Retirement Wealth Decisions in Australia’s Superannuation System: Part 1, Accumulation

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Abstract: This is the first in a series of three papers examining retirement wealth decisions in Australia’s superannuation system. The work seeks to introduce a holistic approach to examining decision making across the key stages of retirement wealth provision, namely: accumulation; conversion; and, decumulation. The central idea considered in this study relates to the final superannuation benefit achieved during the accumulation phase. Using a sample of 245 Australians over the age of 45, we consider three areas, under the following sub-headings: attitudinal (budget; funding priority; and, adequacy); financial market (estate planning; and, financial advice); and, demographic factors (gender; retirement status; household income; employment status; and, accumulation contribution type) and their respective impacts on accumulated balance.

Title: Retirement Wealth Decisions in Australia’s Superannuation System: Part 1, Accumulation

Keywords: Retirement Wealth Decisions, Accumulation, Superannuation, Australia

Category of paper: Research paper

Purpose of the research/paper: To investigate the drivers of retirement wealth decisions, with a particular focus on the accumulation stage.

Methodology: Survey and stepwise regression.

Value of the paper: Identify for academics, practitioners (particularly superannuation product developers), and policy makers the drivers of decisions in the accumulation stage of retirement wealth.

Number of pages: 22

Number of tables/figures: 5

Section headings: 7
Introduction
This is the first in a series of three papers examining retirement wealth decisions in Australia’s superannuation system. The work seeks to introduce a holistic approach to examining decision making across the key stages of retirement income provision, namely: accumulation; conversion; and, decumulation. The idea of ‘stages’ or a ‘continuum’ of decisions provides a useful conceptual map for the research, allowing the formulation of an overarching research question, specifically: what are the key drivers of decisions in the accumulation, conversion and decumulation stages of retirement wealth provision in Australia?

The series of papers build on the findings of the research projects, “Retirement Savings: Drivers and Desires (2001)” and “Retirement Incomes and Long Term Savings Policy Options (2006)”, both undertaken by the Investment and Financial Services Association Ltd (IFSA), through the use of various cross-sectional modeling techniques to explore the drivers of retirement income decisions in Australia. The paper commences with a survey of the literature as it relates to the accumulation stage of retirement income provision. From this foundation, the data collection procedure is outlined, and a stepwise regression procedure is applied to investigate the drivers of decisions in the accumulation stage. Finally, the results of the empirical analysis are considered in light of the retirement income continuum and the superannuation policy setting in Australia.

Literature Survey
The central idea considered in this study relates to the final superannuation benefit achieved during the accumulation phase. In this study, we consider three areas, under the following sub-headings: attitudinal (budget; funding priority; and, adequacy); financial market (estate planning; and, financial advice); and, demographic factors (gender; retirement status; household income; employment status; and, accumulation contribution type) to investigate agent behaviour.

A. Attitudinal Factors
There has been increased research interest recently in understanding attitudes toward saving in Australia (Beal, 2000a and 2000b; Loundes, 2001). This strand of research explores how households decide between consuming and saving and how savings goals are formulated. The work of Beal (2000a) finds that income; occupation; wealth; the desire to hold of precautionary balances; retirement funding priority; financial independence; and, savings goals are all important drivers.1 The contribution of Beal (2000a) stands out from previous literature in the field in terms of developing a savings model that explicitly includes attitudinal factors, and motivates this study to take a similar approach.

Turning specifically to the issue of funding priority, research by the Association of Superannuation Funds of Australia Limited (ASFA) (2003) leads us to a further behavioral factor, namely, attitudes toward the issue of adequacy. It is argued that perceptions regarding adequacy are also important for the current research program as they provide an insight into the impact of differences between expectations and outcomes.

