gained from the holdings of assets. Saving for a profit motive denotes an inclination toward growth, a situation of betterment, and a determination for an improved quality of life. In relation to the BPT, the profit motive clearly reflects a high aspiration level and relates to the emotions of *hope* in the achievement of high potentials. As Shefrin and Statman (2000, p.141) state, high aspirations reflect a desire for "a shot at riches." Having a profit motive hence implies that the selection of assets in the portfolio is determined by expectations of acquiring high potential returns, which can be expected through investments in risky assets. In contrast, it is unlikely that low-risk assets or life insurance are able to deliver high expected returns. Typical financial advise confirms these notions, as suggested through Wall's (1993) portfolio pyramid, suggesting that assets with higher returns are those with higher risk, such as stocks, mutual funds and brokerage accounts (see Sub-section 2.5.1 (Part iv) of Chapter Two). Thus, it is hypothesized that the profit motive will be positively related to risky assets, and negatively related to low-risk assets and life insurance.

H_{D4}: The profit motive is related to the probability of holding / holdings in: low-risk assets (-), risky assets (+), life insurance (-)

7.5.2 Demographic Factors

The second set of hypotheses pertains to the relationship between household characteristics (demographic and behavioural factors) and the portfolio allocation choice. The general hypotheses in this regard, as specified in Chapter Three, are as follows:

H_E: Household characteristics are important determinants of portfolio allocation choice.

Age: In the life-cycle hypothesis (LCH), Modigliani and Brumberg (1954) posited that the relationship between wealth accumulation and age is non-linear and hump-shaped, although no specific differentiation was made in regards to the different types of assets in the portfolio. Nonetheless, research has shown that significant relationships between age and specific asset types in the portfolio exist. In regards to risky assets, King and Leape (1987) argue that older individuals will have acquired more knowledge and experience in regards to understanding the mean-variance relationship of risky assets and hence are more likely to hold risky assets; younger individuals are more likely liquidity-constrained and are thus less likely to invest in risky assets (Guiso *et al.*, 1996). Similarly, a study by Summers *et al.* (2006) found that individuals displayed more risk-seeking behaviour as they age, despite their intuitions that portfolios should be more conservative. However, an opposing argument is that the young have more opportunities and capability of earning labour income, compared to the elderly and hence are more inclined toward investing in risky assets (Bodie *et al.*, 1992). This notion runs parallel to popular investment advice recommending elderly individuals to reduce their exposure to risky assets (Viciera, 2001) - implying a hump-shaped, non-linear relationship between age and risky assets which empirical studies have documented (Viciera, 2001; Aizcorbe *et al.*, 2003; Cocco *et al.*, 2005; Shum and Faig, 2006).

The relationship between low-risk assets and age is unclear. Since it can be reasonably assumed that low-risk assets make up the majority holdings of a person's portfolio, the hump-shaped relationship between age and wealth as suggested by the LCH implies a similar pattern in regards to low-risk assets. However, there is evidence to suggest that the effect of age on the share of safe assets is U-shaped (Hochguertel, 2003) - indicating that younger individuals allocate more wealth into risky assets, but as age increases, investments in risky assets decrease while holdings of low-risk assets increase.

Meanwhile, the relationship between age and life insurance ownership is also ambiguous as empirical evidence reveals both positive and negative signs of relationship between the variables (Zietz, 2003). A negative relationship suggests that life insurance demand is plausibly higher amongst younger individuals due to the relatively lower premium rate, and the higher likelihood of qualifying for insurance purchase due to better pre-existing health conditions (as opposed to older individuals). Meanwhile, a positive relationship between life insurance and age possibly reflects higher accumulated cash values of life insurance policies of older individuals, as opposed to younger individuals whose holdings of life insurance policies are relatively shorter. Due to the ambiguities and possibly non-linear relationships that may exist between age and the asset variables, the predicted signs of relationships are indicated as question-marks (?) in the hypotheses below:

H_{E1}: Age is related to the probability of holding / holdings in: low-risk assets (?), risky assets (?), life insurance (?)

Gender: Gender is a proxy for differences in financial strategies and preferences that may exist between male and female heads of households, or as a result of disparities in consumption behaviour. Hochguertel (2003) found that female-headed households were inclined toward holding more low-risk assets in their portfolios compared to their male counterparts, suggesting that female heads of households had higher liquidity needs as opposed to males. Based on this premise, it is posited that males will have lower propensity of holding low-risk assets, and higher probability of holding risky assets.

H_{E2}: Gender (MALE) is related to the probability of holding / holdings in: low-risk assets (-), risky assets (+), life insurance (?)

Education: Educational attainment is posited to have an impact on the portfolio allocation choice since education relates to the level of knowledge and information-seeking ability involved in investment decisions. Risky assets and life insurance are considered intensive information seeking financial products requiring substantial effort and time in pre-purchase. Empirical studies by Hochguertel *et al.* (1997) and Donkers & van Soest (1999) revealed a significant positive relationship between education and holdings of risky assets, while other studies have found a positive relationship between

education and life insurance holdings (e.g. Hammond *et al.*, 1967; Ferber & Lee, 1980; Burnett & Palmer, 1984; Browne & Kim, 1993). Conversely, findings from Hochguertel's (2003) study suggest that household heads with lower educational attainment tend to hold more liquid assets. Based on the literature, it is posited that:

H_{E3}: Education is related to the probability of holding / holdings in: low-risk assets (-), risky assets (+), life insurance (+)

Household size: Household size is included as a regressor to control for family liquidity needs. It is reasonable to expect a higher demand for liquid assets amongst larger households to support higher costs of living associated with more members in the family. In contrast, this leads to the presumption that risky assets are to be avoided when the wellbeing of a larger number of household members are to be concerned about. It is also sensible to presume that larger household will stimulate stronger demand for life insurance since death of the household head will more likely have a bigger impact when the welfare of a larger number of household members are to be concerned about. This hypothesis is also consistent with the literature which has indicated positive associations between household size and life insurance (e.g. Burnett & Palmer, 1984; Bernheim, 1991; Showers & Shotick, 1994). Based on these arguments, the following relationships are predicted:

H_{E4}: Household size (PEU) is related to the probability of holding / holdings in: low-risk assets (+), risky assets (-), life insurance (+)

Marital status: The marital status of the head of the household is another control variable for the choice of assets in the portfolio. Marital status of the head of the household has implications on the household structure, and hence on financial positions of the household including wealth accumulation and attitudes toward risk (Love, 2008). In addition, marital status is included to act as a proxy for differences in tastes and preferences possibly related to the influence of a significant other in the household decision making. Hence it is posited that marital status influences the portfolio allocation choice.

H_{E5}: Marital status (COUPLE) is related to the probability of holding / holdings in: low-risk assets (?), risky assets (?) , life insurance (?)

Race: Race is included as an explanatory variable to control for differences arising from culture, upbringing, values, and possible racial discrimination that may arise in relation to opportunities of holding certain types of assets. Indeed, there is evidence pointing toward racial differences in asset ownership, the most striking observation is that risky assets are more likely to be held amongst whites as opposed to blacks (Keister, 2000). Brimmer (1988) suggests that the reasons why blacks have low participation in the stock market are due to low average income amongst the black community, under-familiarization of the stock market and differences in perceptions of risk. Meanwhile, the concept of financial exclusion (as previously discussed in Sub-section 6.3.2 of Chapter Six) suggests that certain races may be discriminated from the holdings of certain assets, possibly as a result of lacking the opportunity, contacts or proper advice in regards to entering the market of risky assets or life insurance. In view of the aforesaid, it is hypothesized that BLACK and other minority ethnic groups have a lower tendency of holding risky assets, and a higher inclination toward low-risk assets. The relationship between race categories and life insurance is unclear. The hypotheses to be tested are stated as follows:

H_{E6}: Racial differences are related to the probability of holding / holdings in: low-risk assets (?), risky assets (?), life insurance (?)

Occupational Status: Occupational status is included as a regressor to control for differences in risk-taking behaviour resulting from occupational risk. It is posited that self-employed individuals will have a lower probability of holding risky assets to balance out risks associated with job types. However, it is posited that employed individuals will have a higher tendency of holding risky assets due to greater stability of income due to occupation. Meanwhile, it is hypothesized that self-employed individuals will have a greater tendency of holding life insurance in the absence of employer-sponsored insurance.

H_{E7}: Occupational status is related to the probability of holding / holdings in: low-risk assets (?), risky assets (?), life insurance (?)

Risk tolerance: An investor's risk attitude is crucial in the determination of portfolio allocation. Modern portfolio theory asserts that an investor's risk aversion determines the extent of willingness to invest in risky assets. As demonstrated by Eeckhoudt *et al.* (2005), the more risk averse an individual is,

the lower the proportion held in risky assets and the higher the proportion held in risk-free assets. Empirically, this proposition is widely supported (e.g. Schooley & Worde, 1996; Shum & Faig, 2006; Chen *et al.*, 2006). Risk aversion is also a closely related factor in the demand for life insurance since risk aversion measures the intensity of the desire to purchase insurance. The more risk averse an individual is, the higher the demand for life insurance. Owing to the nature of the SCF question in regards to risk-taking behaviour, this study uses risk tolerance, rather than risk aversion as an explanatory variable. Hence, it is posited that risk tolerance will be positively related to risky assets, but negatively related to low-risk assets and life insurance.

H_{E8}: Risk tolerance is significantly related to the probability of holding / holdings in : low-risk assets (-), risky assets (+), life insurance (-)

Expectations: Expectations regarding future economic conditions are likely to have an impact on the choice of households' portfolios. Positive expectations regarding the future economy indicate an optimistic view of the financial environment, which includes positive outlook of the stock market performance, interest rates movements, labour market opportunities, and so on. The three expectation variables included in this study are expectations of future economy (EXPECON), expectations of future interest rates (EXPINT) and expectations of family income (EXPINC). Reasonably, positive expectations regarding the financial conditions in future years may induce larger holdings of risky assets since people are confident about prospective returns on their risky assets. This implies a shift of funds out of low-risk assets or life insurance, into other riskier investments. It is posited that expectations will be positively related to risky assets and negatively related to life insurance and low-risk assets.

H_{E9}: Expectations are related to the probability of holding / holdings in: low-risk assets (-), risky assets (+), life insurance (-)

Time horizon: Time horizon refers to the financial planning period of the household. The SCF question on time horizon asks the respondents the length of financial planning period which was most important to them (below five years, or, five years and more). It is reasonable to expect that households with shorter financial planning horizons to be more inclined toward safer assets and

households with longer financial planning horizons to prefer risky investments in order to meet their saving objectives of the stipulated time horizons. Meanwhile, an individual with a long financial planning horizon, as opposed to those with short financial planning periods, will be more inclined toward long-term saving commitments such as life insurance, and more susceptible to the uncertainties of risky investments. As such, life insurance and risky asset holdings are predicted to be positively related to time horizon. The relationship between low-risk assets and time horizon is predicted to be negative, since it is unlikely that households will choose to hold low-risk assets to meet long-term financial goals.

H_{E10}: Time horizon is significantly related to the probability of holding / holdings in: low-risk assets (-), risky assets (+), life insurance (+)

Income: For the purpose of analyzing portfolio allocation choice, income is re-defined to exclude investment income and hence will include only noncapital income. The reason for differentiating between capital and noncapital income is to separate the effect of capital income which is derived from the portfolio itself, and to instead focus mainly on the effect of human capital toward portfolio decisions. The new income variable includes annual income from wages and salaries; net annual income from a professional practice, business, partnership or farm; unemployment or worker's compensation; annual income from child support or alimony; annual welfare receipts; net income from Social Security, pensions, annuities, disability or retirement programmemes; and other income excluding investment income. As previously done in Chapter Five and Chapter Six, the cube root of the income variable was taken to condense the distribution while retaining negative values (arising from losses from business).

Income is predicted to be positively related to the probability of risky asset ownership, as households with higher income would logically be able to afford the information and entry costs associated with participation in risky assets. In addition, households with higher labour income should also be less vulnerable to financial risks as they have a greater buffer to protect them against portfolio risk. This notion has been empirically supported where a positive relationship between household income and the probability of owning risky assets has been

noted (Donkers & van Soest, 1999; Bertaut & Starr-McCluer, 2002). However, the literature on portfolio allocation suggests that, besides portfolio risk, investors also react to multiple sources of risk, termed as 'background risks'. As discussed in Chapter Two (Sub-section 2.5.3 (Part i), one of the sources of background risk is labour income risk, which relates to income variability. Gollier (2002) suggests that background risks will result in a 'tempering effect' (Kimball, 1991), which reduces the demand for risky assets in the portfolio. This notion is supported by other researchers (e.g. Hochguertel, 2003; Shum & Faig, 2006) who claim that the net effect of income on portfolios is theoretically ambiguous as "the riskiness of labour income generates a background risk which works in the opposite direction" (Shum & Faig, 2006). Individuals with very high levels of income can plausibly be assumed to have riskier jobs and hence exposed to higher income risks. To illustrate, self-employed individuals (i.e. those who own a business) and employed individuals with performance-related compensations are more likely to be within the higher income percentiles as a result of greater earnings opportunities compared to regular employed individuals with more stable income source; however, the former are exposed to larger income volatility (background risk) in comparison to the latter. Hence, to balance out these risks, the proportion of savings allocated in risky assets is reduced.

In regards to life insurance, Beck and Webb (2003, p.61) suggest that an individual's consumption and human capital usually increase with income, thus stimulating higher demand for life insurance to protect against the potential income loss. This notion has been supported in a number of studies which have revealed a positive significant relationship between life insurance demand and income (e.g. Hammond *et al.*, 1967; Neumann, 1969; Anderson & Nevin, 1975; Burnett & Palmer, 1984). It is also viewed that higher income will also lead to an increase in the holdings of safe assets, as labour income is usually placed in low-risk savings accounts prior to any subsequent consumption or investments. Therefore, it is predicted that the relationship between income and all three asset categories will be positive.

H_{E11}: Income is related to the probability of holding / holdings in: low-risk assets (+), risky assets (?), life insurance (+)

Total Assets / Wealth: There is evidence suggesting strong relationships between wealth and portfolio allocation choice. A number of studies (e.g. Hochguertel *et al*, 1997; Donkers & van Soest, 1999; Shum & Faig, 2006) have found positive relationships between risky assets and wealth, suggesting that stocks are a luxury. This implies that wealthier households are more able to buffer themselves against potential losses that are associated with risky investments. Similarly, studies have shown positive links between wealth and life insurance holdings (e.g. Hammond *et al.*, 1967; Headen & Lee, 1974; Anderson & Nevin, 1975), indicating that life insurance is a luxury good. Meanwhile, Kessler & Wolff (1991) found that portfolios of households with low levels of wealth contained disproportionately large amounts of risk-free assets. As such, it is hypothesized in this study that wealth is positively related to risky assets and life insurance, and negatively related to low-risk assets.

H_{E12}: Wealth is related to the probability of holding / holdings in: low-risk assets (-), risky assets (+), life insurance (+)

Table 7.5 below summarizes the predicted signs of relationships between the three dependent variables (low-risk assets, risky assets and life insurance) and the independent variables. Measurements of the independent variables are the same as in the previous research chapters, as explained in Sub-section 5.3.2. Savings motives are measured as "any-mentioned" motive, as used in Chapter Six. One particular change that was made is the measurement of the income variable. In Chapter Five and Six, income was measured as the total labour income plus various other income sources, including investment income. However, in this chapter, the income variable excludes investment income to separate out the effect of income derived from the portfolio itself (capital income) and noncapital income (comprising mainly labour income).

Table 7.5: Predicted signs of relationships between independent and dependent variables.

INDEPENDENT VARIABLES		Expected signs of relationships		
Demographic variables		**LOW-RISK**	**RISKY**	**Life Ins.**
AGE	Age of the respondent in years	?	?	?
MALE	1 if the respondent is male, 0 if female	-	+	?
EDU	Years of education attended by respondent (1-17 years)	-	+	+
Marital status:	(Base group comprises of those not married and without a partner)			
COUPLE	1 if respondent has a spouse/partner, 0 if otherwise	?	?	?
PEU	Number of people in the Primary Economic Unit / household	+	?	+
Race:	(Base group is WHITE)			
BLACK	1 if respondent is Black, 0 if otherwise	+	-	?
HISPANIC	1 if respondent is Hispanic, 0 if otherwise	+	-	?
Other_RACE	1 of respondents are not in any of the other race categories, 0 if otherwise	+	-	?
Occupation	(Base group is OTHER_WORK)			
EMPLOYED	1 if respondent is employed, 0 if otherwise	?	+	?
OWNBIZ	1 if respondent is self-employed or has a partnership or business, 0 if otherwise	?	-	+
CINCOME	Cube root of noncapital income (excluding investment income)	+	?	+
Log_TOTASSET	Total financial assets (sum of low-risk assets, risky assets and life insurance cash value)	-	+	+
Behavioural factors				
RISKTOL	1 if the respondent is willing to take substantial or above average financial risk, 0 if otherwise	-	+	-
Expectations: EXPECON EXPINT EXPINC	1 if expectations regarding the U.S. economy (EXPECON) / interest rates (EXPINT) / family income (EXPINC) is are positive, 0 if otherwise	-	+	-
TIME_HORIZON	1 if most important financial planning period is less than 5 years, 0 if more than 5 years	-	+	+
New_LC	1 if a life-cycle motive was mentioned at all, 0 if not mentioned	+	+	+
New_PREC	1 if a precautionary motive was mentioned at all, 0 if not mentioned	+	-	?
New_BEQ	1 if a bequest motive was mentioned at all, 0 if not mentioned	+	+	+
New_PROFIT	1 if a profit motive was mentioned at all, 0 if not mentioned	-	+	-

Note: The predicted signs of relationships are denoted as: + (positive), - (negative) and ? (uncertain)

7.6 UNIVARIATE TESTS

This section presents the results of univariate tests on two sets of dependent variables. The first set of dependent variables represents the dollar amounts saved in each asset category (LOWRISK, RISKY and INSURANCE), of which results will be discussed in Sub-section 7.6.1 below. The second set of dependent variables consists of the percentages saved in each asset category (LOWRISK_percentage, RISKY_percentage, and INSURANCE_percentage), of which findings will be presented in Sub-section 7.6.2. Given that the dependent variables are continuous variables and the independent variables are categorical, one-way ANOVA tests were conducted. The purpose of ANOVA tests is to determine whether the means are equal amongst the groups. The ANOVA tests that were conducted used only the first implicate of the SCF and were weighted using the weight variable included in the dataset.

7.6.1 Univariate tests on low-risk assets, risky assets and life insurance

Table 7.6 presents the results for the ANOVA tests on the dollar amounts in each asset category. Results indicate that the mean holdings in all three asset categories are significantly higher for males compared to females. Roughly, household heads who are males hold around 60-70 percent higher amounts in low risk assets, risky assets and life insurance, as opposed to female household heads. A possible reason for this may be due to differences in household structure between male and female household heads. It is quite reasonable to assume that male-headed households have higher family income either due to higher earned income or due to dual source of income (from both the household head and spouse), as opposed to female-headed households which plausibly have lower family income or due to having only a single source of income. (It can reasonably be assumed that in a majority of cases where the head of the household is female, she may be a lone parent or the single breadwinner of the family). This difference, hence, implies income disparities between male and female-headed households.