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1 Beal (2000a, 2000b) operates Keynes’ (1936) ‘eight objectives leading to refrained spending’ framework.
of retirement incomes. Regression analysis of the ratio of projected retirement wealth to needs at retirement for the U.S. by Yuh, Hanna and Montalto (1998) found retirement income, self-employment status, mortgage ownership, retirement age, household budgeting (spending greater than income), investment horizon and gender significantly related to retirement income adequacy.\textsuperscript{2,3} This highlights the numerous channels through which individual’s attitudes to adequacy have an impact on retirement incomes.

**B. Financial Market Factors**

Other work on factors important to accumulation has focused more closely on the interaction between benefit size and financial market incentives. In developing a model of retirement saving decisions, Wills and Ross (2002) list bequeathing as a motive for saving. This is important considering that many retirement income stream products are in the form of allocated pensions which allow estate transfers. This highlights the role estate planning can play not only on accumulation, but the whole retirement income continuum.

The role of financial advice in accumulation may reflect the investors level of knowledge of superannuation and the incentives to receive help to maximize after-tax returns. Questionnaire research by Beal and Delpachitra (2003) targeted at high-wealth, high-educated cohorts (who the researchers hypothesised should have an active knowledge of superannuation), found that some individuals are over-confident of their knowledge and familiarity with the superannuation system. It is suggested that this finding, in concert with a lack of appropriate financial advice, could significantly impact on accumulation decisions, resulting in minimal voluntary saving being practiced through the superannuation system.

**C. Demographic Factors**

It is hypothesised that there are five ‘demographic-style’ variables that may drive the accumulation of retirement savings: gender; retirement status; household income; employment status; and, saving contribution vehicle. The role of gender in accumulation cannot be overstated, not only because of labour pattern differences, but also attitudes and decisions relating to financial market risk. The work of Bernasek and Shwiff (2001)

\textsuperscript{2} Retirement wealth is defined here as financial and non-financial assets including housing wealth and retirement income from DC, DB and social security (the public pension).

\textsuperscript{3} In Australia, much of the debate regarding accumulation has focused on the adequacy of the Superannuation Guarantee (SG) arrangements on replacement rates and retirement incomes. The position of ASFA (1999) is that a SG of 12% is more consistent with target retirement incomes because AWOTE\textsuperscript{3} workers with 30 years of uninterrupted contributions will have a retirement income that is only 45% of gross pre-retirement income, or A$19,000 per year. NATSEM (2001) (in Wills and Ross, 2002) concur with this view, arguing that only in the most favourable circumstances would the SG provide living standards commensurate with pre-retirement life. Moreover, (IFSA, 2003b) concluded that there is wide agreement amongst researchers that most individuals still need to save an additional 3% to 5% in addition to current arrangements. Conversely, simulation modelling of optimal saving by Guest and McDonald (2002) indicates an increase in the SG to 12 to 15 per cent would impose a cost to current living standards for a much smaller discounted future gain. However, focus in the debate on the adequacy of the SG is only one aspect affecting retirement accumulation.
found women are inherently more risk averse than men in investment decisions in defined contribution (DC) plan allocation, almost regardless of marital status. This research suggests that privatising Social Security is more likely to disadvantage women in their efforts to ensure adequate retirement incomes. Similarly, research by Clark-Murphy and Gerrans (2001b, 2001c) report women systemically exhibit a higher degree of risk aversion in their investment decision making, coupled with shorter working lives, lower earnings and longer life expectancies places pressure on the ability of women to provide sufficient income in retirement. Rosenman and Wellen (2002) found women still carry the major responsibility for family care, which contributes to lower lifetime incomes and earning capacities, a result corroborated by Preston and Jefferson (2002). Gender differences in accumulation occur through both demographic characteristics (income and working life), and attitudinal and financial market factors, especially risk aversion.

Income is important to retirement income accumulation because it has strong effects on the ability of agents to contribute to their superannuation plan. Probit modelling in the U.S. by Huberman, Iyengar and Jiang (2003) examining the effect of pay on accumulation found that “401(k) DC participation rates, contributions and savings rates increase with compensation, especially for women; and when employers match employee contributions, it further increases participation and contributions, especially for low-income earners”. For Australia, recent changes to co-contributions legislation confirm that policy makers are incorporating these findings into contemporary policy arrangements.

In summary, it is hypothesised that the factors affecting the dependent variable, retirement income accumulation may include: saving attitudes (towards budgeting, funding priority and adequacy); financial market factors (measured through estate planning and financial advice); and, demographic characteristics (including gender, retirement status, household income, employment status and accumulation saving contribution type).

Methodology
The literature presented on retirement wealth decisions in the accumulation stage provides evidence of several key themes in empirical and theoretical research regarding attitudes, financial market, and demographic factors. The purpose of this section is to develop an accumulation model that allows insights into drivers of decisions by individuals in the accumulation phase by incorporating variables from each of these three

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4 Clark-Murphy and Gerrans (2001a, 2001b, 2001c) survey research using a multinomial regression focused on consultation and resource usage decisions between genders in an Australian university fund.

5 Choice also plays a significant role in retirement income accumulation. Multinomial regression research on choice by Brown, Gallery and Gallery and Guest (2001) focusing on an university superannuation fund proposes risk transfer costs is the main reason why members chose to remain in a DB plan when offered a transfer to a DC plan. DC members were prepared to forego benefit security and accept higher investment risk for higher expected return and the costs of becoming sufficiently informed. This result highlights that although individuals are willing to trade-off security for higher risk aimed at higher benefit accumulation, they should be fully informed.
areas. It is important to note that modelling of the size of superannuation benefit lump sums against factors beyond simply risk and return is still a largely exploratory area. As such, this exploratory work attempts to provide individuals, product providers and policymakers with positive insights into this process, and provide a foundation for future research. In line with the exploratory nature of this study, the following describes the variables selected for the full accumulation model (see Appendix 1 for full variable descriptions) before the stepwise procedure removes the insignificant variables:

\[ Y = \alpha + \beta_1 X_1 + \ldots + \beta_n X_n + \epsilon \]  

(1)

where:

- \( Y \) is the dependent variable;
- \( \alpha \) is the intercept term, alpha; and
- the independent variables \( X_n \) include:

- Lump sum size (the dependent variable) is the log of the original numeric dollar value of the size of agents' superannuation benefit lump sums, transformed due to a non-normal, skewed distribution (predominately due to the nature of the question itself and the unavailability of additional data to increase the sample size);
- The attitudinal variables; which are ordinal data based on a 10-point Likert scale: \(^6\)
  - Budget,
  - Funding priority and
  - Adequacy;
- Financial market factors:
  - Estate planning, a dummy variable where agents structure their financial affairs to leave an estate (1) or not (0);
  - Financial advice, a dummy variable where agents seek financial advice from outside sources (1) or not (0); and
- Demographic factors:
  - Gender, a dummy variable where agents are male (1) or female (0);
  - Retirement status, a dummy variable based on the distinction used by the survey between retirees aged 55+ (1) and pre-retirees aged 45+ (0);
  - Household income, a dummy variable where agents have high household incomes above A$101,000 (1), or low household income below A$100,000 (0); \(^7\)
  - Employment status, represented by three separate dummy variables of agents either in:

\(^6\) According to Berry (1993), the 10-point scale has a sufficient number of classes in the ordinal independent.

\(^7\) The separation between: low (A$0-A$100,000) and high (greater than A$100,000) households is approximately based on the separation between households subject to the (now defunct) 15% surcharge (incomes above A$94,691) to those not (incomes below A$94,691) being closest to A$100,000.
- Full-time employment (1) or not (0),
- Self-employment (1) or not (0), or
- Other employment (1) or not (0);\(^8\)
  - Accumulation contribution type, represented by three separate dummy variables where agents main saving vehicle for retirement is:
    - Employer superannuation (1) or not (0),
    - Other superannuation (1) or not (0), or
    - Other savings (1) or not (0).