Table 7.6: ANOVA tests on low-risk assets, risky assets and insurance (dollar amounts)

VARIABLE	OBS	LOWRISK				RISKY				INSURANCE			
		Mean	Std. Dev.	χ^2	$p>\chi^2$	Mean	Std. Dev.	χ^2	$p>\chi^2$	Mean	Std. Dev.	χ^2	$p>\chi^2$
(1) GENDER													
Female	976	18294	158368			44586	789875			2037	18819		
Male	3543	46830	435610	759.25	0.000	137819	1145171	54.14	0.000	6875	53520	809.89	0.000
(2) AGE													
Less than 20	13	2424	5517			157	403			994	3283		
20-34	742	7446	33366			9009	102635			1117	7783		
35-49	1424	23660	166198			71299	685215			4621	32397		
50-64	1461	57079	397316			188478	1276749			7986	49990		
65 & over	879	72591	668316	4900.00	0.000	187803	1619203	3600.00	0.000	8518	74831	2700.00	0.000
(3) WORK STATUS													
Other work status	1041	55283	448359			145482	1341539			5267	53704		
Employed	2307	20506	230564			67966	726940			3993	26790		
Self-employed	1171	92942	681011	889.89	0.000	253546	1577817	627.50	0.000	13869	88039	1100.00	0.000
(4) RACE													
Other race	166	24740	127355			50273	281747			4885	36146		
White	3521	49489	440096			146002	1216848			6207	50469		
Black	484	7002	30490			8771	127626			3258	30140		
Hispanic	348	5944	28441	3600.00	0.000	12742	490255	2000.00	0.000	3556	35719	135.76	0.000
(5) MARITAL STATUS													
Married/partner	2986	48376	440822			156388	1243791			7918	59516		
Previously married	978	28969	323122			62156	858216			2623	18946		
Never married	555	19547	129950	655.75	0.000	27841	372794	654.61	0.000	1461	7285	2400.00	0.000
(6) EDUCATION													
No college degree	2334	20667	227071			38789	594399			3323	38133		
With college degree	2185	70384	549854	878.05	0.000	238374	1558672	1100.0	0.000	9328	58093	70.17	0.000

(7) TIME HORIZON													
Less than 5 years	2398	26066	220799			56969	787932			3840	40687		
More than 5 years	2121	58811	540362	1100.00	0.000	197403	1375402	343.29	0.000	8143	54306	34.73	0.000
(8) RISK TOLERANCE													
Low-risk tolerance	3372	34915	356070			88911	863951			4464	40565		
High risk tolerance	1147	55212	462918	11.57	0.001	207349	1638941	408.21	0.000	9945	65766	170.37	0.000
(9) EXP.ECONOMY													
Negative exp. of econ	2392	31556	366703			89239	894912			4334	36949		
Positive exp. of econ	2127	48003	393753	0.23	0.629	139970	1234292	152.57	0.000	7012	56325	290.46	0.000
(10) EXP.INTEREST													
Negative exp. of int.	777	21932	305882			50376	689480			3604	23981		
Positive exp. of int.	3742	43047	395094	30.46	0.000	126995	1131682	171.12	0.000	5994	50609	406.06	0.000
(11) EXP.INCOME													
Negative exp. of inc.	3247	36940	363383			98416	802174			5401	43136		
Positive exp. of inc.	1272	45159	427824	0.55	0.460	156592	1657072	692.63	0.000	5896	56534	29.28	0.000
(12) SVG. MOTIVE													
Life-cycle	3006	39078	300896			120633	901581			6224	48707		
Precautionary	1060	40128	385978			88257	932045			4059	35836		
Bequest	244	41358	654311			119620	1535229			5294	55126		
Profit	59	51871	911545	530.78	0.000	277391	3812507	470.76	0.000	17534	133531	232.63	0.000
(13) TOTAL INCOME													
Below 10,000	315	5397	34951			13048	182042			709	3969		
10,000-24,999	666	10415	35080			15474	87178			1385	6892		
25,000-49,999	977	16939	88077			33018	135091			2266	10914		
50,000-99,999	952	35456	156458			79687	273628			4688	15220		
100,000-199,999	572	52693	156867			178567	550025			10685	50852		
200,000-499,999	366	235026	599274			752276	1896433			35258	169522		
500,000-999,999	168	517770	1036553			1970803	2934088			95986	208696		
1,000,000 & above	503	1877393	5808197	8100.00	0.000	7144336	15346893	9200.00	0.000	133316	400540	6800.00	0.000

In regards to age, the dollar-amount holdings in each asset category increase with age (row 2 in Table 7.6). It appears that the highest age group (65 and over) has the highest amounts in all asset classes, implying that the elderly generally have more wealth accumulated over the years. This observation, however, raises questions on the validity of the life-cycle hypothesis (LCH) which proposes that the elderly dissave their wealth accumulation to maintain their desired standard of living during retirement.

In terms of work status, the self-employed have the highest dollar-amount holding in all asset categories. This finding implies that the self-employed have the highest earned income and are the wealthiest compared to the other households within the other employment categories (employed and other work status). Ethnicity differences also reveal that whites have the highest holdings in all asset classes, implying that white households are generally wealthier in comparison to other races.

The mean asset values between households of different marital status are significantly different from zero. Dollar amount holdings for all assets appear to be the highest amongst head of households who are married or living with a partner. An obvious explanation to the differences is that the spouse or partner also positively contributes toward household income, hence, resulting in higher dollar-amount holdings in all three asset categories.

As can be seen in row 6 of Table 7.6, the mean asset holdings between head of households with a college degree and without a college degree are significantly different for all asset classes. As opposed to heads of households without a college degree, heads of households with a college degree have 70 percent higher amounts in low-risk assets, 84 percent higher amounts in risky assets, and 64 percent higher holdings in life insurance. These results suggest that individuals with higher education earn higher income and are generally wealthier, hence resulting in larger dollar-amounts allocated in each asset class.

Results indicate that differences in financial planning horizon result in significantly different mean holdings in all categories of assets. Households

with a financial planning horizon of more than five years have at least twice as much dollar-value holding in each asset class as opposed to households with financial planning horizon of less than five years. This implies that households with better foresight over their future financial plans generally accumulate more wealth in all asset categories.

From Table 7.6 (row 7), it can be observed also that the difference in mean asset holdings between household heads with high and low risk tolerance levels is significantly different from zero. Household heads with high risk tolerance levels have almost 40 percent higher holdings in low risk assets, nearly 60 percent higher holdings in risky assets, and 55 percent higher holdings in life insurance, as opposed to those with low risk tolerance levels.

The mean asset holdings between the four saving motives are significantly different, as can be seen from row 12 in Table 7.6. It appears that households with a profit motive for saving have the highest dollar-value in all three asset categories. This implies a positive association between wealth levels and the profit motive for saving: the profit motive becomes the priority saving motive only when total assets are high, plausibly suggesting that saving for "investment reasons" (for interest, to invest in a business – see Table 5.1 of Chapter Five) is of primary importance only amongst wealthy households.

In regards to total income, results of the ANOVA show that higher income levels result in higher amounts allocated to all asset categories. This is not surprising given the logical presumption that income and total assets (or wealth) are positively related, hence resulting in larger dollar amount allocations in each asset category.

7.6.2 Univariate tests on the percentage amounts allocated in each asset category

Results of the ANOVA tests on the second set of dependent variables (percentage amounts allocated to low-risk assets, risky assets and life insurance) are presented in Table 7.7 below. As can be seen from the first row

of the table, significant differences are noted between genders in terms of the allocated amounts in the three asset types. In comparison to male household heads, female household heads have significantly higher proportions in low-risk assets (69 percent allocation by females versus 59 percent allocation by males) as well as life insurance (9 percent share by females versus 7 percent share by males). However, male household heads have higher allocation in risky assets (30 percent), compared to females (about 20 percent). A possible explanation of these differences may be related to variations in risk attitudes between the genders, where males have typically been associated with higher risk-taking behaviour as opposed to females.

Table 7.7: ANOVA tests on the percentage invested in low-risk assets, risky assets and life insurance

VARIABLE	OBS	LOWRISK_PERCENTAGE				RISKY_PERCENTAGE				INSURANCE_PERCENTAGE			
		Mean	SD	χ^2	$p>\chi^2$	Mean	SD	χ^2	$p>\chi^2$	Mean	SD	χ^2	$p>\chi^2$
(1) GENDER													
Female	850	0.6903	0.3903			0.2181	0.3485			0.0915	0.2438		
Male	3368	0.5971	0.3946	45.38	0.000	0.3237	0.3758	17.93	0.000	0.0792	0.2076	187.00	0.000
(2) AGE													
Less than 20	10	0.8242	0.3401			0.0689	0.1611			0.1069	0.3257		
20-34	644	0.7718	0.3400			0.1844	0.3110			0.0439	0.1639		
35-49	1317	0.6372	0.3872			0.2740	0.3604			0.0888	0.2225		
50-64	1390	0.5191	0.4036			0.3908	0.3937			0.0900	0.2248		
65 & over	857	0.5754	0.4020	33.02	0.000	0.3237	0.3834	28.56	0.000	0.1009	0.2409	95.31	0.000
(3) WORK STATUS													
Employed	2134	0.6444	0.3880			0.2766	0.3626			0.0790	0.2103		
Self-employed	1149	0.5452	0.3957			0.3909	0.3846			0.0639	0.1719		
Other work status	935	0.6073	0.4070	345.72	0.000	0.2940	0.3790	295.49	0.000	0.0987	0.2499	779.42	0.000
(4) RACE													
Other race	159	0.6553	0.3845			0.2836	0.3703			0.0611	0.1905		
White	3403	0.5849	0.3951			0.3417	0.3802			0.0733	0.1980		
Black	387	0.7031	0.3899			0.1294	0.2829			0.1675	0.3239		
Hispanic	269	0.8509	0.3092	27.11	0.000	0.0987	0.2493	47.87	0.000	0.0504	0.1802	428.30	0.000
(5) MARITAL STATUS													
Married/partner	2868	0.5827	0.3941			0.3377	0.3774			0.0796	0.2052		
Previously married	877	0.6590	0.3983			0.2355	0.3576			0.1055	0.2603		
Never married	473	0.7214	0.3721	60.95	0.000	0.2278	0.3463	28.31	0.000	0.0508	0.1729	296.12	0.000
(6) EDUCATION													
No college degree	2047	0.6964	0.3855			0.2072	0.3368			0.0964	0.2436		
With college degree	2171	0.5073	0.3833	134.54		0.4316	0.3816	31.66		0.0611	0.1687	759.63	0.000
(7) TIME HORIZON													

Less than 5 years	2171	0.6767	0.3882			0.2369	0.3502			0.0864	0.2295		
More than 5 years	2047	0.5412	0.3925	51.80	0.000	0.3821	0.3852	11.33	0.001	0.0767	0.1995	196.63	0.000
(8) RISK TOLERANCE													
Low-risk tolerance	3097	0.6567	0.3897			0.2616	0.3603			0.0817	0.2178		
High risk tolerance	1121	0.4847	0.3887	53.52	0.000	0.4296	0.3853	21.41		0.0857	0.2186	50.17	0.000
(9) EXP.ECONOMY													
Negative exp. of econ	2205	0.6463	0.3934			0.2747	0.3667			0.0789	0.2163		
Positive exp. of econ	2013	0.5922	0.3963	6.41	0.011	0.3208	0.3761	2.92	0.088	0.0870	0.2200	4.40	0.036
(10) EXP.INTEREST													
Negative exp. of int.	692	0.6944	0.3884			0.2177	0.3463			0.0879	0.2341		
Positive exp. of int.	3526	0.6047	0.3953	8.96	0.003	0.3141	0.3750	0.69	0.407	0.0812	0.2139	47.45	0.000
(11) EXP.INCOME													
Negative exp. of inc.	3029	0.6208	0.3956			0.2946	0.3717			0.0845	0.2197		
Positive exp. of inc.	1189	0.6268	0.3953	41.36	0.000	0.2977	0.3710	41.82	0.000	0.0755	0.2115	62.10	0.000
(12) SVG. MOTIVE													
No motive	121	0.7761	0.3782			0.1259	0.2928			0.0980	0.2769		
Life-cycle	2826	0.5919	0.3968			0.3305	0.3787			0.0776	0.2055		
Precautionary	991	0.6647	0.3847			0.2446	0.3527			0.0907	0.2323		
Bequest	223	0.6689	0.4003			0.2302	0.3556			0.1009	0.2573		
Profit	57	0.8581	0.2959	28.25	0.000	0.0903	0.2244	54.16	0.000	0.0516	0.1923	99.71	0.000
(13) TOTAL INCOME													
Below 10,000	216	0.7716	0.3719			0.1250	0.2877			0.1035	0.2822		
10,000-24,999	545	0.7645	0.3689			0.1480	0.3069			0.0875	0.2390		
25,000-49,999	909	0.6779	0.3880			0.2350	0.3527			0.0871	0.2280		
50,000-99,999	940	0.5681	0.3827			0.3530	0.3691			0.0789	0.1954		
100,000-199,999	571	0.4254	0.3602			0.5048	0.3712			0.0699	0.1811		
200,000-499,999	366	0.3549	0.3218			0.5912	0.3337			0.0539	0.1652		
500,000-999,999	168	0.2565	0.2788			0.6494	0.3162			0.0941	0.2041		
1,000,000 & above	503	0.2581	0.2747	2200.00	0.000	0.7025	0.2906	2000.00	0.000	0.0394	0.0875	3000.00	0.000

Results of the univariate tests reveal that the average proportion allocated in each asset category is significantly different between age groups. The mean percentage allocation in low-risk assets appear to be U-shape with age, where the highest share invested in low-risk assets is by the lowest age group (less than 20 years old) and the lowest proportion held is by the 50-64 year age group. A similar U-shape pattern is also observed in the proportion invested in life insurance, with approximately same proportions held by the lowest and highest age category ('less than 20' and '65 & over'). Conversely, the proportion invested in risky assets appears to be n-shaped, where the youngest age group has the lowest proportion invested in risky assets (about 7 percent) and the second oldest age group (50-64 years) has the highest proportion invested in risky assets.

The univariate tests reveal significant differences in the means of asset allocations between employment categories. Comparing across the groups, household heads who are employed have the highest proportion invested in low-risk assets (64 percent), self-employed household heads have the highest allocation in risky assets (almost 40 percent), and the 'other' work status category hold the highest proportion in life insurance (about 10 percent). The results reflect a possible self-selection into employment types according to risk attitudes, where employed individuals may also be those who are more risk averse, hence self-selecting into 'safe' jobs and also investing in low-risk assets. Self-employment implies low-risk aversion, hence plausibly leading to selection of riskier job types and also investment in risky assets. The fact that the 'other' work status group (students, retirees) has the highest share in life insurance implies that alternative income protection methods such as personal life insurance are relied upon in the absence of a steady income stream.

As can be noted in row 4 of Table 7.7, the means of asset allocation proportions are significantly different from zero between race categories. Households in which the heads are of Hispanic ethnicity have the highest proportions allocated in low-risk assets (85 percent), while white household heads have the lowest proportion held in low-risk assets (58 percent). Conversely, white household heads hold the highest proportion in risky assets

(34 percent), while Hispanic household heads hold the lowest proportion in risky assets (10 percent). The highest proportion allocated in life insurance is held by blacks (17 percent) as opposed to other races, who allocate only around 5-7 percent of their portfolios in life insurance. Possible reasons for the differences between means across ethnic groups include divergences in risk attitudes, employment opportunities, and income levels.

Significant differences in the means of asset allocation are also noted amongst marital status groups, where the highest proportion invested in low-risk assets (more than 70 percent) is held by those who have never been married. Compared to other marital status categories, household heads who are married or living with a partner have the highest percentage in risky assets (over 30 percent), while those who have previously been married have the highest allocation in life insurance (11 percent).

Row 6 of Table 7.7 shows that household heads without a college degree have higher proportions invested in low-risk assets (70 percent) and life insurance (9 percent), while those with college degrees have higher proportions invested in risky assets (38 percent). However, recalling back from the results of the dollar amount holdings, those with a college degree have higher amounts in all three asset types. This suggests that the higher proportion allocated in risky assets by higher educated household heads can be associated with higher risk-taking attitudes and higher wealth levels.

As one would expect, households with longer financial planning horizons (more than five years) hold larger proportions in risky assets (38 percent) compared to those with shorter financial planning horizons (24 percent). This implies higher risk-taking behaviour occurs when financial planning horizons are longer. Meanwhile, households with shorter financial planning horizons of less than five years appear to hold higher proportions in safe assets (low-risk assets and life insurance).

Results of the ANOVA tests reveal that household heads with higher risk tolerance levels, as opposed to those with low-risk tolerance levels, have higher proportions allocated in risky assets and life insurance. In contrast,

those with low-risk tolerance levels have higher proportions allocated in low-risk assets. These results support modern portfolio theory which proposes that more risk averse individuals allocate higher proportions in low-risk assets, and less risk averse individuals allocate lower amounts into risky assets.

As predicted, households who expect the future economy to perform better in the next five years hold higher proportions in risky assets compared to households with negative expectations, although this difference is marginally significant at the 10 percent level. Households who expect the economy to perform worse in the future appear to have higher proportions allocated in low-risk assets.

Compared to households with positive expectations of interest rates, households who expect future interest rates to be lower in the future appear to have higher amounts invested in low-risk assets. Conversely, households who expect interest rates to be higher in the future have higher shares invested in risky assets, as opposed to those with negative expectations. Meanwhile, as opposed to households with negative expectations of future family income, households who anticipate family income increase higher than inflation have higher proportions invested in both low-risk and risky assets. Those with negative expectations of future family income have higher amounts allocated in life insurance. This suggests that life insurance is used as a buffer against possible reductions in future income.

Row 12 of Table 7.7 shows that the means of asset holding proportions are significantly different between 'any-mentioned' saving motive categories. Amongst the different saving motives, households with the profit motive have the highest proportion invested in low risk assets (86 percent) and have the lowest share in risky assets (9 percent). These results are rather surprising as we should be expecting people with profit motive to go for more risky portfolios which give higher returns. However, recalling back from the results in Sub-section 7.4.3, households with the profit motive have the highest mean dollar amount in all three asset categories. Households with a life-cycle motive have the highest proportion in risky assets (33 percent), while those with a

bequest motive have the highest proportion allocated in life insurance (10 percent).

Results of the ANOVA tests indicate that as income increases, the proportion invested in low risk assets declines, while the proportion invested in risky assets increases. As can be seen from row 13 in Table 7.7, households in the highest income group (1,000,000 and above) invest 70 percent of their portfolios in risky assets, compared to those in the lowest income group (below 10,000) who allocate only 12.5 percent of the portfolio in risky assets. Conversely, results show that the latter group allocates 77 percent of their portfolios into low risk assets compared to the former group which allocates only 26 percent of wealth into low risk assets. Meanwhile, the highest income group also holds the lowest share in life insurance (4 percent) as opposed to the lowest income group which holds the highest proportion in life insurance (10 percent).

Having presented the univariate tests on two sets of dependent variables (the dollar and percentage amounts allocated in each asset category), the next section (Section 7.7) will deal with the specification of the portfolio allocation model, while the section after that (Section 7.8) will present the results of the multivariate tests and an analysis of the results. The final section (7.9) concludes this chapter.

7.7 MODEL SPECIFICATION OF MULTIVARIATE ANALYSES

The portfolio allocation choice is modeled as a two-stage decision process, consistent with other studies (e.g. Perraudin & Sørensen, 2000; Guiso *et al.*, 1996; Poterba & Samwick, 2001). The first stage involves the choice of whether or not to hold a particular asset category, to be analyzed by using a discrete choice model. Following Perraudin and Sørensen (2000), it is assumed in this case that there are fixed costs involved in holding each of the assets, to accommodate the observation that households do not have holdings in all of the asset types. The second stage involves the decision of how much to allocate in those asset categories, to be examined using a 'continuous' econometric

model. A prior condition that needs to be met is that households must first have positive holdings in total assets, since the asset allocation decision can only arise if there are positive assets to begin with. As such, the analysis is restricted to households with positive total assets.

In the first model, households decide whether or not to hold a particular asset type. In this study, the choice refers to the holdings in one or more of three asset categories (low-risk, risky assets and life insurance). The dependent variables used are binary variables which equal 1 if there are positive holdings in a particular asset category, or zero if otherwise. The three dependent variables are named POSITV_LOWRISK, POSITV_RISKY, and POSTIV_INSURANCE. Given that the three categories of assets are contained within a single portfolio, the outcomes of the estimation are likely to be correlated to each other. Thus, the trivariate probit model is viewed to be an appropriate method to deal with the analysis. The model consists of three equations, where the holdings of low-risk assets (L), risky assets (R) and insurance (I) are specified as:

$$y_{iL} = \alpha + \beta_{aL}X_{iL} + \beta_{bL}Y_{iL} + \beta_{cL}Z_{iL} + \beta_{dL}M_{iL} + \varepsilon_{iL} \quad (1)$$

$$y_{iR} = \alpha + \beta_{eR}X_{iR} + \beta_{fR}Y_{iR} + \beta_{gR}Z_{iR} + \beta_{hR}M_{iR} + \varepsilon_{iR} \quad (2)$$

$$y_{iI} = \alpha + \beta_{iI}X_{iI} + \beta_{jI}Y_{iI} + \beta_{kI}Z_{iI} + \beta_{lI}M_{oI} + \varepsilon_{iI} \quad (3)$$

where $y_{ij} = 1$ if $y_{ij} > 0$, and 0 otherwise.

y_{ij} is defined as household i's holdings of asset j (L,R I) , X_i refer to a vector of control variables in relation to demographic characteristics (AGE, EDU, MALE, PEU, BLACK, HISP, COUPLE, PRVMAR), Y_i is a vector of variables representing the household i's total financial assets (log_TOTASSET) and total income (CINCOME), Z_i refer to a vector of variables in relation to the behavioural characteristics (EXPINT, EXPINC, EXPECON, TIME_HORIZON, RISKTOL), M_i is a vector representing the four dummy "any-mentioned" saving motive variables (New_LC, New_PREC, New_BEQUEST, New_PROFIT), and ε is the error term. The parameters to be estimated are denoted by the terms β. Explanations on each of the independent variables are listed in Table 7.5.

The error terms (ε_{iL} , ε_{iR} , ε_{iI}) are assumed to be jointly normally distributed with mean of zero; they are to allow for unobserved heterogeneity across households. As described by Cappellari & Jenkins (2003), the structure of the model is comparable to that of a seemingly unrelated regression (SURE[12]), except that the outcome variables are binary rather than continuous.

The second stage of the household's decision entails the amounts to allocate in each of the pre-selected asset categories. Due to the fact that a number of households hold only a subset of assets, the lower level values are truncated at zero. Such data can be handled by a Tobit analysis (Tobin, 1958). The Tobit model assumes that there is a latent variable q_i* which is unobservable and is linearly related to the hypothesized independent variables. The observed variable is q_i, which equals the latent variable if the latter is above zero, or zero if otherwise.

$$q_{ij} = \begin{cases} q_{ij}^* & \text{if } q_{ij}^* > 0, \\ 0 & \text{if } q_{ij} \leq 0 \end{cases}$$

The specification of the model takes the following form[13]:

$$q_{iL}^* = \alpha + \beta_{1L}X_{iL} + \beta_{2L}Y_{iL} + \beta_{3L}Z_{iL} + \beta_{4L}M_{iL} + \varepsilon_L \quad (4)$$

$$q_{iR}^* = \alpha + \beta_{1R}X_{iR} + \beta_{2R}Y_{iR} + \beta_{3R}Zi_R + \beta_{4R}M_{iR} + \varepsilon_R \quad (5)$$

$$q_{iI}^* = \alpha + \beta_{1I}X_{iI} + \beta_{2I}Y_{iI} + \beta_{3I}Z_{iI} + \beta_{4I}M_{iL} + \varepsilon_I \quad (6)$$

q_{im} is defined as household i's log amount of holdings in asset j (L,R I) , X_j refer to a vector of control variables in relation to demographic characteristics

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[12] SURE (Zellner, 1962) derives from a linear regression model, but instead of running singular equations, the former can simultaneously analyze a set of unrelated equations. Due to the fact that the equations are unrelated, the independent variables of each equation need not necessarily be the same. Although these equations may appear unrelated due to different determining factors, the fact that they come from the same data implies that the error terms may be correlated, thus necessitating a joint estimation.

[13] In view that there are three possible asset categories with correlated errors, a trivariate or multivariate Tobit model was the ideal option to run the analysis. However, attempts to run the *mvtobit* regression on STATA version 11SE using Microsoft Windows Vista (2007) operating system remained futile. The STATA programme for the multivariate Tobit written by Barslund (2007, 2009) successfully ran; however, it failed to converge even after nearly 200 iterations and after more than 72 hours of computational time.

(AGE, EDU, MALE, PEU, WHITE, BLACK, HISP, COUPLE, PRVMAR), Y_i is a vector of variables representing the household's i's total financial assets (log_TOTASSET) and total income (CINCOME), Z_i refer to a vector of variables in relation to the behavioural characteristics (EXPINT, EXPINC, EXPECON, TIME_HORIZON, RISKTOL), M_i is a vector representing the four dummy "any-mentioned" saving motive variables (New_LC, New_PREC, New_BEQUEST, New_PROFIT), and ε_j are the error terms. The parameters to be estimated are denoted by the parameters β. Table 7.5 in the earlier section provides a complete list of the independent variables.

7.8 RESULTS OF MULTIVARIATE TESTS

7.8.1 Probability of holdings in different asset classes

Table 7.8 presents the results of the trivariate probit analyses. Prior to delving into specific dependent-independent variable relationships, a note on the overall trivariate probit regression is necessary. Of particular importance is the results shown in the last row of the table, which indicate that the rho (ρ) value for equation 1 and 3 (low-risk assets and life insurance) is significant, rejecting the null hypothesis that the error terms between equations are uncorrelated. Unobserved heterogeneity could possibly reflect differences in preferences, attitudes, family background, perceptions regarding expected future returns, or heuristics.

Table 7.8: Results of the Triprobit Regression on POSITV_LOWRISK, POSITV_RISKY and POSITV_INSURANCE

TRIPROBIT REGRESSION	POSITV_LOWRISK				POSITV_RISKY				POSITV_INSURANCE			
	Coef.	Robust SE	z	P>|z|	Coef.	Robust SE	z	P>|z|	Coef.	Robust SE	z	P>|z|
New_LC	-0.1525	0.2873	-0.53	0.595	0.5082	0.2035	2.50	0.013	0.2464	0.1480	1.66	0.096
New_PREC	0.1527	0.3039	0.50	0.615	0.3235	0.2048	1.58	0.114	0.2193	0.1494	1.47	0.142
New_BEQ	0.1947	0.3589	0.54	0.587	0.3174	0.2184	1.45	0.146	0.2906	0.1581	1.84	0.066
New_PROFIT	0.2256	0.5089	0.44	0.658	0.5034	0.2958	1.70	0.089	0.1255	0.2032	0.62	0.537
AGE	0.0090	0.0049	1.86	0.063	-0.0084	0.0023	-3.63	0.000	0.0108	0.0019	5.75	0.000
MALE	-0.3008	0.1856	-1.62	0.105	-0.1104	0.0952	-1.16	0.246	0.0705	0.0788	0.89	0.371
EDU	0.1295	0.0204	6.36	0.000	0.0688	0.0118	5.83	0.000	-0.0181	0.0096	-1.89	0.059
PEU	-0.1001	0.0581	-1.72	0.085	-0.0100	0.0280	-0.36	0.722	0.0441	0.0201	2.19	0.028
COUPLE	0.2966	0.2115	1.40	0.161	0.1386	0.0973	1.42	0.155	0.0371	0.0749	0.50	0.620
BLACK	-0.9622	0.1588	-6.06	0.000	-0.2962	0.0988	-3.00	0.003	0.4560	0.0763	5.98	0.000
HISPANIC	0.4146	0.2858	1.45	0.147	-0.4593	0.1174	-3.91	0.000	-0.3207	0.1064	-3.01	0.003
Other_RACE	3.7968	0.1924	19.73	0.000	-0.2830	0.1333	-2.12	0.034	-0.1039	0.1134	-0.92	0.360
EMPLOYED	0.3255	0.1776	1.83	0.067	0.0558	0.0817	0.68	0.495	0.0952	0.0661	1.44	0.150
OWNBIZ	0.3569	0.2195	1.63	0.104	-0.0938	0.0988	-0.95	0.342	0.1648	0.0685	2.41	0.016
RISKTOL	-0.2744	0.1657	-1.66	0.098	0.1618	0.0586	2.76	0.006	0.0552	0.0498	1.11	0.267
EXPECON	0.3220	0.1263	2.55	0.011	0.0703	0.0529	1.33	0.184	0.0336	0.0431	0.78	0.435
EXPINT	-0.3870	0.1925	-2.01	0.044	0.0527	0.0697	0.76	0.449	0.1283	0.0599	2.14	0.032
EXPINC	-0.0433	0.1376	-0.31	0.753	-0.1469	0.0673	-2.18	0.029	-0.0856	0.0498	-1.72	0.085
TIME	0.5484	0.1876	2.92	0.003	-0.0701	0.0565	-1.24	0.215	0.0798	0.0448	1.78	0.075
CINCOME	0.0176	0.0043	4.12	0.000	-0.0057	0.0023	-2.46	0.014	0.0005	0.0009	0.58	0.559
log_TOTASSET	-0.0137	0.0232	-0.59	0.554	0.5353	0.0199	26.84	0.000	0.1130	0.0094	12.07	0.000
_cons	0.2110	0.5209	0.41	0.685	-5.8783	0.3305	-17.78	0.000	-2.7557	0.2310	-11.93	0.000

No. Of obs=21043; Wald Chi2 (62) = 3418.3; Prob > chi2 = 0.0000; Std error adjusted for 4206 clusters in household			
rho12=0.088	Std.Err.=0.108	z=0.821	Pr>|z|=0.412
rho13= -0.150	Std.Err.=0.061	z= -2.460	Pr>|z|=0.014
rho23= -0.022	Std.Err.=0.026	z= -0.854	Pr>|z|=0.393

H_D: Saving motives are significant predictors of the portfolio allocation choice.

H_{D1}: The life-cycle motive is related to the probability of holding: low-risk assets (+), risky assets (+), life insurance (+)

As can be observed in Table 7.8, the findings reveal that the life-cycle motive is an important determinant of portfolio allocation choice. The life-cycle variable, New_LC, relates positively to the probability of holding risky assets and life insurance. The effect of life-cycle motives on risky asset holdings is stronger (z=2.50, p=0.013) compared to its effect on life insurance holdings (z=1.66, p=0.096). Generally, these results support earlier predictions that life-cycle motives reflect both the emotions of *hope* (hence, a striving for *potential*), as well as *fear* (thus a desire for *security*). With both emotions coming into effect on the portfolio decision, the emerging results show significant relationships with the holdings of two differing types of assets – in this case, risky assets and life insurance – to meet the objectives of the household. Meanwhile, there is no evidence to support predictions of a significant relationship between life-cycle motives and the holdings of low-risk assets.

H_{D2}: The precautionary motive is related to the probability of holding: low-risk assets (+), risky assets (-), life insurance (+)

Results of the triprobit regression reveal that the precautionary saving motive is not a significant predictor of the portfolio allocation choice. As can be seen from Table 7.8, the z- and p-values for New_PREC are insignificant. Hence, based on these findings, the null hypothesis stating that the precautionary motive is not related to the portfolio allocation choice cannot be rejected.

H_{D3}: The bequest motive is related to the probability of holding: low-risk assets (+), risky assets (-), life insurance (+)

As predicted, the bequest motive has some influence on the demand for life insurance. This is evident from Table 7.8 which shows a positive and significant relationship between the bequest motive and the probability of holding life insurance (z=1.84, p=0.066), supporting theories of life insurance

demand (Yaari, 1965) as well as empirical findings (Berhneim, 1991; Chen *et al.* 2006; Fitzgerald, 1989). Meanwhile, the hypothesized relationships between the bequest motive and low risk as well as risky assets are not supported by the results, as they show insignificant relationships between the variables.

H_{D4}: The profit motive is related to the probability of holding: low-risk assets (-), risky assets (+), life insurance (-)

As can be seen from Table 7.8, the relationship between profit motives and the probability of holding risky assets is marginally significant (z=1.70, p=0.089), supporting prior expectations that the desire to attain higher financial rewards encourages investments in risky assets. In contrast, the results show that there is insufficient evidence to say that the profit motive is related to holdings in low-risk assets and life insurance. Generally, the results support the proposition put forth in Sub-section 7.2.2 that the profit motive relates to the aspiration for *potential*, and the emotion of *hope*, as suggested in the Behavioural Portfolio Theory (Shefrin & Statman, 2000).

H_E: Demographic factors are important determinants of portfolio allocation choice.

H_{E1}: Age is related to the probability of holding: low-risk assets (+), risky assets (-), life insurance (+)

Age appears to be a significant determinant of portfolio allocation choice, as reflected in the z- and p-values for holdings in risky assets and life insurance. Findings indicate that as age increases, the likelihood of holding risky assets decreases (z= -3.63, p=0.000). This result supports earlier predictions and the recommendations of investment advisors that individuals should reduce their exposure to financial risks as they grow older. Compared to younger individuals, older people have a relatively shorter time to buffer against potential losses associated with risky assets; hence, will avoid holding these types of assets in order to minimize the impact of potential loss. However,

these results contradict those of Summers *et al.* (2006) that found that as investors age, they tend to display more risk-seeking behaviour in their investments. Meanwhile, the relationship between age and life insurance holdings is highly significant and positive (z=5.75, p=0.000), which confirms *a priori* expectations that older individuals are more likely to own life insurance policies as opposed to younger individuals. Furthermore, this finding supports prior studies which have found positive relationships between age and life insurance ownership (e. g. Berekson, 1972, Showers & Shotick, 1994; Truett & Truett, 1990).

H_{E2}: Male is related to the probability of holding: low-risk assets (-), risky assets (+), life insurance (?)

Results indicate that gender is not a very important factor affecting the portfolio allocation decision. The MALE variable is only marginally statistically significant (at the 10% level) with the probability of holding low-risk assets, supporting the results of a study by Hochguertel (2003) which found that female-headed households preferred holding low-risk assets as opposed to their male counterparts. These findings imply that there may be differences in financial strategies, consumption behaviour, or preferences between the two genders. Meanwhile, results show that the MALE variable does not significantly predict the probability of holding risky assets or life insurance. These insignificant findings suggest that gender-based differences in regards to the holdings of these two asset categories may be captured in other unobservable characteristics such as risk preferences, expectations, and other attitudes, which are also included as explanatory variables in this study.

H_{E3}: Education level is related to the probability of holding: low-risk assets (-), risky assets (+), life insurance (+)

As can be noted from Table 7.8, educational level of the head of the household is an important determinant of portfolio allocation choice. Education is positively related to both low-risk and risky assets, and this relationship is highly significant at the 1% level. The results confirm earlier predictions that, assuming all other factors are equal, higher levels of education strongly

influence holdings in assets which require more knowledge and understanding (Hochguertel *et al.* 1997, Donkers & van Soest, 1999). However, the positive relationship between education and the probability of holding low-risk assets is rather surprising and contradicts prior expectations. One may expect lower educated individuals to have a higher tendency of holding low-risk assets, but the results here indicate otherwise. A possible explanation is that individuals with lower education tend to prefer to hold other safe assets such as life insurance. This notion is somewhat supported by the results showing a marginally significant negative relationship between education and life insurance ($z= -1.89$, $p=0.059$). The unexpected results are also counterintuitive, and contradict earlier arguments that education is a strong influence in decisions to buy sophisticated financial products. A plausible explanation to this puzzle is that higher education levels correlate with the probability of being employed, and hence, the receipt of employer-sponsored insurance benefits. The receipt of such benefits thus reduces the likelihood of purchasing own personal life insurance policies.

H_{E4}: The size of the household is related to the probability of holding: low-risk assets (+), risky assets (-), life insurance (+)

Results show that the probability of holding safe assets decrease with the size of the household, consistent with the findings of Hochguertel (2003), which show that larger households tend to hold less liquid and safe assets. This finding is counterintuitive since larger households presumably increase the demand for liquid types of assets for consumption transactions. An explanation to this apparent puzzle is that families with children tend to prefer other fairly safe financial products such as life insurance, which is meant to protect the children's future, and putting less importance on current, liquid balances (Hochguertel, 2003, p.68). The results indicate some support to this rationalization, since it shows that household size is highly relevant in the decision of holding life insurance ($z=2.19$, $p=0.028$). This implies that the importance of life insurance as a means of protecting the welfare of dependants in the family increases as the household size increases. The results also

indicate that the relationship between household size and choice of risky assets is insignificant.

H_{E6}: Race is related to the probability of holding: low-risk assets, risky assets, life insurance

There is evidence to suggest that race significantly affects portfolio allocation choices. In particular, findings reveal that, compared to white-Americans (the reference group), African-American heads of households have lower tendency of holding low risk and risky assets, but have higher probability of holding life insurance. These results, which are significant at the 1% level, support the results of prior research which have found that black individuals are less likely to hold risky assets (Keister, 2000; Brimmer, 1988). Meanwhile, the results for Hispanics show negative statistical significance between the variable and risky assets and also insurance holdings. Compared to whites, the minority group labelled as 'Other_RACE' have a higher tendency of holding low risk assets and a lower tendency of holding risky assets. The results suggest that race is an indication of variations in saving and investing behaviour plausibly arising from differences in cultural values and beliefs. Another possible explanation is the notion of 'financial exclusion' which suggests that certain groups of the population may be excluded from the access of certain financial products due to differences in geographic location or economic status. However, this claim cannot be made with certainty unless further specific research is done in regards to this issue.

H_{E7}: Occupational status is related to the probability of holding: low risk assets (-), risky assets (+), life insurance (+)

Overall, the findings indicate that occupational status has some impact on asset holdings. In comparison to the base group ('other work status,' including unemployed, students, retirees), employed and self-employed individuals have a higher probability of owning low risk assets. These variables were not, however, significant in the decision of holding risky assets. Results also indicate that in comparison to the base group, self-employed individuals tend

to have a higher probability of having insurance policies (z=2.52, p=0.012). This reflects the notion that, in comparison to unemployed people, self-employed individuals place more importance on insuring themselves through personally-owned life insurance policies.

H_{E8}: Risk tolerance is related to the probability of holding: low risk assets (-), risky assets (+), life insurance (+)

It appears that risk tolerance significantly contributes toward the portfolio allocation decision. An individual who is more risk tolerant tends to hold lower amounts in low risk assets and higher amounts in risky assets, which is consistent with the literature (e.g. Schooley & Worde, 1996; Shum & Faig, 2006; Chen *et al.*, 2006; Eeckhoudt *et al.*, 2005). The relationship between risk tolerance and low risk assets is negative and significant at the 10% level, while the relationship between risk tolerance and having risky assets is positive and highly significant at the 1% level (z=2.76, p=0.006). These findings confirm *a priori* expectation that risk preference of the investor is an important determinant of portfolio choice. However, results show that risk tolerance is not a significant predictor of the probability of holding life insurance.

H_{E9}: Expectations are significantly related to holdings in: low-risk assets (-), risky assets (+), life insurance (-)

The results in regards to expectations and portfolio allocation choice are mixed. Positive expectations of the future economy appear to be marginally significant in influencing the probability of holding low-risk assets, contradicting prior expectations. This finding is rather surprising as one would expect a positive outlook of the future economy to stimulate holdings of risky assets rather than low-risk assets. However, expectation regarding "the future of the U.S economy" can be viewed as a very subjective matter and may include a number of aspects, including the labour market, stock market performance, credit access, and many more factors. The results show that, *ceteris paribus*, households prefer holding low-risk assets when they perceive that future economic conditions will be more favourable in the next five years. Holding other factors constant, positive expectations of future interest rates

tend to reduce the probability of holding low-risk assets, implying that households tend to prefer saving in other types of assets in anticipation of higher interest rates. These results are similar to those of Hochguertel (2003) which also found that households who anticipate more secure future income hold less safe portfolios than those who expect an income reduction.

Findings indicate that positive expectations of future interest rates increase the tendency of holding life insurance. This suggests that the returns or dividends (or bonuses declared) from life insurance are perceived to be positively related to interest rates, hence demand increases with positive expectations of interest. The relationship is significant at the 5% level. Positive expectations regarding household income decrease the probability of holding life insurance demand. as noted from the negative relationship between EXPINC and life insurance holdings (z= -1.73; p=0.084). This finding suggests that uncertainty regarding future income motivates the holding of life insurance, supporting earlier predictions.

The predicted relationships between owning risky assets and expectations are not strongly supported by the findings. The only apparent significant results was that between expectations of income and risky assets which, surprisingly, reveal a negative sign (z= -2.18, p=0.029). The results indicate that all factors being equal, positive expectations of future family income depresses the probability of holding high risk assets. A possible explanation is that high risk assets are typically held to counter inflation risk. Thus, when the household anticipates family income to rise higher than inflation rate, the need to invest in high risk asset diminishes.

H_{E10}: Financial planning horizon is significantly related to holdings in low-risk assets (-), risky assets (+), life insurance (+)

Financial planning horizons of the household is a significant predictor of holdings in low-risk assets (z=2.92, p=0.003), marginally significant in the holdings of life insurance (z=1.78, p=0.075), and insignificant in the holdings of risky assets. As can be seen from Table 7.8, TIME_HORIZON is positively related to both the probability of holding low-risk assets and life insurance.

indicating that longer financial planning horizons encourage holdings in these two relatively safe types of assets. The positive relationship confirms prior expectations that insurance programs are usually taken up to meet long term objectives. However, the positive relationship between low-risk assets and financial planning horizon is counterintuitive. The fact that households will choose to save in low-risk assets when their planning horizon is long-term implies that individuals place more confidence in safe assets with fixed interest rates in order to deliver their desired financial goals over the life-time.

H_{E11}: Income is significantly related to the probability of holding: low-risk assets (+), risky assets (+), life insurance (+)

The results show that income is an important predictor of low-risk and risky asset holdings. However, the signs of the coefficients are not as expected – results show that higher income depresses the likelihood of holding risky assets, and increases the probability of holding low-risk assets, *ceteris paribus*. One would expect *a priori* that the relationship between income and holdings of risky assets is positive as households with higher income are able to afford the information and participation costs of risky assets. Nonetheless, the surprising results may be explained by the likely correlation between income and labour income risk, defined as the variability of household labour income (Cardak & Wilkins, 2009). As discussed in Sub-section 7.5.2, individuals earning very high levels of income can plausibly be assumed to have riskier jobs and hence exposed to higher income risks. Self-employed individuals (i.e. those who own a business) and employed individuals with performance-related compensations are more likely to be within higher income percentiles as a result of greater earnings opportunities compared to regular other individuals who work as employees and earn a stable income source. Nonetheless, the former are exposed to larger income volatility (background risk) in comparison to the latter. Hence, to balance out these risks, the proportion of savings allocated in risky assets is reduced. Meanwhile, the relationship between the income and the probability of holding life insurance variable is positive, as predicted, although not statistically significant. This implies that income may not be an important factor in the decision to purchase life insurance.

H_{E12}: Wealth is significantly related to the probability of holding: low-risk assets, risky assets, life insurance

Despite the counterintuitive results in regards to income, the results for wealth confirm earlier predictions. Total assets are found to be a highly significant predictor of risky and insurance holdings, suggesting that wealthier households are more likely to participate in risky investments and also life insurance. These results support *a priori* notion belief that insurance and risky investments are luxury goods in which demand will increase with wealth. The relationship between wealth and low-risk assets is negative but not significant, implying that wealth may not be an important determinant of holdings in safe assets.

7.8.2 Investigating the non-linear relationship between age and asset choice

Some studies have suggested that the relationship between age and portfolio allocation may be non-linear (Guiso *et al.*, 1996; Guiso & Jappelli, 2002; Hochguertel, 2003), and thus have included AGE and AGE-squared (AGE^2) in the multivariate regression analyses. In the main multivariate analysis section of this chapter, only one variable (AGE) was included in the regression to avoid multicollinearity problems. Nonetheless, this section attempts to uncover possible non-linear effects between age and asset holdings.

Table 7.9 presents the results of a Triprobit regression inclusive of both AGE and AGE^2. The two variables and their effects on the three asset categories are highlighted in the table. Findings reveal that these two variables are not significantly related to holdings in low-risk assets, but are highly relevant in the choice of holding risky assets and life insurance. The coefficient for AGE is positive for both risky assets and life insurance, while the coefficient for AGE^2 is negative for both these asset categories. This implies that the relationship between these two asset types (risky assets and life insurance) is hump-shaped.

To determine the maximum point of age on the probability of holding risky assets and life insurance, the first derivative of the function is taken. To solve for the maximum point of age on risky asset holdings, the following function is differentiated:

$$y = a + bx + cx^2, \text{ where } x = \text{AGE}.$$

The maximum point of the function is determined by taking the derivative of the above equation:

$$\frac{dy}{dx} = b + 2cx = 0$$

Solving the above equation, the value for x is given as

$$x = (-b)/(2c)$$

Subsequently, the coefficient values for AGE and AGE^2 taken from Table 7.10 are substituted into the above equation, producing the following results:

For risky assets: $x = \frac{(-0.0239)}{2(-0.0003)} = 39.83 \approx 40.$

For life insurance: $x = \frac{(-0.0353)}{2(-0.0002)} = 88.25 \approx 88.$

These results suggest that the maximum point for the probability of holding risky assets is 40 years old, while the maximum point for the probability of holding life insurance is 88 years old. What these results suggest is that the probability of holding risky assets increases till middle-age and then falls. Similarly, the probability of holding life insurance tends to increase throughout the lifetime – only decreasing at extreme old age.

Table 7.9: Triprobit regression on POSITV_LOWRISK, POSITV_RISKY & POSITVE_INSURANCE (with AGE^2)

TRIPROBIT REGRESSION	POSITV_LOWRISK				POSITV_RISKY				POSITV_INSURANCE			
	Coef.	Robust Std. Err.	z	P>|z|	Coef.	Robust Std. Err.	z	P>|z|	Coef.	Robust Std. Err.	z	P>|z|
New_LC	-0.1357	0.2875	-0.47	0.637	0.4766	0.1997	2.39	0.017	0.2235	0.1466	1.52	0.127
New_PREC	0.1570	0.3033	0.52	0.605	0.2991	0.2011	1.49	0.137	0.2027	0.1478	1.37	0.170
New_BEQ	0.1991	0.3606	0.55	0.581	0.2785	0.2151	1.29	0.195	0.2920	0.1566	1.86	0.062
New_PROFIT	0.2643	0.5118	0.52	0.606	0.5054	0.2933	1.72	0.085	0.1206	0.2018	0.60	0.550
AGE	-0.0191	0.0224	-0.85	0.393	0.0239	0.0108	2.22	0.027	0.0353	0.0089	3.98	0.000
AGE^2	0.0003	0.0002	1.36	0.174	-0.0003	0.0001	-3.03	0.002	-0.0002	0.0001	-2.83	0.005
MALE	-0.3067	0.1864	-1.65	0.100	-0.1115	0.0947	-1.18	0.239	0.0720	0.0789	0.91	0.361
EDU	0.1351	0.0202	6.70	0.000	0.0668	0.0118	5.68	0.000	-0.0197	0.0096	-2.05	0.040
PEU	-0.0906	0.0574	-1.58	0.115	-0.0191	0.0292	-0.65	0.514	0.0395	0.0204	1.94	0.052
COUPLE	0.2926	0.2117	1.38	0.167	0.1308	0.0976	1.34	0.180	0.0314	0.0751	0.42	0.676
BLACK	-0.9581	0.1594	-6.01	0.000	-0.3110	0.0994	-3.13	0.002	0.4505	0.0764	5.89	0.000
HISPANIC	0.4328	0.2866	1.51	0.131	-0.4703	0.1183	-3.97	0.000	-0.3254	0.1065	-3.05	0.002
Other_RACE	3.9738	0.2311	17.20	0.000	-0.2921	0.1342	-2.18	0.029	-0.1104	0.1133	-0.97	0.330
EMPLOYED	0.3488	0.1746	2.00	0.046	-0.0231	0.0837	-0.28	0.783	0.0657	0.0666	0.99	0.324
OWNBIZ	0.4259	0.2197	1.94	0.053	-0.1732	0.1005	-1.72	0.085	0.1225	0.0699	1.75	0.080
RISKTOL	-0.2706	0.1677	-1.61	0.107	0.1630	0.0614	2.65	0.008	0.0560	0.0500	1.12	0.262
EXPECON	0.3237	0.1276	2.54	0.011	0.0710	0.0533	1.33	0.183	0.0387	0.0431	0.90	0.369
EXPINT	-0.3721	0.1919	-1.94	0.053	0.0470	0.0701	0.67	0.503	0.1249	0.0600	2.08	0.037
EXPINC	-0.0540	0.1383	-0.39	0.696	-0.1346	0.0678	-1.98	0.047	-0.0807	0.0501	-1.61	0.107
TIME	0.5773	0.1876	3.08	0.002	-0.0895	0.0561	-1.60	0.111	0.0645	0.0451	1.43	0.152
CINCOME	0.0188	0.0041	4.55	0.000	-0.0058	0.0021	-2.79	0.005	0.0004	0.0009	0.40	0.686
log_TOTASSET	-0.0160	0.0226	-0.71	0.480	0.5357	0.0202	26.53	0.000	0.1127	0.0093	12.06	0.000
_cons	0.6686	0.6824	0.98	0.327	-6.4485	0.3738	-17.25	0.000	-3.2509	0.2898	-11.22	0.000

No. Of obs=21013; Wald Chi2 (66) = 3468.83; Prob > chi2 = 0.0000; Std error adjusted for 4206 clusters in household			
rho12=0.087	Std.Err.=0.115	z=0.760	Pr>|z|=0.447
rho13= -0.145	Std.Err.=0.061	z= -2.362	Pr>|z|=0.018
rho23= -0.023	Std.Err.=0.027	z= -0.838	Pr>|z|=0.402

7.8.3 Determinants of the value of asset holdings

As earlier discussed in Section 7.7, the second stage of the portfolio allocation decision involves the decision of how much to allocate in each of the asset categories. This will be analyzed in a series of tobit analyses on the log-values of dollar amount holdings in each of the asset categories. The dependent variables used in this analysis are: log_LOWRISK, log_RISKY, and log_INSURANCE. The tobit analyses are deemed appropriate given that the dependent variables in this case are continuous, although the values are censored at zero. Results are shown in Table 7.10 below.

Table 7.10: Tobit regressions on log_LOWRISK, log_RISKY and log_INSURANCE

TOBIT REGRESSION	log_LOWRISK				log_RISKY				log_INSURANCE			
	Coef.	Robust Std. Err.	t	P>|t|	Coef.	Robust Std. Err.	t	P>|t|	Coef.	Robust Std. Err.	t	P>|t|
New_LC	0.1182	0.1837	0.64	0.520	1.3398	0.9973	1.34	0.179	1.0587	1.4327	0.74	0.460
New_PREC	0.2750	0.1857	1.48	0.139	0.8548	1.0026	0.85	0.394	0.8803	1.4419	0.61	0.542
New_BEQ	0.1666	0.2061	0.81	0.419	1.1592	1.0630	1.09	0.276	1.0442	1.5644	0.67	0.504
New_PROFIT	0.2232	0.2480	0.90	0.368	1.7324	1.2077	1.43	0.151	1.4734	2.0574	0.72	0.474
AGE	0.0002	0.0020	0.07	0.941	-0.0266	0.0099	-2.68	0.007	0.0847	0.0179	4.74	0.000
MALE	0.1054	0.0911	1.16	0.247	-0.4465	0.3828	-1.17	0.244	0.4655	0.7204	0.65	0.518
EDU	0.0219	0.0120	1.83	0.067	0.2329	0.0524	4.44	0.000	-0.1808	0.0925	-1.96	0.051
PEU	-0.0387	0.0233	-1.66	0.097	-0.0856	0.1137	-0.75	0.452	0.5341	0.2028	2.63	0.008
COUPLE	0.0270	0.0881	0.31	0.759	0.6994	0.3798	1.84	0.066	-0.0562	0.7308	-0.08	0.939
BLACK	-0.4570	0.1136	-4.02	0.000	-1.3635	0.4772	-2.86	0.004	3.5322	0.6294	5.61	0.000
HISPANIC	0.2294	0.0726	3.16	0.002	-2.1114	0.5963	-3.54	0.000	-3.0812	1.0295	-2.99	0.003
Other_RACE	0.0775	0.1038	0.75	0.455	-0.9693	0.5614	-1.73	0.084	-1.7959	1.2249	-1.47	0.143
EMPLOYED	0.0499	0.0723	0.69	0.490	0.3326	0.3153	1.05	0.291	1.1909	0.6439	1.85	0.064
OWNBIZ	0.0891	0.0986	0.90	0.366	-0.1568	0.3554	-0.44	0.659	-0.4956	0.7769	-0.64	0.523
RISKTOL	-0.2536	0.0678	-3.74	0.000	0.7743	0.2401	3.23	0.001	0.7365	0.5216	1.41	0.158
EXPECON	0.0088	0.0507	0.17	0.862	-0.0400	0.2144	-0.19	0.852	0.0634	0.4302	0.15	0.883
EXPINT	-0.0744	0.0638	-1.16	0.244	0.2859	0.3048	0.94	0.348	0.8413	0.5671	1.48	0.138
EXPINC	0.0244	0.0567	0.43	0.667	-0.0779	0.2493	-0.31	0.755	-0.4906	0.5262	-0.93	0.351
TIME	0.0424	0.0514	0.83	0.409	-0.1066	0.2177	-0.49	0.625	0.1977	0.4430	0.45	0.655
CINCOME	0.0081	0.0025	3.26	0.001	-0.0224	0.0094	-2.38	0.017	-0.0641	0.0191	-3.36	0.001
log_TOTASSET	0.7181	0.0134	53.76	0.000	2.6790	0.0631	42.46	0.000	1.5155	0.1027	14.76	0.000
_cons	0.8932	0.2810	3.18	0.001	-24.7999	1.3482	-18.40	0.000	-21.8331	2.2155	-9.85	0.000
	No. Of obs=21043; F(19,21024) = 573.28; Prob > F = 0.0000; Pseudo R2=0.2100 (Std error adjusted for 4212 clusters in household),				No. Of obs=21043; F(19,21024) = 225.7; Prob > F = 0.0000; Pseudo R2=0.1784 (Std error adjusted for 4212 clusters in				No. Of obs=21043; F(19,21024) = 26.91; Prob > F = 0.0000; Pseudo R2=0.0377 (Std error adjusted for 4212 clusters in			

	218 left-censored observations at log_LOWRISK≤0, 20825 uncensored observations, 0 right-censored observations	household) 8446 left-censored observations at log_LOWRISK≤0 12597 uncensored observations, 0 right-censored observations	household) 14380 left-censored observations at log_LOWRISK≤0 6663 uncensored observations, 0 right-censored observations

H_D: Saving motives are significant predictors of portfolio allocation choice

As shown in Table 7.9, results of the separate tobit regressions on the three asset categories reveal that saving motives are insignificant determinants of the portfolio allocation choice in terms of dollar amount holdings in each of these asset classes. Notably, these results differ from the earlier findings of the triprobit regression (Sub-section 7.8.1) where results suggest that to a certain degree, saving motives do have an effect on the choice of assets holdings. As noted earlier from Sub-section 7.8.1, the probability of holding risky assets is influenced by life-cycle and profit motives, and that the probability of holding life insurance is influenced by life-cycle and bequest motives. These findings imply that saving motives have an impact on the first-order decision of asset holding, but their impacts on the second-order decision of portfolio allocation are diluted, such that they do not have an important effect on the amounts allocated in each of the asset categories.

Nonetheless, to allow for the fact that saving motives vary according to income, the specification model was then run according to income quartiles. This is similar to the analyses that were conducted in Chapter Six, whereby the saving motives among different households of different income were found to differ. In Chapter Six, the income quartiles that were used were based on CTOTINC, but for the purpose of this chapter, the quartiles were segregated according to CINCOME. The reason for this is to maintain consistency in the employment of CINCOME in this chapter. As discussed, in Sub-section 7.5.2, the reason for re-defining the income variable is to segregate capital income from labour income.

Hence, using CINCOME as a measure of income for this chapter, the first income quartile consists of households with annual income below $20,000; the second quartile consists of households with annual income between $20,001 and 40,000; the third quartile includes households with annual income in the range of $40,001 to $71,400; and the fourth quartile includes households with annual income exceeding $71,400. Results of the regressions are shown in the Appendix (Table 1 - Table 4).

The results reveal that saving motives are relevant in the decision of dollar-amount allocation of assets in the portfolio for households in certain income quartiles. For households in the first income quartile, the life-cycle, precautionary and bequest motives positively impact holdings in low-risk assets. This implies that these households aim for security, and fear the possibility of falling into low levels of wealth, as the Behavioural Portfolio Theory (BPT) suggests. However, none of the saving motives were significant in the determination of risky asset and life insurance holdings. This implies that participation costs (including information, entry and transaction costs) may be a more important determining factor in accessing these financial assets.

For households in the second income quartile, holding amounts in low-risk assets are negatively influenced by life-cycle motives, but are not affected by the presence of any other motives. The negative relationship between having life-cycle motives and low-risk assets are rather peculiar, since one would expect that having this saving motive should increase, rather than decrease, the dollar amount holdings. A possible explanation is that holdings in low-risk assets are shifted into other types of assets when life-cycle motives are present. However, results indicate that the allocation decision of risky assets and life insurance are not significantly affected by any of the saving motives.

Portfolio allocation for households in the third income quartile appear to be most influenced by saving motives whereby results show that the life-cycle, precautionary and profit motives reduce holdings in low-risk assets. This finding suggests that these saving motives may in turn have positive impact on the holdings of other types of assets – which the results seem to support. All the saving motive categories (life-cycle, precautionary, bequest and profit motives) are positively related to the holding amounts in risky assets, although not significantly related to holdings in life insurance.

The portfolio allocation choice of households in the highest income quartile is unaffected by saving motives, since results indicate that none of the saving motives are significantly related to the holding amounts of all three asset categories. In relation to propositions of the Behavioural Portfolio Theory, this finding suggests that richer households are not affected by the feelings of hope

and fear, or the aspirations for security and potential – possibly because households of this income level perceive themselves to have already achieved a high level of financial security. Wealth appears to have a much more significant influence on portfolio decisions for these households. As the results show, total financial wealth appears to be a significant predictor of portfolio choice not only for households in the highest income quartile, but for all the other quartiles as well.

H_E: Demographic factors are important determinants of the portfolio allocation choice.

H_{E1}: Age is related to holdings in low-risk assets, risky assets, and life insurance.

Results of the Tobit regressions show that age is a significant predictor of the amounts held in risky assets and life insurance, although not of low-risk assets. Results indicate that the relationship between age and owning risky assets is negative and significant (t= -2.68, p=0.007), suggesting that, as individuals grow older, the amounts held in risky assets decreases. This finding supports prior research work (Perraudin & Sørenson, 2000) and recommendations by investment advisors that risky assets should be avoided as individuals age. Conversely, findings reveal a positive and significant relationship between age and life insurance (t=4.74, p=0.000) implying that older individuals have higher allocations in life insurance. Again, these results confirm earlier results of the triprobit regression that older individuals are more likely to own life insurance policies.

Additional analyses were conducted with the age-squared variable (AGE^2), included to test for non-linear effects of age on portfolio choices. The results are shown in Table 7.11. Findings suggest that the relationship between age and all three asset categories are non-linear - the relationship between age and risky assets is hump-shaped with a peak at age 41; a similar non-linear effect between age and life insurance is noted whereby life insurance holdings increase with age till age 82 before it dips downwards; and lastly, there is a U-shaped relationship between age and low-risk with a trough at age 50. The

results support prior research studies which have found a similar relationship between age and risky assets (Viciera, 2001; Aizcorbe *et al.*, 2003; Shum & Faig, 2006; Cocco *et al.*, 2005) and low-risk assets (Hochguertel, 2003).

H_{E3}: EDU is related to holdings in low-risk assets (-), risky assets (+), and life insurance (+).

As can be observed from Table 7.9, education is an important determinant of portfolio allocation. The *t*- and corresponding *p*-values are significant for all three asset categories. The signs of relationship are similar to those obtained from the triprobit results, wherein the relationships between EDU and log_LOWRISK, as well as EDU and log_RISKY are positive, while the relationship between EDU and log_INSURANCE is negative. This suggests that assuming all other factors equal, higher educated individuals allocate more savings into low risk and risky assets, and less into life insurance. The significant positive relationship between log_RISKY and EDU confirms *a priori* hypothesis that the ownership of risky assets is determined by the level of knowledge and information-seeking capabilities of the investor. Education is a proxy of these abilities; hence, as the results suggest, it significantly affects the allocation into risky assets. However, the positive relationship between education and low risk assets is counterintuitive. As argued in Sub-section 7.8.2, a possible explanation is that lower educated individuals tend to prefer other safe assets such as life insurance. As education level increases, the tendency of saving in life insurance diminishes, while the likelihood of saving in low risk assets increases.

H_{E4}: Household size is related to holdings in low-risk assets (+), risky assets (-), life insurance (+)

Results of the tobit regressions show that household size significantly affects holdings in low-risk assets (t= -1.66, p=0.097) and life insurance (t= 2.79, p=0.000). The latter results confirm prior expectations that larger households encourage the demand for life insurance since the well-being of a larger

number of family members is at stake in the unfortunate event of death of the breadwinner. This finding also supports prior research studies which have found positive relationships between family size and life insurance demand (e.g. Bernheim, 1991; Burnett & Palmer, 1984; Showers & Shotick, 1994). Meanwhile, the negative coefficient for low-risk assets indicates that the ability to save in these safe and liquid assets is negatively affected by the household size. While it was earlier argued (in Sub-section 7.5.2) that larger households should plausibly have a stronger demand for liquid assets to support higher costs of living, results suggest otherwise. One interpretation could be that larger households have higher levels of consumption, and as such, the amount to allocate as saving is relatively lower to begin with.

H_{E5}: Marital status is related to holdings in: low-risk assets, risky assets, life insurance.

Findings reveal that in comparison to household heads who are 'single', household heads who are married or living with their partners are more likely to hold higher amounts in risky assets (t=1.84, p=0.066), consistent with past research (Bertaut & Starr-McCluer, 2002). The results imply that the presence of a significant other has considerable influence on risk-taking behaviour, which subsequently affects financial positions, due to joint decisions being made in regards to household financial matters. Results show that marital status does not significantly influence the amounts held in low-risk assets or life insurance.

H_{E6}: RACE is related to holdings in low-risk assets, risky assets, life insurance.

Similar to the results of the triprobit regression in Sub-section 7.8.1, results of the tobit regression indicate that race is an important determinant of portfolio allocation. As can be seen in Table 7.9, in comparison to the base category (WHITE), blacks, Hispanics and other races have significantly lower dollar amount allocations in risky assets, holding other factors equal. In terms of the

other assets, blacks have lower amounts in low-risk assets but have higher amounts in life insurance. Conversely, Hispanics have higher amounts in low-risk assets and lower amounts in life insurance. These findings render support to a proposition by Tin (1999) suggesting that differences in asset demand may be attributed to variations in subjective and objective motives to save related to culture, as well as idiosyncratic values and beliefs.

H_{E7}: Occupational status is related to holdings in: low-risk assets, risky assets, life insurance.

Out of the three asset categories, the only one that shows positive relationship with work status is log_INSURANCE. Results show that, as opposed to the base group ('other' work status – including unemployed individuals, students and retirees), employed individuals hold higher amounts in life insurance (t=1.85, p=0.064), *ceteris paribus*. A possible explanation is that as opposed to the base group, employed individuals have a higher human capital which needs to be protected, hence leading to larger face amount values, premium payments, and hence, cash values of the policies.

H_{E8}: Risk tolerance is related to holdings in low-risk assets, risky assets, life insurance.

As can be seen from Table 7.9, investor's risk attitude significantly influences the portfolio allocation choice. The relationship between risk tolerance and low-risk assets is negative (t= -3.74, p=0.000) while the relationship between risk tolerance and risky assets is positive (t=3.23, p=0.001). These results support propositions of standard portfolio theory suggesting that the investor's risk attitudes do influence portfolio allocation whereby it is posited that higher risk aversion encourages holdings in low-risk assets while discouraging holdings in risky assets (Eeckhoudt *et al.*, 2005; Schooley & Worde. 1996; Shum & Faig, 2006). Meanwhile, there is insufficient evidence to reject the null hypothesis that risk tolerance does not affect the amounts held in life insurance.

H_{E9}: Expectations are related to holdings in low-risk assets, risky assets and life insurance.

Results indicate that all the expectation variables are not related to the holding amounts in each asset category. These findings differ from results of the triprobit regression where some of the expectation variables are noted to have some significance in the probability of holding certain assets classes.

H_{E10}: Time horizon is related to holdings in low-risk assets, risky assets and life insurance.

There is insufficient evidence to support the hypothesis that time horizon influences portfolio allocation in any of the three asset categories. These results are at odds with the findings from Sub-section 7.8.1 which reveals that time horizon positively affects the probability of holding low- risk assets and life insurance.

H_{E11}: Income is related to holdings in low-risk asset, risky assets, life insurance.

As expected, income is a key determinant of asset holdings. The variable CINCOME is significantly related to all three asset categories. However, the signs of relationship are perplexing. The results suggest that, for a given level of wealth, income is found to be positively related to the amounts allocated in low-risk assets, and negatively related to the amounts invested in risky assets and life insurance. These results are similar to results of the triprobit regression in Sub-section 7.8.1. The signs of coefficients do not only contradict results of past research (Donkers & van Soest, 1999) but they are also counter-intuitive. One would reasonably expect income to be positively related to the amounts held in risky assets, since higher income provides more leverage in dealing with risk. This puzzle may be due to the reasonable assumption that income levels are related to income risk. As previously explained in Sub-section 7.8.1, individuals with very high income can be reasonably assumed to be exposed to

greater 'background risk' inclusive of labour income variations. Hochguertel (2003, p.61) argues that "under suitable restrictions on preferences and on the covariance with endogenous risks, these exogenous risks can induce reduced financial risk taking as precautionary response." Thus, it is argued that high income levels correlate with uninsurable income risks; hence, these reduce holdings of risky assets. Similarly, the negative relationship between income and life insurance suggests that higher income individuals prefer other means of saving such as low-risk assets.

H_{E12}: Wealth is related to holdings in low-risk asset, risky assets, life insurance.

Despite the puzzling results in regards to income and the portfolio allocation choice, findings confirm *a priori* expectation that wealth will positively influence holdings in risky assets and life insurance. The findings are consistent with past research (e.g. Bertaut & Starr-McCluer, 2002) support the notion that life insurance and risky investments are luxury goods whereby demand will increase as wealth increases. Surprisingly, wealth is also positively related to holdings in low risk assets. This simply suggests that any increase in wealth will generally increase the amounts held in all asset categories regardless of the risk-level associated with each of the asset types, as one would expect *a priori*.

7.9 DISCUSSION OF RESULTS

This chapter has examined the determinants of portfolio allocation choice, by investigating the impact of household's socio-demographic and behavioural characteristics on portfolio decisions. Of particular interest is the role of saving motives in the portfolio allocation process. The postulated link is based on tenets of the Behavioural Portfolio Theory (Shefrin & Statman, 2000) which suggests that the portfolio of an investor resembles a layered pyramid of which the bottom layer provides security to protect against poverty, and the upper layer represents the potential of becoming rich. The Behavioural Portfolio

Theory (BPT) hypothesizes that emotions (of *hope* and *fear*) influence the portfolio allocation choice, such that *fear* will induce people into placing their money in secure types of assets in the lower level of the portfolio pyramid, and *hope* will encourage holdings of assets in the upper level of the pyramid which potentially give high returns. Based on the idea that different layers in the portfolio pyramid correspond to different aspiration levels, saving motives are conceptualized as the underlying manifestation of these emotions and aspirations; hence, they (saving motives) will have varying impacts on the household's portfolio allocation choice.

Results of the multivariate analyses reveal that to a certain extent, portfolio allocation decisions are driven by motives to save. Life-cycle motives increase the probability of participating in risky assets and also in the purchase of life insurance. This observation implies that two distinct types of assets (risky assets and life insurance, which is not risky) are held to satisfy the long-term nature of the 'consumption-smoothing' saving motive. Meanwhile, profit motives also appear to be significant in the probability of owning risky assets. This finding supports the notion of the Behavioural Portfolio Theory asserting that risky assets are held for a "shot at riches." The significant positive relationship between bequest motives and the probability of holding life insurance also supports the conceptions of the Behavioural Portfolio Theory, suggesting that assets in the lower level of the portfolio pyramid are held for financial security and protection of the family.

Findings from the present study reveal insignificant relationships between *all* saving motives and the probability of owning *low-risk assets* – an indication that low-risk assets are not affected by saving goals. This result also implies that aspirations and emotions are not manifested in holdings of low-risk assets. The descriptive statistics in Section 7.4 show that more than 90% of households allocate wealth in *low-risk assets* compared to over 40% holdings in *risky assets* and over 20% in life insurance. This observation implies that although participation in low-risk assets are not affected by saving motives, they are still a popular choice of wealth holdings and suggest that they are held as a basic necessity for liquidity and transactional needs. As argued by Shefrin

and Statman (2000, p.143), "the *first* dollar of wealth [W_0] will be allocated to the low aspiration account" and "achieving low aspiration, or safety comes *first*." This notion is also supported in a study of acquisition patterns of financial products by Paas, Bijmolt & Vermunt (2007) which revealed that the least risky asset (saving accounts) are generally the first financial asset acquired by households.

Although saving motives appear to have some significance in the decision of owning risky assets and life insurance, the results suggest that its overall impact on the portfolio allocation choice is marginal. This is because, when it comes to the determination of actual dollar-amount holdings, none of the motives contribute to the decision. While life-cycle and profit motives increase the likelihood of owning risky assets, these motives do not result in higher allocated amounts in these asset categories. Similarly, although life-cycle and bequest motives positively predict the probability of owning life insurance policies, these goals do not determine the actual allocated values.

While these results may appear puzzling, the literature offers some insights as to why there may be differences in the factors that influence asset ownership decisions and those that affect share amounts. Guiso & Jappelli (2002) suggest that these differences are mainly attributed to fixed costs involved in entering the equity market, including information costs, participation fees, transaction costs and minimum investment requirements. The first-order decision of participating in certain assets are affected by information costs and minimum investment requirement, while the second-order decision of determining how much to allocate in these assets are affected by transaction costs. Hence, if portfolio allocation decisions are influenced by participation costs, then the interpretation of results pertaining to ownership and holding amounts should be made in consideration of these factors.

Coming back to the role of saving motives, further analysis provides evidence that the relevance of saving motives in the portfolio allocation choice differ according to income quartiles. For households in the lowest income quartile, the allocation of funds into low-risk assets are significantly related to life-cycle, precautionary and bequest motives. However, holdings of other types of

assets are not affected by saving goals. The results suggest that the portfolio allocation choice of households in the lowest income quartile with these saving motives are primarily driven by an underlying fear of falling into poverty, and therefore they opt to allocate funds in relatively safe assets. Holdings in risky assets and life insurance are not affected by saving motives, implying that participation costs such as transaction costs could be a deterrent to higher allocations in these types of assets.

Portfolio allocation decisions of households in the third income quartile are also significantly driven by saving motives. Allocations in low-risk assets are negatively affected by life-cycle, precautionary and profit motives, while holdings in risky assets are positively influenced by all four saving motives. Generally, the results suggest that having certain saving objectives in mind will result in an outflow of funds from low-risk assets into risky assets such as mutual funds or direct equity holdings. The findings suggest that households in this income quartile have 'overcome' the burden of participation costs involved in risky assets holdings.

There is evidence to suggest that portfolio decisions of households in the fourth income quartile are not affected by saving motives (and hence, by emotions). A plausible explanation is that these households perceive themselves to be in a 'comfort zone' and are unlikely to fall into poverty levels. In addition, their portfolio decisions are also not affected by aspirations of becoming rich (possibly due to the perception of already having reached high levels of wealth), nor by participation costs. For these households, portfolio allocation decisions are influenced by other factors such as wealth, risk tolerance, age and employment status.

Overall, the results suggest that other factors apart from saving motives are more important in the portfolio allocation choice. As expected, wealth strongly affects the probability of holding risky assets and life insurance, although it does not affect the probability of holding low-risk assets. This finding again supports the idea that low-risk assets are held as a basic necessity, regardless of household wealth levels. Nonetheless, the results indicate that an increase in wealth leads to higher dollar-amount allocations in all asset categories. The

coefficient value for risky assets is the highest, suggesting that as households become wealthier, there will be a larger inclination toward investing in risky assets as opposed to the other asset categories.

Meanwhile, there are some puzzling results in regards to the effect of income on portfolio allocation whereby significant negative associations between income and risky assets, and between income and life insurance, are observed. In other words, these results suggest that for a given level of wealth, higher income depresses holdings in risky assets and also in life insurance. Although results of prior research have typically shown positive relationships between income and risky assets (e.g. Bertaut & Starr-McCluer, 2002; Alessie, Hochguertel & van Soest, 2002), it has been suggested that family income is not an important predictor of allocation decisions. For instance, Hochguertel *et al.* (1997, p.89) argue that:

> ..family income may determine wealth but, for given financial wealth, will not affect the choice between riskfree and risky assets. This corresponds to the idea of two-stage budgeting in a demand system: financial wealth is determined in the first stage and in principle depends on all background variables, such as prices of consumption, housing, durables, permanent income, etc. Under the assumption of direct weak separability, however, the share invested in risky assets will only depend on financial wealth, and variables affecting preferences for these assets, such as expected returns, the variance of the returns, and risk aversion.

The negative relationship observed between income and the allocation in risky assets suggests that the impact of income may be intertwined with the effect of background risks on portfolio decisions. Income may be correlated with labour income risk, which will in turn effect portfolio decisions. According to Gollier (2002, p.36), background risks have an off-setting effect on the demand for risky assets, a behaviour termed as 'temperance' by Kimball (1991). The tempering effect implies that background risks and portfolio risks are substitutes. Households exposed to greater labour income uncertainties should

intuitively be more cautious in their selection of assets (Gollier, 2002), and hence, should favour safe assets.

Meanwhile, the negative relationship between income and life insurance is also rather puzzling. One would expect income and holdings in life insurance to be positively related due to two factors. First, higher income results in the need for a larger coverage of life insurance as income protection. Second, having higher levels of income suggests that households are able to afford the information and entry costs associated with life insurance purchase. However, the surprisingly negative relationship between income and life insurance cash values suggests that for a given level of wealth, an increase in income reduces the allocated amount in personal insurance protection. A likely explanation is the possible correlation between income and employer-sponsored insurance. Employed individuals are likely to receive employer-sponsored insurance, which is positively tied to income levels, hence reducing the need for purchasing personal insurance.

Other factors which are significant in the portfolio allocation decision are demographic factors of the head of the household. As expected, older individuals are less likely to invest in risky assets, and are more likely to hold life insurance. The results imply that age and income risk may be correlated. Younger individuals have a higher capability of earning secure income from employment; older individuals in retirement are plausibly more exposed to labour uncertainty and income variability, and hence the tempering effect acts to reduce holdings in risky assets. Age may also be related to risk aversion whereby older individuals are more risk averse given that the investment time period is shorter compared to their younger counterparts. As noted from Table 7.10, higher risk tolerance levels results in higher amounts allocated in risky assets and lower allocations in low-risk assets. This finding strongly supports tenets of standard portfolio theory that risk preferences of investors determine the proportions of wealth allocated in risk-free and risky assets.

Ethnic backgrounds appear to have a significant impact on portfolio allocation decisions. In comparison to whites, all other races have significantly lower probability of holding risky assets. The results imply that portfolio decisions

are influenced by risk preferences, family background and cultural upbringing. Differences in portfolio choices caused by race could also reflect supply-side barriers of entry (including participation costs) into sophisticated financial markets and differential treatment by financial services providers (Loury, 1998). The results support prior works which have shown that whites are more likely to hold risky assets as opposed to blacks (Keister, 2000).

Another factor that significantly contributes to the portfolio allocation decision is education level of the household head. Education is a proxy for the ability to gather information and make informed decisions regarding sophisticated financial products. Results show that higher levels of education increase holdings in risky assets (ownership and share amounts), supporting earlier predictions. However, a negative relationship between education and life insurance is noted, contradicting earlier predictions. As argued earlier, the negative effect of education on life insurance may be due to possible correlations between education and financial and/or occupational status. Higher levels of education implies having a higher level of occupation, which in turn suggests the possibility of receiving higher work-sponsored insurance benefits and hence reduces the need for personal life insurance.

Household size is also significantly related to the probability of holding low-risk assets and life insurance, whereby results show a negative relationship between low-risk and household size, but a positive relationship between household size and life insurance. As articulated earlier, the positive relationship between family size and life insurance indicates that in the event of death of the head of the household, there is a greater expected impact on dependants. The negative relationship between household size and low-risk assets suggests that family size may have impact on consumption, hence resulting in lower allocations into these transactional accounts.

In summary, the results indicate that there are differences between the determinants of financial asset participation and the determinants of dollar-amount holdings. Guiso & Jappelli (2002) suggests that these differences are due to participation costs such as information and transaction costs. Saving motives influence the ownership decision of risky assets and life insurance, but

have no influence on portfolio allocation choice of the overall sample. However, when the sample was divided into income quartiles, evidence suggest that dollar-amount holdings of risky assets are driven by all saving motives for households in the third income quartile. A possible reason why saving motives are more prevalent for households in this income quartile is that these households have achieved some financial success and have the ability of allocating wealth into different classes of assets based on their saving motives. These households would also have successfully overcome the entry costs of participating in risky assets. Households of the highest income quartile are not affected by saving motives because these households have perceivably attained their desired aspiration levels and are no longer driven by emotions of hope and fear.

7.10 CONCLUSION

The main objective of this chapter was to determine the significance of saving motives in the portfolio allocation decision, and to answer the third research question: "What is the relationship between saving motives and the antecedents of saving, and the portfolio allocation choice?" This conception was made on the basis that saving motives underlie the emotions of *hope* and *fear*, as well as the aspirations for *security* and *potential*. Through the Behavioural Portfolio Theory (BPT), Shefrin & Statman (2000) hypothesized that these emotions and behavioural concepts influence portfolio allocation decisions.

After explaining the basis for the postulated link between saving motives and portfolio allocation, the chapter proceeded by explaining the measurement for portfolio allocation. Based on the literature, the portfolio is modeled as consisting of three asset categories: low-risk assets, risky assets, and life insurance. After providing a descriptive analysis of portfolio allocation based on the SCF dataset, a detailed list of hypotheses was presented, followed by univariate tests. Then, the specification models for the multivariate analyses were stated and results of the tests were presented.

The main findings of the multivariate analysis indicate that saving motives are, to a certain extent, important in the first-order decision of whether or not to hold a particular asset type. Life-cycle and profit motives significantly influence the decision of holding risky assets in the portfolio. In regards to the decision of owning life insurance, life-cycle and bequest motives are found to be relevant. These findings support *a priori* the importance of saving motives on these asset categories. Results reveal that none of the saving motives is significant in the determination of holding low-risk assets.

Meanwhile, the second set of analysis (tobit regressions) indicate that none of the saving motives are important in the second order decision of how much wealth to allocate in any of the asset categories. A notable observation that can be made of the two multivariate analyses is that it raises questions on the strength of intentions (or motives) on the actual performance of the behaviour. As mentioned earlier, saving motives influence the choices of assets, but do not have an effect on the actual amounts allocated in them. Nonetheless, when further investigations were conducted according to income quartiles of the sample, saving motives appear to influence the portfolio decisions of households in the lower three income quartiles. The most salient observation is that three of the motives (life-cycle, precautionary and profit motive) reduce allocations in low-risk assets, while all of the motives increase allocations in risky assets. This suggests that these households are to a certain extent influenced by saving motives and make conscious decisions on the allocation of funds to meet these goals.

The following chapter summarizes the thesis by first restating the research issues, listing the objectives to be achieved, briefly explaining the methodolgy employed to address those objectives, and then consolidating the results reported in Chapters Five, Six and Seven. It will discuss the salient findings of the empirical analyses in order to provide answers to the research questions and make a self-assessment of the extent to which the objectives of the research have been accomplished. The implications of these findings toward theory and practice will be discussed, followed by a caveat on the limitations

of the study, and a list of suggestions for future research, thereby concluding the thesis.

Table 7.11: Tobit regressions on log_LOWRISK, log_RISKY and log_INSURANCE (with Age^2)

TOBIT REGRESSION	log_LOWRISK				log_RISKY				log_INSURANCE			
	Coef.	Robust Std. Err.	t	P>|t|	Coef.	Robust Std. Err.	t	P>|t|	Coef.	Robust Std. Err.	t	P>|t|
New_LC	0.1574	0.1805	0.87	0.383	1.2181	0.9903	1.23	0.219	0.9208	1.424	0.65	0.518
New_PREC	0.305	0.1825	1.67	0.095	0.7602	0.9954	0.76	0.445	0.7725	1.4322	0.54	0.590
New_BEQ	0.1582	0.2023	0.78	0.434	1.1446	1.0548	1.09	0.278	1.0464	1.554	0.67	0.501
New_PROFIT	0.2355	0.2423	0.97	0.331	1.7091	1.1985	1.43	0.154	1.4122	2.0517	0.69	0.491
AGE	-0.05	0.0088	-5.65	0.000	0.0897	0.0465	1.93	0.054	0.2456	0.0806	3.05	0.002
AGE2	0.0005	0.0001	5.75	0.000	-0.0011	0.0005	-2.50	0.012	-0.0015	0.0008	-2.02	0.043
MALE	0.1029	0.0898	1.15	0.252	-0.4557	0.3794	-1.20	0.230	0.4685	0.7176	0.65	0.514
EDU	0.0248	0.0119	2.08	0.038	0.2315	0.0523	4.42	0.000	-0.1857	0.0924	-2.01	0.044
PEU	-0.025	0.0233	-1.07	0.283	-0.1147	0.1148	-1.00	0.318	0.5062	0.2031	2.49	0.013
COUPLE	0.0229	0.0868	0.26	0.792	0.7045	0.3765	1.87	0.061	-0.0727	0.729	-0.1	0.921
BLACK	-0.4305	0.1129	-3.81	0.000	-1.4343	0.4792	-2.99	0.003	3.44	0.6271	5.49	0.000
HISPANIC	0.2323	0.0722	3.22	0.001	-2.1261	0.5946	-3.58	0.000	-3.1213	1.0276	-3.04	0.002
Other_RACE	0.0969	0.1013	0.96	0.339	-0.989	0.5622	-1.76	0.079	-1.8523	1.2226	-1.52	0.13
EMPLOYED	0.1328	0.0747	1.78	0.076	0.1053	0.3215	0.33	0.743	0.9476	0.6531	1.45	0.147
OWNBIZ	0.2021	0.0998	2.02	0.043	-0.4331	0.3612	-1.20	0.231	-0.8105	0.7936	-1.02	0.307
RISKTOL	-0.2605	0.0673	-3.87	0.000	0.7963	0.2404	3.31	0.001	0.7739	0.5233	1.48	0.139
EXPECON	-0.0016	0.0503	-0.03	0.974	-0.0042	0.2141	-0.02	0.984	0.0975	0.4296	0.23	0.821
EXPINT	-0.0599	0.0634	-0.94	0.345	0.2579	0.3053	0.84	0.398	0.7992	0.5664	1.41	0.158
EXPINC	0.0028	0.0565	0.05	0.96	-0.0248	0.2502	-0.10	0.921	-0.4303	0.5274	-0.82	0.415
TIME	0.0786	0.0508	1.55	0.122	-0.1902	0.2193	-0.87	0.386	0.0822	0.4463	0.18	0.854
CINCOME	0.0111	0.0026	4.26	0.000	-0.0274	0.0094	-2.91	0.004	-0.071	0.0192	-3.69	0.000
log_TOTASSET	0.7139	0.0134	53.37	0.000	2.6749	0.0629	42.53	0.000	1.517	0.1023	14.82	0.000
_cons	1.7714	0.308	5.75	0.000	-26.8384	1.5832	-16.95	0.000	-24.8869	2.6821	-9.28	0.000

	No. Of obs=21043; F(19,20991) = 199.37; Prob > F = 0.000; Pseudo R2=0.2139 (Std error adjusted for 4206 clusters in household), 218 left-censored observations at log_LOWRISK≤0, 20795 uncensored observations, 0 right-censored observations	No. Of obs=21013; F(19,20991) = 225.7; Prob > F = 0.0000; Pseudo R2=0.1781 (Std error adjusted for 4206 clusters in household) 8451 left-censored observations at log_LOWRISK≤0 12562 uncensored observations, 0 right-censored observations	No. Of obs=21013; F(19,21024) = 25.36; Prob > F = 0.0000; Pseudo R2=0.0392 (Std error adjusted for 4206 clusters in household) 14355 left-censored observations at log_LOWRISK≤0 6658 uncensored observations, 0 right-censored observations

Chapter Eight

SUMMARY OF FINDINGS, IMPLICATIONS AND CONCLUSION

8.1 SUMMARY

The purpose of this chapter is to recapitulate the salient aspects of the thesis. In doing so, this section will first summarize the research problems and research objectives; and then briefly describe the methodology that was used to address the research questions. The chapter then proceeds, in Section 8.2, by presenting the results of the three main empirical investigations. The chapter continues by tying-up the results of the three research objectives, whereby a discussion of the overall results and its implications will be provided, in Section 8.3. Next, the contribution of the study is explained, in Section 8.4. The chapter ends, in Section 8.5, by discussing the limitations of the study, and providing recommendations for future research.

8.1.1 Research issues

The conduct of this study was spurred by the incidence of low personal saving rates observed worldwide since the 1980s up to the current new millennium. This phenomenon has raised concerns amongst governments and policy-makers across nations, as the data imply low levels of capital accumulation and that the country's source of investment is at stake. Furthermore, incidence of low saving rates suggest that families will have difficulties sustaining their desired standards of living during retirement and that they are inadequately prepared for future uncertainties that may take a toll on earnings.

The observations of low personal saving rates mentioned above contradict tenets of traditional theories of saving (the life-cycle hypothesis), which postulate that households save during their younger years in preparation for retirement. Alternative explanations to resolve discrepancies in the data have

lately emerged, i.e. by incorporating behavioural theories in what was previously thought to be solely an economic experience. Proponents of behavioural saving theory argue that one of the reasons why individuals do not save in the manner prescribed by traditional saving models is that they face self-control problems, which impede on their intentions to save for the long term. Furthermore, individuals are affected by their cognitions and emotions that limit their ability in making decisions as hypothesized by normative theory.

In addition to the perturbing issues regarding household saving, there are also a number of unanswered questions in regards to the household's portfolio allocation choices. Household portfolios appear to be concentrated in very few types of assets, mainly low-risk ones. This suggests that household portfolios are under-diversified and that risky assets tend to be avoided. The patterns noted in households' portfolios are in disagreement with postulations of modern portfolio theory suggesting that diversification is the key to reduce riskiness of portfolio investments. Newer theories on portfolio allocation suggest that individuals are affected by emotions and aspirations, which impinge on their ability to allocate assets in the way prescribed by modern portfolio theory.

8.1.2 Research objectives

Motivated by the above research issues, this study was performed with three main objectives. First, the study sought to identify the factors that are instrumental to the formation of household's saving motives, by examining households' socio-demographic and behavioural factors that might influence their motivations to save. Second, the study aimed to determine the factors that might influence the household's propensity to save and establish their quantitative relationships. Third, the study targeted to evaluate the factors that could impact the choice of assets that households save in, particularly by examining their preferences in regards to low-risk assets, risky assets, and life insurance.

8.1.3 Research Methodology

The 2004 U.S. Survey of Consumer Finances was chosen to address the three research objectives mentioned above. The SCF is a comprehensive survey on the financial affairs of American households, conducted by the University of Michigan and sponsored by the Federal Reserve Board of the U.S. The selection of this data source was based on the availability and suitability of relevant variables pertaining to the research objectives. The analytical tools that were used to address the research objectives were: (i) a series of logit regressions and a multinomial logit regression on four categories of saving motives, to address the first research objective; (ii) an ordered logit regression on the propensity to save, to tackle the second research problem; and (iii) a trivariate probit regression and a series of tobit regressions on three categories of assets in the portfolio (low-risk assets, risky assets, and life insurance), to answer the third research question. These data analytical tools were viewed the most appropriate methods to deal with each research goal, in consideration of the measurement of each of the dependent variables. Since saving motives were discrete-choice variables, these were examined using logit/multinomial regressions. The propensity to save was an ordinal variable, so it was evaluated using ordered logit regression. As the portfolio allocation choice consisted of three variables that could be measured in two ways (discrete and truncated continuous), trivariate probit regressions and tobit regressions were employed, respectively.

8.1.4 Theoretical background

This study was conducted to examine the impact of saving motives on saving behaviour. More specifically, it focused on determining the influence of *saving motives* on the household's *propensity to save* and their *portfolio allocation decisions*. Rather than examining external, macroeconomic factors that influence saving, this study explored micro-level household characteristics and focused on the impact of motives on decisions to engage in household saving.

Review of the literature led to the identification of certain gaps in knowledge, which formed the basis of the conceptualization of a research framework

integrating two main facets of saving (or decision dimensions) as suggested by Keynes (1936): *First*, the decision of how much the household should consume and how much to save; and *second*, the decision concerning the form in which savings is to be held. The integration of these two aspects (*how much* to save and *where* to save) into a single research framework was viewed essential in order to be able to capture a more comprehensive understanding of saving behaviour. Furthermore, the inclusion of saving motives as the common underlying explanatory variable is warranted due to the dearth of studies that integrate various savings motives in a single research framework. The decision to focus on motives is important as motives are the underlying determinants of behaviour; motives help to explain the reasons for particular behavioural conduct.

From the literature, four main categories of saving motives were identified: *life-cycle, precautionary, bequest* and *profit* motives. Life-cycle motives relate to the desire to smooth consumption over the life-time, to prepare for reductions in income that may occur during retirement. Precautionary motives refer to the intentions of having a contingency fund to protect against life's uncertainties (e.g. health and mortality risks). Bequest motives are the desire to accumulate wealth to leave as inheritance to dependants. Finally, profit motives indicate the wish to earn favourable returns on savings. Of course, households may save for 'unplanned' reasons too, and this is important to recognize when it comes to exploring actual saving behaviour.

Keynes (1936) suggested that the strength of saving motives is shaped by exogenous factors such as race, educational background, religion and past experience, as well as institutional and economic background. Driven by this notion, the study explored the influence of household characteristics (socio-demographic and behavioural factors) on saving motives (*research question 1*). After identifying the antecedents that might significantly predict the probability of having the four saving motives, the study proceeded to examine role of motives on saving behaviour (*research question 2*).

Although vast amounts of research has been conducted on each of these motives separately, studies that examined all motives simultaneously are

limited. The importance of examining all motives simultaneously rests on the idea that these motives are not mutually exclusive, and that individuals may have more than one motive at a particular time (Browning & Lusardi, 1996; Dynan *et al.*, 2002; Fisher & Montalto, 2010; Wärneryd, 1999). Thus, integration of the various saving motives was viewed essential as it enabled the researcher to determine the relative importance of these motives on household saving behaviour.

This study aimed to provide a comprehensive framework to address the issues of saving and portfolio decisions, by including saving motives as a common underlying explanatory variable. Based on the tenets of Behavioural Portfolio Theory, which postulated that emotions and aspiration are significant predictors of portfolio choice, saving motives were postulated to have an impact on portfolio allocation choice (*research question 3*).

8.2 RESULTS SUMMARY

8.2.1 Determinants of saving motives

Chapter Five addressed the first research question of the thesis: *What is the relationship between the posited antecedents of savings and the household's saving motives?* The chapter sought to identify the socio-demographic and behavioural characteristics that shaped household saving motives. As discussed in Chapter Three, the need for this examination was enthused by a classical argument by Keynes (1936, p.109) that the intensity of saving motives differs, among others, by "habits formed by race, education, religion, and current morals according to present hopes and past experience."

The analytical tools used to address the first research question were four logit regressions and a multinomial logit regression; these helped to determine the strength of relationship between household characteristics (demographic and behavioural factors) and the dependent variables, i.e. four categories of saving motives. The dependent variables were four binary dummy variables in reference to each saving motive category (*life-cycle, precautionary, bequest*

and *profit* motives), which equalled 1 if the motive was the *first*-mentioned motive (hence, assumed to be the most important saving motive of the respondent), or zero if otherwise. Although the SCF allows the respondent to provide up to six responses to the open-ended question on saving reasons, only the first-mentioned motive was considered and adopted for the analysis in this chapter. This was because saving motive was the dependent variable, and hence, it was necessary to assume mutual exclusiveness among the motives. In addition, the first-mentioned motive was considered to be the most important saving motive of the respondent.

Results indicate that household demographics and behaviour impact the formation of saving motives. *Age* of the household head has significant influence on three of the four saving motives (life-cycle, precautionary, and bequest motives), although not on profit motives. The results are generally in line with findings of others reported in the literature. Younger households are found to be more likely to have life-cycle motives, supporting results of DeVaney *et al.* (2007). When testing the non-linear effect of age on life-cycle motives (as suggested by Modigliani and Brumberg's (1954) life-cycle theory, the results reveal a 'hump-shaped' pattern, where the peak of the 'hump' occurs at age 39. Although these results support the proposition of the life-cycle theory that stipulates that life-cycle saving is hump-shaped with respect to age, it is worrying to note that individuals beyond age 39 are decreasingly concerned about life-cycle motives. Nonetheless, these findings suggest that other motives are more important to older households. As noted in the results, precautionary motives are more prevalent amongst older individuals, supporting results of previous studies (e.g. Kennickell and Lusardi, 2001; Kazarosian, 1999; Lusardi, 1998, 2000). The results also reveal that older households are more likely to have bequest motives, consistent with existing literature (Menchick & David, 1983; Alessie *et al.*, 1997; Hurd, 1987; Kennickell & Lusardi, 2001).

The results indicate that household income positively influences the probability of having life-cycle motives, thus supporting the life-cycle/permanent income hypothesis. In contrast, income is found to be

negatively related to the probability of having profit and precautionary motives. The relationship between income and precautionary motives supports earlier works by others (Hubbard *et al.*, 1995; Carroll *et al.*, 2003); however, the relationship between profit motives and income appears to be at odds with the literature (e.g. DeVaney *et al.*, 2007; Xiao & Noring, 1994). However, this is possibly due to measurement differences between their studies and the present one.

Minority groups (African-Americans and Hispanics) are more likely to have profit motives when they save. This result suggests that, compared to white households, these two minority groups are more driven to save to gain favourable returns on their saving, with the hope and intentions to improve their financial (or wealth) positions. Plausibly, this finding may be related to the fact that these households have historically been less privileged compared to whites in terms of access to financial amenities (Cancio *et al.*, 1996, cited in Keister 2000). Meanwhile, behavioural factors that are significant in the determination of motives are expectations of income and time horizon. Positive expectations of income increase the probability of having profit motives in their saving behaviour, but they tend to reduce the probability of having precautionary motives. Interestingly, households with a longer financial planning horizon are more likely to have life-cycle motives, which is perfectly logical as a life-cycle itself is a long-term phenomenon.

8.2.2 Determinants of the propensity to save

Chapter Six addressed the second research question of the thesis i.e., *what is the relationship between saving antecedents and motives, and the household's propensity to save?* This was done by examining relationships between household characteristics and saving motives on one hand (two groups of independent variables), and the propensity to save on the other (dependent variable). The two groups of independent variables were posited to reflect the notion that saving might be the result of *planned* (as spurred by saving motives) and *unplanned* behaviour (purely a result of household

characteristics). According to the Theory of Planned Behaviour (Ajzen, 1985), favourable intentions precede planned behaviour, subject to sufficient levels of behavioural control. In the context of this study, it is argued that saving motives reflect the intentions and goals of the household, and hence, signifies *planned* saving. Meanwhile, it is posited that characteristics of the household signify its (household's) capabilities and opportunities to save, which can either promote or discourage the performance of saving. Therefore, it is argued that household characteristics connote *unplanned* saving.

This research question was explored by using an ordered-logit regression on the discrete, three-way, dependent variable that reflects three levels of the propensity to save – negative saving, zero saving, and positive saving. As mentioned earlier, the independent variables (regressors) included household demographics, and income (to reflect unplanned behaviour), and saving motives (to reflect planned behaviour). The analysis takes into account the various saving motives in a single framework, as the literature suggests that saving motives are not mutually exclusive, but may in fact co-exist at any one time (Dynan *et al.*, 2002; Fisher & Montalto, 2010; Warneryd, 1999; Browning & Lusardi, 1996). While the saving motive variable for Chapter Five considered only the *first-mentioned* motive since motive was the dependent variable that needed to be exclusively examined, the saving motive variables for this analysis were four dummy variables on *any-mentioned* motive. The emphasis was on 'any-mentioned' motive to take into consideration the data, which included up to six responses of the respondent, and to acknowledge the fact that more than one saving motive may be present at a single point of time in a person's lifetime.

There is ample evidence to suggest that saving motives do influence the household's propensity to save. Results of this study indicate all saving motives significantly impact the household's propensity to save. The results of the marginal effects test show that, when the *profit motive* is present, it has the strongest impact on saving; nonetheless, it is worth acknowledging that the profit motive is the least frequently reported motive in the SCF, which provided the data for the present study. The second most important motive is

precautionary motives, followed by *life-cycle motives*, and lastly, *bequest motives*. These results imply that for households who report having profit motives, their propensity to save is compellingly driven by their intentions to gain more on their savings, with the desire to improve their current financial positions. Likewise, it simply means that the *returns on saving* strongly impinge on the decision to save; although an individual may have a precautionary, life-cycle or bequest motive, there may be no saving if returns on saving are not favourable.

The results for life-cycle and precautionary motives are in line with the literature (e.g. Rha *et al.*, 2006; Fisher & Montalto, 2010). Bequest motives are also significantly related to saving propensity, thus contradicting the results of Fisher and Montalto (2010), although they are the least powerful group of motives. A possible reason for this could be due to unintended bequests that may arise out of unutilized precautionary saving, as suggested by Dynan *et al.* (2002). It has been argued in the literature that unintended bequests are a result of precautionary motives, which are 'accidentally' left behind when death occurs unexpectedly, and the funds accumulated for precautionary reasons have not been exhausted.

Demographic factors that are significantly related with saving propensity are age, gender and household size. Apparently, older individuals are more likely to have higher saving, other things being equal. Results of this study indicate that male household heads are more likely to have higher saving as opposed to female household heads. This imbalance may be due to differences in consumption habits between genders (such as tendencies to go 'shopping,' and responses to sales gimmicks), and also, possibly due to differences in financial management practices (such as keeping track of expenses and managing cash-flow of the household). In addition, it may also be a result of unplanned saving, whereby male households may have better access to financial markets, and a higher capability of making saving decisions.

As for size of households, larger households are less likely to have higher saving, supporting past research (e.g. Browning & Lusardi, 1996). Furthermore, income is significantly and positively related to the probability of

being in a higher saving category, which is consistent with the literature (e.g. Alessie *et al.*, 1999; Rha *et al.*, 2006; Avery & Kennickell, 1991). This finding rightly suggests that richer households have the greater ability to save, possibly due to 'left-over' income that is not spent, or, they have greater capability to save as a result of better access to a wider assortment of financial institutions (such as mutual funds, foreign exchange trading, futures market, gold trading, etc.). Positive expectations of the future of the economy also positively induce higher saving, implying that expectations of more favourable economic conditions encourage households to set aside more of their current income (i.e. save more), rather than enjoy current consumption. Furthermore, households with longer financial planning horizons are also more likely to be in a higher saving category, in line with the literature (Rha *et al.*, 2006). This finding suggests that households with a longer foresight take necessary measures and put extra effort to save part of their income to meet long-term goals.

The evidence presented in Chapter Six also suggests that, whenever present, the desire to obtain returns from saving (*profit motives*) most prominently impacts saving propensity. Hence, for households that indicate having profit motives, it is ultimately the desire to improve financial positions that influences saving propensity the most. The results indicate that precautionary motives and life-cycle motives are also important determinants of saving. Apparently, based on the present study, bequest motive is the least influential motive in saving. Hence, the results of this study render support to the findings of Dynan *et al.* (2002) that maintain that bequest motives have minimal impact on saving, and are 'overlapped' by stronger saving objectives, such as precautionary motives. Overall, these results show that saving is a result of planned behaviour; however, further tests reveal that it is *unplanned saving* that contributes more to the propensity to save.

8.2.3 Determinants of portfolio allocation choice

The third empirical investigation of the thesis was undertaken in Chapter Seven. It sought to evaluate the impact of household characteristics and saving

motives (independent variables), on the household's portfolio allocation choice (dependent variable). Based on the literature, the portfolio was modeled as consisting of three asset categories: *low-risk assets*, *risky assets*, and *life insurance*. The analysis contained two parts: *first*, to model the portfolio allocation choice as a two-stage decision process entailing the choice of whether or not to hold a particular asset type, and *second*, to examine the decision of how much to allocate in each of the asset categories. The *first* decision was analyzed by using a trivariate probit model to examine the discrete choices of holding each of the asset categories, recognizing the inter-dependent nature of this choice. The *second* decision on the amount of holdings was examined by using three separate tobit regressions on each of the motives. The analyses were confined to households that had positive holdings in total assets, as the asset allocation decision could only arise when there was wealth to allocate to the three channels of assets, in the first place.

The main findings from the trivariate probit analysis reveal that saving motives are, to a certain extent, important in the first-order decision of whether or not to hold a particular asset type. Although none of the saving motives are important in the decision of owning *low-risk assets*, results show that motives are relevant in the decision to own *risky assets* and *life insurance*. In particular, the probability of holding risky assets is influenced by life-cycle and profit motives, supporting prior expectations. Meanwhile, the probability of owning life insurance is significantly influenced by life-cycle and bequest motives, as predicted.

In the second set of analysis (tobit regressions), results indicate that motives are not relevant in the dollar-amount allocation decision for households in the overall sample. However, these results seem to differ by income (i.e. according to quartiles), whereby some of the saving motives are significantly related to the dollar-amount allocation decision for households in several of the income quartiles. Households in the first income quartile appear to be driven by life-cycle, precautionary and bequest motives, which result in increased amounts in low-risk assets. The evidence also indicates that life-cycle, precautionary and profit motives reduce holdings in low-risk assets, while *all* saving motives

increase holdings in risky assets, for households in the third income quartile. It appeared that the dollar-amount allocation decision of high income households is not affected by saving motives.

The evidence also indicates that older individuals favour low-risk assets and life insurance, and that younger individuals are attracted to risky assets. Results suggest that holdings in risky assets increase till age 40, and thereafter decrease. The findings are consistent with previous research studies (e.g. Perraudin & Sørenson, 2000), and recommendations by investment advisors that risky assets should be avoided as individuals age. Furthermore, the result that older people are more likely to hold life insurance also supports the literature (e.g. Hammond *et al.*, 1967; Ferber & Lee, 2980; Burnett & Palmer, 1984; Browne & Kim, 1993).

Turning to the analysis of holdings, the results suggest that smaller families tend to hold more in low-risk assets, while larger families tend to own more life insurance. This finding suggests that larger families have higher levels of consumption, and hence, have lower amounts held in liquid assets. Nonetheless, having more holdings in life insurance suggests that larger families understand the need to protect the family in the event of death of the breadwinner, consistent with past research (Berhneim, 1991; Burnett & Palmer, 1984).

Compared to the base group (whites), African-American households tend to hold less in low-risk assets and risky assets, but higher amounts in life insurance; Hispanic households have higher amounts in low-risk assets, but lower amounts in risky assets and life insurance; and the 'other race' category have more in low-risk assets and less in risky assets. The most prominent observation from these results is that all three minority race groups have *lower* allocations in *risky assets*, compared to whites. This may be due to the fact that, compared to whites, these groups of households have limited knowledge of, and restricted access to, certain financial markets. The results lend support to Hogarth and O'Donnell's (2000) findings that racial background determined financial exclusion in the U.S.

The results also indicate that risk tolerance significantly affects the portfolio allocation choice, as suggested in the literature (Eeckhoudt *et al.*, 2005; Schooley & Worde, 1996, Shum & Faig, 2006). More risk tolerant individuals hold less in low-risk assets but higher amounts in risky assets, rendering support to the propositions of modern portfolio theory that asserts that risk preference of the investor largely determines the portfolio allocation decision.

The evidence suggests that the relationship between portfolio allocation choice and *wealth* is as expected. Results show that wealth is positively related to holdings in all three asset types, which generally support prior research (e.g. Hochguertel *et al.*, 1997; Donkers & van Soest, 1999; Shum & Faig, 2006). Meanwhile, household income (excluding investment income) is also a significant predictor of portfolio allocation decisions. The results show that, holding wealth constant, income positively predicts the amounts held in low-risk assets, but negatively impacts the amounts held in risky assets and life insurance. The signs of the coefficients are, however, counterintuitive and are not as expected. One would logically expect that individuals with higher income, *ceteris paribus*, to participate more in risky investments, and be able to afford the costs involved in participating in risky assets and life insurance. These puzzling results can be explained by the notion that income may be strongly related to income risk. Individuals with high levels of income can plausibly be assumed to have riskier jobs and are therefore exposed to higher income uncertainties. Hence, households with high income risk would reduce the proportion of savings allocated in risky assets to balance out exposure to these risks.

This section has briefly presented the results of the three empirical investigations, and has provided satisfactory answers to the research questions. The following section amalgamates these results and discusses the implications of the salient findings to the savings industry.

8.3 DISCUSSION AND IMPLICATIONS

As mentioned in the introduction of this thesis, the conduct of the study was spurred by the incident of low personal saving rates observed worldwide. Empirical evidence has shown many inconsistencies between theory and data – first, there appears to be inadequate life-cycle saving amongst households, implying that future retirement needs may not be sufficient; and second, the elderly continue to save beyond retirement. These observations contradict the life-cycle hypothesis (Modigliani & Brumberg, 1954) that asserts that households save during their younger days to be able to finance consumption during retirement; and hence, when retirement occurs, elderly individuals will draw down on the accumulated funds.

The evidence on portfolio allocation also shows that households diverge from the propositions of portfolio theory. According to modern portfolio theory (Markowitz, 1952), the main criterion considered by investors in the determination of portfolio allocation decision is the trade-off between risk and return on assets in the portfolio. One of the ways to reduce overall risk is by diversifying assets in the portfolio. However, the data indicate that portfolios are under-diversified and that households tend to shy away from risky assets. This is perplexing, given that risky assets are the only assets that are potentially able to provide high returns on investment over the long term. This study argues that the emotions of *hope* and *fear*, manifested through saving motives, have an impact on portfolio allocation decisions.

In view of the puzzles observed in the data, this study attempted to examine the factors underlying household saving behaviour, by delving into their motivations to save, and their portfolio allocation decisions. In this determined effort to uncover what motivates saving, it was posited that saving arises from planned saving (the motives to save), and also unplanned saving (due to capabilities and opportunities to save associated with household's characteristics). Results suggest that, although all saving motives significantly impacted the propensity to save – hence delineating the importance of planned saving – it is *unplanned* saving that more notably affects household saving.

The importance of unplanned saving lies in the capabilities and opportunities presented to households that determine their saving behaviour.

Results of the study indicate that, where present, *profit motives* most significantly influence the propensity to save. In other words, people who have profit motives want high returns on their saving, hence, suggesting that risky assets are favoured. Risky assets, although subject to a wider scope of uncertainties, surpass low-risk assets in terms of the benefit of providing the opportunity for higher returns on investments, particularly over the long run. Results show that participants of risky assets are mainly higher educated individuals; hence, it is necessary to heighten efforts in educating savers on the various types of financial assets to strengthen awareness, increase understanding, and promote accessibility to these products. It also appears that the minority ethnic groups have lower holdings in risky assets, plausibly due to lack of ability to gain access into sophisticated financial markets. Marketers of financial and saving institutions must thus ensure that these markets are not neglected, and that equal opportunity is given to all households regardless of financial or demographic background.

The life-cycle motive is the most popular saving motive that most households have. Nonetheless, the evidence provided in this study is consistent with the reports that people are not saving adequately for retirement. This inference can be made from the findings that younger households are less inclined to save, and from the observations that there is a tendency for life-cycle motives to diminish by age 39. To promote life-cycle saving amongst households, saving institutions should work together with employers to target the young working population. In view that the younger generation of savers are inclined to save for profit motives, managed pension funds with participation in risky assets may appeal to these households.

Past research has found that the elderly continue to accumulate wealth even after retirement (Lusardi, 2000; Jappelli & Modigliani, 2003); and results of the current study seem to support that finding. The evidence provided in this study also shows that older households are more likely to save as opposed to their younger counterparts, and that saving amongst the former is highly driven

by precautionary and bequest motives. The finding that elderly households are prudent and are concerned about future life's uncertainties, and at the same time care about the welfare of their dependants in the event of their death, provides a likely explanation to the observation that the elderly continue saving beyond retirement. Results of the analysis on portfolio allocation choice indicate that older households are more inclined toward holding low-risk assets and life insurance, and tend to avoid risky assets. This suggests that precautionary and bequest motives tend to influence holdings into relatively safe assets – plausibly explaining why participation in stock markets and other risky assets is lower amongst the elderly.

The results also suggest that, for households who report having profit motives, this motive provides the strongest impact on the propensity to save, relative to other saving motives. There is also evidence indicating that profit motives influence holdings in risky assets. This suggests that individuals with profit motives have the aspirations of becoming rich, and hence, their portfolio allocation decisions are driven by this desire. Efforts to increase savings and participation in equities market may prove to be fruitful if the 'right' markets are targeted. The results in Chapter Five suggest that blacks, Hispanics, and also those in the lower income group are more likely to have profit motives. Ironically, results from Chapter Seven indicate that blacks and Hispanics are *less* likely to own risky assets. This simply implies that these household groups have the *motives* to save, but are not able to realize their saving intentions by participating in the assets that can potentially realize their saving goals. This finding is an indication that these minority ethnic groups are being financially excluded from accessing risky financial products, supporting prior research finding that racial background is an important determinant of financial exclusion in the U.S. (Hogarth & Donnell, 2000). Similarly, the evidence in Chapter Five indicates that Hispanics are more likely to have bequest motives, compared to whites. However, the analysis on portfolio allocation shows that life insurance holdings are significantly lower amongst Hispanics. This strongly implies that these households are deprived from access to insurance markets, consistent with the view that the economic power of individuals and the accessibility into the financial system is strongly determined by the

economic power of individuals (Leyshon & Thrift, 1995). Plausibly, this also suggests that these minority groups are financially illiterate, and are not able to make informed decisions regarding which types of financial products to choose. The implications of these results are that life insurance companies need to increase accessibility to their products, and to heighten marketing efforts to target Hispanic households so as to fulfil their desire to save for bequest motives.

In order to increase allocation amounts in higher-risk assets and life insurance, mutual fund companies and life insurance providers need to increase efforts in educating households regarding the risks and benefits of the various financial products that they offer. It is also important that these financial services companies ensure accuracy and transparency in relaying information to the public, in view of the possible economic fluctuations that may affect returns on investments. This is because evidence from the present study shows that households respond to multiple sources of risk by being more conservative in their financial decisions (judging by the negative relationship between income and risky asset holdings). In addition, the results show that education strongly relates to holding amounts in all three asset categories, with the strongest effect on risky assets. This suggests that financial literacy is a key factor in determining investments in risky assets, which supports recent works in the field (e.g. Alessie, Lusardi & van Rooji, 2007; Guiso & Jappelli, 2008).

As mentioned earlier, one of the main objectives of this study was to examine simultaneously the relative impact of the various saving motives on saving behaviour. The results indicate that the four saving motives indeed co-exist along the life-cycle, such that they all significantly influence the propensity to save. The current study reveals that for households who report having all saving motives, the profit motive emerges as the one giving the strongest impact on the propensity to save, followed by precautionary, life-cycle, and bequest motives. Hence, the evidence renders support to Dynan et al.'s (2002) proposition that saving motives may overlap each other. In view of their overlapping existence, it is crucial for financial services providers to promote saving products that are able to simultaneously serve the various saving

motives. Products such as investment-linked insurance policies that provide favourable returns and pay out in the event of a major illness or disability, may appeal to those groups of people who concurrently have profit and precautionary motives. Pension funds that participate in risky assets may appeal to individuals who have profit and life-cycle motives.

The current study presents evidence that brings to light which groups of households were not saving. Households that are larger, headed by women and those of lower income are less inclined to save. These revelations are an indication that these groups of household are being financially excluded, or that they need extra encouragement to perform saving. To increase private saving, there may be a need for policy makers to increase awareness and to educate these households on the importance of being financially prepared to face the future. Although it appears that low income households have lower propensities to save, results also show that they have profit motives. If low income households are less likely to save due to lower discretionary saving, or are unable to pay for participation costs, banks and other financial institutions should offer products that have low entrance fees and those that involve lower but fixed regular contributions.

Results have indicated that it is possible to identify characteristics of individuals who have certain saving motives, and to recognize which saving motives influence saving propensity and portfolio allocation choices. The results have also assisted in the identification of households that had saving motives, but are unable to realize their saving intentions. For these households, there should be concerns regarding their ability to translate intentions into actions. As mentioned above, low income household are inclined to have profit and precautionary motives, but have lower propensities to save. Hispanics are more likely to have bequest motives, but are less likely to own life insurance products. These results clearly imply that there may be elements of financial exclusion that affect the ability of households to save and to participate in certain financial products.

The Theory of Planned Behaviour (Ajzen, 1985) suggests that intentions precede behaviour, subject to actual behavioural control. Therefore, although

individuals have intentions to act, other impeding factors may come in the way to hamper these intentions. Similarly, although households may have saving motives, other factors may interfere and discourage the performance of saving. As Rabinovich & Webley (2007) suggested, there are a group of people who 'plan-and-do' (because they had the resources and will) and another group that 'plan-in-vain' (because they lack the means, will or both). Shefrin & Thaler (1992) suggests that self-control may be an issue affecting "intention realizations." Likewise, in this study, it is argued that successful saving rests on the *opportunity* and *ability* of the individual to access financial markets, and ultimately, to conduct saving. *Opportunity* and *ability* are therefore necessary and sufficient conditions for saving successfully.

In order to help individuals successfully implement their plans, there is a need for financial institutions to reach out to these households who seem to be financially excluded, and those that appear to have restricted access to the various financial products. If certain households are being excluded due to geographical constraints or due to lack or marketing focus on these markets, financial institutions should tap into these markets and give them equal opportunity to access their products. It may also be necessary to implement control mechanisms to ensure that savers keep to their saving commitments over the long term. Hence, policy-makers and financial services providers should capitalize on the information that has been revealed as to which groups of households have motives but were not able to save, by assisting them to 'realize' their plans by imposing control-mechanisms (e.g. tax incentives, auto-deduction from regular income sources, or withdrawal fees which could be viewed as a penalty for not keeping to original plans).

One of the puzzling observations noted in the results is that, after controlling for wealth, income was found to be negatively related to holdings in risky assets. Intuitively, one would expect income to be positively related to the amounts held in risky assets, since higher income provides a stronger buffer against potential risks involved with risky assets. Furthermore, individuals with higher income would be able to afford the participation costs, compared to lower income households. The results of this study show that higher income

households are less likely to hold risky assets, and this counter-intuitive observation can be possibly explained by the close relationship between income and income risk. Households with very high income consist of self-employed individuals, who also have high variability of income and hence, are exposed to higher income risk. Holdings in risky assets are therefore reduced in order to balance out the risks associated with occupational income and investment. In view of these findings, it is crucial that financial services providers handle high net worth clients with caution. Although households may be richer, hence, are potentially more able to deal with the risks associated with risky assets, the plausible association between income and income risk creates an offsetting effect on their willingness to accept investment risk. It may thus be sensible to recommend a balanced portfolio among safe assets, risky assets and life insurance, to ensure that savings and income are well protected.

The results of this study provide important implications to policy formulation. Policy-makers can use this information in attempts to promote household saving by increasing awareness amongst households on the consequences of having inadequate savings. Lack of saving can adversely affect the households' ability to lead a comfortable life during retirement and also their ability to cope with unexpected emergencies in the future. In light of these two eventualities, nationwide campaigns must be carried out to target and educate households who seem to be lacking the drive to save, by underscoring the importance of saving to protect against future life's uncertainties. Favourable tax-incentives should also be considered to encourage savings, such as direct tax reductions on savings and exemption of income tax on interest earned.

Obviously, the evidence provided by this study is most relevant in the context of U.S. households, and hence, its applicability to other nations may be questioned. There is, therefore, a need for similar studies to be done in other parts of the world, particularly the developing countries. Undoubtedly, households' saving motives are influenced not only by idiosyncratic household characteristics, but also by the economic environment of the particular nation, the interest rate environment, saving and investment opportunities provided by

the market, household structures, social security benefits, as well as pension and tax structures. Due to these factors, it can thus naturally be expected that households' motives to save will differ according to nations. Nonetheless, there are certain aspects that are common even across cultures, such as the need to have contingency funds in the event of illness and disability, and the need to prepare funds for future life-cycle events, which can be expected to provide similar results across cultures. In addition, the problems of self-control, which have been postulated to affect saving behaviour, can also be expected to be universal across cultures. This is because deferred gratification is a psychological issue that concerns all human beings, regardless of nationality or cultural background. Hence, recommendations in regards to assisting individuals save for the future, and helping them implement and abide to their saving plans, are matters that may be generalized across nations. However, more specific issues such as distinguishing the importance of different saving motives, or identifying which households are not saving, may need further investigation according to countries.

The current study examined household's portfolio allocation choice in the U.S. and explored the factors that influenced holdings in different asset classes. In other parts of the world especially less developed nations and emerging markets, the availability of risky assets may not be as extensive as in developed nations such as the U.S. Therefore, the results of this study in regards to portfolio allocation choice are not entirely applicable to other nations, since the range of assets available to the specific populations may differ. However, there are certain behavioural aspects that are not culture-specific, which may affect portfolio allocation choice. For example, the concept of risk aversion suggest that people are risk averse and either want to avoid risk or wish to be compensated for the risks that they take. Although the degree of risk aversion can reasonably be assumed to be affected by the economic environment that households live in, the general nature of risk aversion does not generally depend on cultural upbringing, but is more of a personality trait. Hence, the results of this study, which show that risk tolerant households allocate more in risky assets and less in low-risk assets, can be

regarded as a universal phenomenon and can be considered relevant across households of different nations.

Nonetheless, in Islamic countries, there may be differences in attitudes and beliefs that affect household's portfolio allocation choices. The religious conception, which stipulate that investments in interest-bearing assets, risky assets and life insurance, is *haram* or forbidden, will certainly affect the choice of assets in households' portfolios. In countries such as Malaysia, where nearly 60% of the population consists of Muslims, availability of Islamic financial products provides additional investment avenues that cater for the needs of Muslim individuals. Hence, to study the portfolio allocation choices of households in countries with strong Islamic influence, the importance of religion needs to be acknowledged.

8.4 CONTRIBUTION OF THE STUDY

The main contribution made by the present study is that it has provided a comprehensive framework for establishing the link between *saving motives* and two aspects of saving behaviour, namely, (i) the household's propensity to save and, (ii) their portfolio allocation choices. The literature shows that the issues of household saving and portfolio allocation have usually been addressed separately, whereby household saving is usually examined in the domain of economics, and portfolio choice being studied in the realm of finance. However, as called for by Guiso and Jappelli (2000), there is a need for research to jointly examine these two research domains, given the close association between them.

The study contributes to the literature on saving motives by identifying the factors that might influence the formation of household saving motivations. The present study extends Xiao and Noring's (1994) bi-variate tests on the determinants of 'perceived saving motives', as well as Alessie *et al.*'s (1999) investigation on the contributing factors to two types of saving motives (precautionary and bequest motives). This study investigates the determinants of the various categories of saving motives as identified from the literature.

namely, *life-cycle*, *precautionary*, *bequest* and *profit* motives. Identifying the characteristics of the household that are instrumental in the formation of its saving motives will assist financial practitioners in identifying saving motives according to household's characteristics. Chapter Six, which evaluates the relationship between saving motives and saving propensity, reveals which saving motives are important, and hence, the results in Chapter Five can be used to recognize which groups of households have saving motives and yet do not have the ability to save. With this information, financial services providers can then increase efforts to help these household realize their saving intentions.

Another contribution of this study is that it integrates the various saving motives in a single research model. The literature has recognized that studies that evaluate the impact of several motives *simultaneously* are limited. By incorporating the various saving motives in a particular framework, results of this study have revealed the relative dominance of certain motives on saving decisions. The findings render support to Dynan *et al.*'s (2002) proposition that household saving motives co-exist and overlap each other during the life-cycle. Dynan *et al.* (2002) found that both precautionary and bequest motives are relevant to the household, although the impact of the latter is marginal as opposed to precautionary motives. This study has revealed similar findings, in which bequest motive is the least powerful motive in influencing saving.

This study adds to the existing body of knowledge by establishing the relationship between saving motives and portfolio decisions, which, to the knowledge of the researcher, has not been established in previous studies. Results of this study show that some of the saving motives significantly influence the holdings of several types of assets in the portfolio. In particular, life-cycle and profit motives strongly affect holdings in risky assets, while life-cycle and bequest motives impacts the holdings in life insurance. The present study renders support to the Behavioural Portfolio Theory (Shefrin & Statman, 2002), which suggests that investor's portfolio decisions are influenced by emotions and aspirations.

8.5 LIMITATIONS OF THE STUDY AND RECOMMENDATIONS FOR FUTURE RESEARCH

One of the limitations of this study is that the dataset employed is cross-sectional, which therefore provides only a 'snapshot' of saving behaviour at a given point in time. If a different time frame is used, there may be a possibility that the results may differ. Furthermore, the fact that the dataset is cross-sectional, does not allow a quantitative measure of saving. The saving measure that was used was a simple ordinal measure indicating positive, zero and negative saving. In view of the complexities and measurement errors that are bound to occur in a quantitative measure of saving, however, the qualitative measure of saving was deemed sufficient to meet the research objectives. Furthermore, the advantages of using the SCF dataset were believed to overshadow its shortfalls. This is because the dataset includes a comprehensive range of saving motives and asset holding information.

The puzzling results in regards to the relationship between income and holdings in risky assets suggest that income risk could be a determining factor influencing portfolio choice. The specification of the model did not include income risk as there was not a direct measurement of this variable in the SCF model. Nonetheless, it may be advantageous for future studies to include a proxy for income risk, from the SCF dataset, or from other data sources.

This study used saving motives as an indication of 'hope' and 'fear,' which the behavioural portfolio theory suggests are important determinants of portfolio allocation choice. Saving motives were posited to reflect these emotions. Future research could use different proxies for these emotions to examine their effects on portfolio choice, in the regime of the behavioural portfolio theory. It would be worthwhile exploring if other proxies of these constructs produce different results.

The context of the current study is on saving behaviour of U.S. households, which may not be generalized to other populations in the world. It would thus be interesting to explore whether there are differences in the saving behaviour

of households in other nations, such as those in developing nations. Cross-country comparisons can then be made, to determine whether saving motives, saving behaviour, and portfolio allocation choices differ according to nations. Furthermore, similar studies can also be conducted in Islamic countries, to investigate the effect of religious beliefs on asset choice. The examination of portfolio allocation choice, should take into consideration Islamic financial products, to determine possible differences in the selection of assets. One of the ultimate goals of the researcher is to conduct a household financial survey in her home country that is similar to the U.S. Survey of Consumer Finances, to contribute to the understanding of the behaviour of Malaysian savers. Determining the influence of saving motives on the choice of Islamic financial products in the portfolio will also be an interesting aspect to explore.

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APPENDIX

Table 1: Tobit regressions on financial asset categories for households in the first income quartile

TOBIT REGRESSION	POSITV_LOWRISK				POSITV_RISKY				POSITV_INSURANCE			
	Coef.	Robust SE	z	P>|z|	Coef.	Robust SE	z	P>|z|	Coef.	Robust SE	z	P>|z|
New_LC	0.6312	0.3090	2.04	0.041	-0.2545	1.7902	-0.14	0.887	-1.9248	2.1909	-0.88	0.380
New_PREC	0.5291	0.3080	1.72	0.086	-0.0276	1.7469	-0.02	0.987	1.4483	2.1096	0.69	0.492
New_BEQ	0.6042	0.3710	1.63	0.103	-0.7283	2.0435	-0.36	0.722	-2.7075	2.5364	-1.07	0.286
New_PROFIT	0.4073	0.5138	0.79	0.428	2.9118	2.5316	1.15	0.250	-1.2032	3.3067	-0.36	0.716
AGE	0.0076	0.0036	2.12	0.034	-0.0453	0.0255	-1.78	0.075	0.0872	0.0346	2.52	0.012
MALE	0.0427	0.1814	0.24	0.814	-1.8830	0.9462	-1.99	0.047	0.9235	1.3457	0.69	0.493
EDU	0.0771	0.0303	2.55	0.011	0.0775	0.1453	0.53	0.594	-0.2817	0.1844	-1.53	0.127
PEU	-0.0553	0.0657	-0.84	0.401	-0.2767	0.4993	-0.55	0.579	0.4184	0.6280	0.67	0.505
COUPLE	0.0398	0.2353	0.17	0.866	0.4106	1.1955	0.34	0.731	-0.9551	1.6735	-0.57	0.568
BLACK	-0.8175	0.2516	-3.25	0.001	-2.7598	1.2997	-2.12	0.034	5.7245	1.1796	4.85	0.000
HISPANIC	0.5030	0.1666	3.02	0.003	-6.9196	2.2876	-3.02	0.003	-5.0299	2.7292	-1.84	0.065
Other_RACE	0.0103	0.3064	0.03	0.973	0.7608	1.8095	0.42	0.674	-11.1990	4.0216	-2.78	0.005
EMPLOYED	0.2696	0.1456	1.85	0.064	0.6254	0.9038	0.69	0.489	-0.1356	1.4225	-0.10	0.924
OWNBIZ	0.0941	0.2612	0.36	0.719	-0.7406	1.0182	-0.73	0.467	-0.1281	1.7419	-0.07	0.941
RISKTOL	-0.2826	0.2780	-1.02	0.309	0.7551	0.9972	0.76	0.449	0.1255	1.5198	0.08	0.934
EXPECON	-0.1057	0.1346	-0.78	0.433	0.3306	0.6966	0.47	0.635	1.2151	1.0014	1.21	0.225
EXPINT	-0.3342	0.1337	-2.50	0.012	0.0120	0.7958	0.02	0.988	2.4811	1.2307	2.02	0.044
EXPINC	0.0128	0.1431	0.09	0.929	0.1407	0.8442	0.17	0.868	-0.1535	1.2851	-0.12	0.905
TIME	0.0940	0.1362	0.69	0.490	1.0721	0.7038	1.52	0.128	0.2056	1.1668	0.18	0.860
log_TOTASSET	0.7387	0.0288	25.61	0.000	2.9529	0.1584	18.64	0.000	1.4592	0.1928	7.57	0.000
_cons	-0.3550	0.5341	-0.66	0.506	-24.0134	3.2041	-7.49	0.000	-22.9143	4.3963	-5.21	0.000
	No. Of obs=3989; F(20,3969) = 101.89; Prob > F = 0.000; Pseudo R2=0.1956; (SE adjusted for 835 clusters in household), 102 left-censored at log_LOWRISK≤0, 3887 uncensored, 0 right-censored obs				No. Of obs=3989; F(20,3969) = 49.6; Prob > F = 0.000; Pseudo R2=0.2012; (SE adjusted for 835 clusters in household); 2524 left-censored obs at log_RISKY≤0, 1465 uncensored, 0 right-censored				No. Of obs=3989; F(20,3969) = 11.69; Prob > F = 0.000; Pseudo R2=0.081 (SE adjusted for 835 clusters in household) at log_INS≤0; 3079 left-censored, 910 uncensored, 0 right-censored obs			

Table 2: Tobit regressions on financial asset categories for households in the second income quartile

TOBIT REGRESSION	log_LOWRISK				log_RISKY				log_INSURANCE			
	Coef.	Robust SE	t	P>|t|	Coef.	Robust SE	t	P>|t|	Coef.	Robust SE	t	P>|t|
New_LC	-0.4606	0.1985	-2.32	0.020	1.9188	2.5213	0.76	0.447	0.8903	2.3618	0.38	0.706
New_PREC	-0.0348	0.2005	-0.17	0.862	0.2312	2.5388	0.09	0.927	-0.1279	2.3957	-0.05	0.957
New_BEQ	-0.2275	0.2306	-0.99	0.324	0.4673	2.6590	0.18	0.861	1.3927	2.6818	0.52	0.604
New_PROFIT	0.0794	0.2667	0.30	0.766	0.2858	3.2780	0.09	0.931	-1.3114	4.0434	-0.32	0.746
AGE	-0.0014	0.0048	-0.30	0.764	-0.0115	0.0227	-0.51	0.612	0.1118	0.0389	2.87	0.004
MALE	0.0795	0.1338	0.59	0.553	-1.1981	0.7223	-1.66	0.097	0.8885	1.2916	0.69	0.492
EDU	0.0099	0.0181	0.55	0.584	0.2775	0.1095	2.54	0.011	0.0680	0.1900	0.36	0.721
PEU	-0.0776	0.0542	-1.43	0.152	-0.1654	0.3396	-0.49	0.626	0.8601	0.4713	1.82	0.068
COUPLE	0.0715	0.1543	0.46	0.643	1.1867	0.8213	1.44	0.149	-0.3179	1.4235	-0.22	0.823
BLACK	-0.3313	0.1578	-2.10	0.036	-1.7242	1.1155	-1.55	0.122	4.1318	1.2889	3.21	0.001
HISPANIC	0.2250	0.1444	1.56	0.119	-2.3389	1.5662	-1.49	0.135	-2.2177	2.0573	-1.08	0.281
Other_RACE	0.2918	0.1796	1.63	0.104	-4.8993	2.4341	-2.01	0.044	-7.3874	3.7816	-1.95	0.051
EMPLOYED	-0.1081	0.1328	-0.81	0.415	0.1298	0.7419	0.18	0.861	2.0277	1.3987	1.45	0.147
OWNBIZ	-0.3043	0.2197	-1.39	0.166	1.0692	0.8391	1.27	0.203	-1.5159	1.8759	-0.81	0.419
RISKTOL	-0.1880	0.1507	-1.25	0.212	2.3025	0.6747	3.41	0.001	0.4442	1.2229	0.36	0.716
EXPECON	0.0300	0.0977	0.31	0.759	-0.6691	0.5377	-1.24	0.213	0.4143	0.9523	0.44	0.664
EXPINT	0.1164	0.1259	0.92	0.355	-0.4710	0.6886	-0.68	0.494	1.2840	1.1404	1.13	0.260
EXPINC	0.1041	0.1274	0.82	0.414	0.3089	0.7012	0.44	0.660	1.0847	1.1010	0.99	0.325
TIME	0.0692	0.1030	0.67	0.501	-0.4341	0.5247	-0.83	0.408	-0.7224	0.9543	-0.76	0.449
log_TOTASSET	0.7485	0.0268	27.95	0.000	3.3598	0.1581	21.26	0.000	2.1027	0.2266	9.28	0.000
_cons	1.5626	0.4609	3.39	0.001	-33.3775	3.4620	-9.64	0.000	-36.4133	4.5514	-8.00	0.000
	No. of obs=4127; F(20,4107) = 120.95; Prob > F = 0.000; Pseudo R2=0.2304; (SE adjusted for 910 clusters in household), 69 left-censored obs at log_LOWRISK≤0, 4058 uncensored obs, 0 right-censored obs				No. of obs=4127; F(20,4107) = 57.02; Prob > F = 0.000; Pseudo R2=0.2273; (SE adjusted for 910 clusters in household); 2549 left-censored obs at log_LOWRISK≤0; 1578 uncensored obs, 0 right-censored obs				No. of obs=4127; F(20,4107) = 13.84; Prob > F = 0.000; Pseudo R2=0.0799 (SE adjusted for 910 clusters in household); 3100 left-censored obs at log_LOWRISK≤0; 1027 uncensored obs, 0 right-censored obs			

Table 3: Tobit regressions on financial asset categories for households in the third income quartile

TOBIT REGRESSION	log_LOWRISK				log_RISKY				log_INSURANCE			
	Coef.	Robust SE	t	P>|t|	Coef.	Robust SE	t	P>|t|	Coef.	Robust SE	t	P>|t|
New_LC	-0.4450	0.1801	-2.47	0.014	3.4687	1.8943	1.83	0.067	5.1084	3.9460	1.29	0.196
New_PREC	-0.3258	0.1900	-1.71	0.086	3.6567	1.9154	1.91	0.056	2.6360	3.9988	0.66	0.510
New_BEQ	-0.4436	0.2558	-1.73	0.083	3.8360	2.0396	1.88	0.060	4.5043	4.2644	1.06	0.291
New_PROFIT	-0.2478	0.4654	-0.53	0.594	4.0201	2.3048	1.74	0.081	0.1726	5.5923	0.03	0.975
AGE	-0.0004	0.0046	-0.08	0.934	-0.0510	0.0216	-2.36	0.019	0.0508	0.0403	1.26	0.208
MALE	-0.0939	0.1897	-0.50	0.621	1.6559	0.8195	2.02	0.043	-1.1106	1.7399	-0.64	0.523
EDU	-0.0106	0.0188	-0.56	0.572	0.3358	0.1149	2.92	0.003	0.0140	0.2090	0.07	0.947
PEU	0.0039	0.0389	0.10	0.920	-0.1971	0.2667	-0.74	0.460	0.1797	0.4620	0.39	0.697
COUPLE	0.0718	0.1677	0.43	0.669	-0.1850	0.7804	-0.24	0.813	2.1026	1.7052	1.23	0.218
BLACK	-0.2420	0.2047	-1.18	0.237	-1.1364	0.9779	-1.16	0.245	2.8869	1.3429	2.15	0.032
HISPANIC	0.2438	0.1483	1.64	0.100	-3.1509	1.2916	-2.44	0.015	-5.9062	2.2345	-2.64	0.008
Other_RACE	0.2054	0.1162	1.77	0.077	-1.4441	1.2420	-1.16	0.245	2.6539	2.0931	1.27	0.205
EMPLOYED	0.1657	0.1910	0.87	0.386	-0.8231	0.7033	-1.17	0.242	0.9270	1.4760	0.63	0.530
OWNBIZ	0.1068	0.2043	0.52	0.601	-0.3903	0.7954	-0.49	0.624	-1.1876	1.8507	-0.64	0.521
RISKTOL	-0.3393	0.1153	-2.94	0.003	1.1434	0.5183	2.21	0.027	2.2245	1.0391	2.14	0.032
EXPECON	0.1451	0.0903	1.61	0.108	0.0264	0.4669	0.06	0.955	-0.7569	0.9353	-0.81	0.418
EXPINT	-0.0526	0.1202	-0.44	0.662	0.9975	0.7350	1.36	0.175	1.2947	1.3361	0.97	0.333
EXPINC	0.0802	0.1076	0.75	0.456	0.0769	0.5852	0.13	0.895	-1.2240	1.2838	-0.95	0.340
TIME	0.1585	0.1009	1.57	0.116	-1.1170	0.4704	-2.37	0.018	-0.3632	0.9414	-0.39	0.700
log_TOTASSET	0.7172	0.0274	26.17	0.000	2.8683	0.1578	18.18	0.000	2.1086	0.2372	8.89	0.000
_cons	2.0578	0.5199	3.96	0.000	-30.7502	3.1268	-9.83	0.000	-34.6092	6.0619	-5.71	0.000
	No. Of obs=4254; F(20,4234) = 65.76; Prob > F = 0.000; Pseudo R2=0.1949; (SE adjusted for 930 clusters in household), 42 left-censored obs at log_LOWRISK≤0; 4212 uncensored obs; 0 right-censored obs				No. Of obs=4254; F(20,4234) = 39.62; Prob > F = 0.000; Pseudo R2=0.1574; (Std error adjusted for 930 clusters in household); 8446 left-censored obs at log_LOWRISK≤0; 12597 uncensored obs; 0 right-censored obs				No. Of obs=4254; F(20,4234) = 11.35; Prob > F = 0.000; Pseudo R2=0.0599; (Std error adjusted for 930 clusters in household); 3088 left-censored obs at log_LOWRISK≤0; 1166 uncensored obse; 0 right-censored obs			

Table 4: Tobit regressions on financial asset categories for households in the fourth income quartile

TOBIT REGRESSION	log_LOWRISK				log_RISKY				log_INSURANCE			
	Coef.	Robust SE	t	P>|t|	Coef.	Robust SE	t	P>|t|	Coef.	Robust SE	t	P>|t|
New_LC	0.4547	0.5810	0.78	0.434	1.3490	2.1242	0.64	0.525	-0.3108	3.0217	-0.1000	0.92
New_PREC	0.5458	0.5827	0.94	0.349	0.7341	2.1361	0.34	0.731	-0.3014	3.0740	-0.1000	0.92
New_BEQ	0.3610	0.5904	0.61	0.541	2.0615	2.1621	0.95	0.340	0.7791	3.2115	0.2400	0.81
New_PROFIT	0.3003	0.5973	0.50	0.615	1.4818	2.2659	0.65	0.513	3.6895	3.6638	1.0100	0.31
AGE	-0.0072	0.0034	-2.11	0.035	-0.0124	0.0144	-0.87	0.387	0.0894	0.0370	2.4200	0.02
MALE	0.4295	0.2470	1.74	0.082	-1.1903	0.7709	-1.54	0.123	1.6034	2.0626	0.7800	0.44
EDU	0.0000	0.0170	0.00	1.000	0.1583	0.0827	1.91	0.056	-0.4377	0.1871	-2.3400	0.02
PEU	-0.0318	0.0310	-1.03	0.305	-0.0744	0.1276	-0.58	0.560	0.7172	0.3159	2.2700	0.02
COUPLE	-0.0909	0.1467	-0.62	0.536	0.4735	0.6300	0.75	0.452	0.0367	1.4796	0.0200	0.98
BLACK	-0.1493	0.1212	-1.23	0.218	-0.9349	0.7516	-1.24	0.214	1.5547	1.4198	1.1000	0.27
HISPANIC	0.2197	0.1215	1.81	0.071	-0.5750	0.8567	-0.67	0.502	-1.3637	1.8453	-0.7400	0.46
Other_RACE	-0.0568	0.1808	-0.31	0.754	-0.6138	0.6386	-0.96	0.336	-2.2052	1.7114	-1.2900	0.20
EMPLOYED	-0.2700	0.1332	-2.03	0.043	0.8199	0.4586	1.79	0.074	1.4950	1.2528	1.1900	0.23
OWNBIZ	0.1120	0.1367	0.82	0.413	-0.1436	0.4831	-0.30	0.766	0.7452	1.3246	0.5600	0.57
RISKTOL	-0.1835	0.0757	-2.43	0.015	0.1335	0.2848	0.47	0.639	0.0532	0.7720	0.0700	0.95
EXPECON	-0.0144	0.0735	-0.20	0.845	0.3155	0.2717	1.16	0.246	-0.4020	0.7101	-0.5700	0.57
EXPINT	-0.0469	0.1069	-0.44	0.661	0.6474	0.4458	1.45	0.147	-0.2044	1.0123	-0.2000	0.84
EXPINC	0.0003	0.0828	0.00	0.997	-0.3433	0.2968	-1.16	0.247	-0.8609	0.8068	-1.0700	0.29
TIME	-0.0611	0.0709	-0.86	0.389	0.2129	0.2882	0.74	0.460	0.8403	0.7169	1.1700	0.24
log_TOTASSET	0.6466	0.0194	33.31	0.000	2.3051	0.0851	27.10	0.000	0.9652	0.1999	4.8300	0.00
_cons	2.4885	0.6920	3.60	0.000	-20.9498	2.6706	-7.84	0.000	-13.8599	4.9887	-2.7800	0.01
	No. Of obs=8718; F(20,8698) = 95.32; Prob > F = 0.000; Pseudo R2=0.161; (Std error adjusted for 1779 clusters in household), 5 left-censored obs at log_LOWRISK≤0; 8713 uncensored obs,0 right-censored obs				No. Of obs=8718; F(20,8698) = 54.61; Prob > F = 0.000; Pseudo R2=0.1312 (Std error adjusted for 1779 clusters in household); 1368 left-censored obs at log_LOWRISK≤0; 7350 uncensored obs; 0 right-censored obs				No. Of obs=8718; F(20,8698) = 3.260; Prob > F = 0.000; Pseudo R2=0.014; (Std error adjusted for 1779 clusters in household); 5113 left-censored obs at log_LOWRISK≤0; 3585 uncensored obs; 0 right-censored obs			

Table A5: Asset Definitions

Asset-type	Definition
CHECKING ACCOUNTS	Regular checking accounts held in financial institutions, including money market accounts only if used regularly as checking accounts, but not including loan accounts or credit cards with check-writing privileges.
IRA/KEOGH ACCOUNTS	IRAs are "Individual Retirement Accounts", and include regular IRAs, Roll-over IRAs from pension accounts and Keogh plans. Does not include "Education IRAs" which are savings accounts. *Keogh*: A pension plan for self-employed individuals, in which tax is deferred until withdrawals are made. *Roth IRA*: A retirement savings account where contributions are made with after-tax money. The account accumulates tax-free until withdrawals are made. An account must be five years old before withdrawals are made, and the account holder must be 59.5 years old before withdrawing without penalty. *Roll-over IRA*: An IRA rollover is a lump-sum distribution deposited from an existing retirement plan into an individual retirement account. The existing retirement plan is frequently a 401k, but it may be any other type of plan. To be eligible for tax-deferral, an IRA rollover must meet certain requirements: 1) the IRA rollover funds must be placed into the new IRA within 60 days of withdrawal from the old account; 2) to avoid a penalty tax on the IRA rollover, the new IRA's balance must be the same as that of the old account; and 3) only one IRA rollover may occur per year. An IRA rollover can be undertaken on one's own by requesting a form from the custodian of the old account, or a financial institution can perform the IRA rollover as part of an investment plan; however, the latter choice will limit the number of possible accounts the IRA rollover funds can be put into. *Regular IRA*: Individual Retirement Account. A tax-deferred retirement account for an individual that permits individuals to set aside money each year, with earnings tax-deferred until withdrawals begin at age 59 1/2 or later (or earlier, with a 10% penalty). The exact amount depends on the year and your age. IRAs can be established at a bank, mutual fund, or brokerage. Only those who do not participate in a pension plan at work or who do participate and meet certain income guidelines can make deductible contributions to an IRA. All others can make contributions to an IRA on a non-deductible basis. Such contributions qualify as a deduction against income earned in that year and interest accumulates tax-deferred until the funds are withdrawn. A participant is able to roll over a distribution to another IRA or withdraw funds using a special schedule of early payments made over the participant's life expectancy.
CERTIFICATES OF DEPOSIT	Certificate of Deposits are certificates held for a set period of time that must be cashed or renewed at the maturity date. Includes "Bankers Acceptances" and "Repurchase Agreements".
SAVINGS/MONEY MARKET ACCOUNTS	These could be traditional savings accounts, Coverdell or 529 education accounts, Christmas Club accounts, or any type of savings or money market account.

	A money market account has an interest that varies from month to month, and has limited checking privileges. Coverdell accounts and state-sponsored "529" accounts are educational savings plans (ESAs).
MUTUAL FUNDS	Include open-end and closed-end funds, unit trusts, equity trusts, load and no-load funds, commodity pools, REITs (real estate investment trusts), mortgage trusts, and all other types of mutual funds.
Stock mutual funds	Stock funds include domestic stock funds, growth funds, index funds, global stock funds, sectors funds, and any other type of fund primarily invested in stock.
Tax-free bond funds	These funds include municipal bonds ("MUNIs") and other tax-exempt bonds.
Government or government backed bond mutual funds	These funds include U.S. Treasury bills and bonds, and other U.S. Government-sponsored bonds.
Other bond mutual funds	These funds include corporate bonds, commercial paper, junk bonds, and all remaining types of bonds.
Combination funds	Combination funds ("Balanced funds") hold both stock and bonds; also include REITs, and misc. types of funds.
Any other mutual funds	These include hedge funds.
SAVINGS BONDS	U.S. government savings bonds
BONDS OTHER THAN SAVINGS BONDS	Corporate, municipal, government, or other type of bonds or bills. (Not including bonds or bills held in pension accounts, trusts, annuities, or any other accounts).
U.S. Government bonds or Treasury bills	Include U.S. government bills and bonds as well as U.S. government agency bonds.
State or municipal bonds, or other tax-free bonds	Includes "revenue bonds" "industrial development bonds" and other bonds issued by state and loan goverments.
Foreign bonds	Include bonds issued by foreign governments or companies.
Corporate or any other type of bonds	Include corporate bonds, commercial paper, unk bonds and miscellaneous bonds not already mentioned.
PUBLIC STOCK	Publicly traded stock not including stock held through pension accounts, annuities, trusts, or assets previously mentioned.
BROKERAGE ACCOUNTS	A brokerage account for the purchase or sale of stocks and other securities
"Cash" or "call money" account	Cash or call money accounts are held at stock brokerages and hold money received from the sale of stock until the money is reinvested.
ANNUITIES, TRUSTS, AND MANAGED INVESTMENT ACCOUNTS	Annuities do not include job pensions. Managed investment accounts include legal trusts.

LIFE INSURANCE	These are policies that pay a death benefit and also build up in cash value. Also known as "whole life" and "universal life" policies. These do not include policies that pay out only in special circumstances such as accident life insurance.
MISCELLANEOUS ASSETS AND DEBTS	Money owed by friends, businesses, and relatives apart from financially dependent family members.
ACCOUNTS IN FOREIGN CURRENCY	Accounts held in some currency other than U.S. dollars.

Source: SCF Codebook 2004 and http://www.investorglossary.com/ira-rollover.htm