The accumulation model is an Ordinary Least Squares (OLS) regression using the SPSS forward stepwise procedure which iteratively processes variable entry and removal.\(^9\)

Considering the exploratory nature of testing, Garson (2003) considers this technique appropriate as the stepwise regression is used for purposes of pure prediction or research, not theory testing. Tabachnick and Fidell (1989) also consider stepwise the surest path to the best prediction equation. Moreover, if the only aim of research is a prediction equation, stepwise regression can be used to develop a subset of independent variables (IV) that are useful in predicting the dependent variable (DV) and to eliminate those IVs that do not provide additional prediction.

After running the full model with the stepwise regression, the final model containing 245 observations is:

\[
Y = \alpha + \beta_1 X_1 + \ldots + \beta_8 X_8 + \varepsilon \tag{2}
\]

where

- \(Y\) is the dependent variable, the log of the size of superannuation benefits; and
- the independent variables are:
  - \(X_1\) Adequacy;
  - \(X_2\) Funding priority;
  - \(X_3\) Budget
  - \(X_4\) Gender;
  - \(X_5\) Retirement status;
  - \(X_6\) Household income;
  - \(X_7\) Other employment;
  - \(X_8\) Other savings; and,

\(^8\) This technique matches as closely as possible to the ABS (2003) practice of treating full-time workers only as those employed persons who usually worked 35 hours or more a week.

\(^9\) In stage one, the independent best correlated with the dependent is included in the equation. Next, the remaining independent with the highest partial correlation with the dependent, controlling for the first independent, is entered, repeated, at each stage partialling for previously-entered independents, until the addition of a remaining independent does not increase \(R^2\) by a significant amount.
$\epsilon$ is the associated error term assumed to be normally distributed with zero mean and constant variance.

The stepwise procedure produced a model that avoids over-fitting by only including variables that only significantly increase the coefficient of determination ($R^2$) at each iterative step. An alternative technique of hierarchical multiple regression was not used as this would require the researcher to determine the order of entry of the variables, not the technique. This would require an explicit prior theory or expectation of significant variables (Garson, 2003). In line with the exploratory approach of this study, the stepwise procedure removes and includes significant variables affecting lump sum accumulation according to the research agenda previously established.

Data
In order to estimate the multiple regression model outlined, data on the size of accumulated superannuation benefits, attitudinal measures of adequacy, funding priority and budget; financial market variables including estate planning and financial advice; and demographic variables including gender, retirement status, household income, employment status, and accumulation contribution saving type are required. The following outlines the type and source of data collected for estimation in the accumulation model. For the stepwise multiple regression model, the data used was based on a sample survey collected by Chant Link and Associates via a telephone questionnaire developed as a component of a large research project called “Retirement Savings, Drivers and Desires”, undertaken by IFSA. A total of 245 responses, from Australian aged 45 years and over were used in this study. This study focuses on data collected on two of the major sections of the questionnaire. The first sought to measure attitudes towards retirement savings using a 10-pont likert scale with a greater score representing greater agreement with the statement. The second section collected a number of variables describing financial market decisions and demographic attributes (Appendix 1). A summary of the accumulation model data set is presented in Table 1.

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10 For a complete table of summary statistics, see Drew, Stanford and Stanhope (2005). The total sample size was $n=600$ individuals aged 45 years and over. The pre-retiree group ($n=400$) consisted of those individuals who identified as the main income earner in the household, were aged 45 years or over and who were currently engaged in paid employment for more than 25 hours per week. The retiree group ($n=200$) consisted of those individuals who identified as the former main income earner of the household, were aged 55 years or over and had either fully or partially retired from the workforce in the past five years. A selected range of the sample population’s demographic characteristics were also collected. In summary, the pre-retiree group was comprised of 66.5% male and 33.5% female respondents. The retired group was comprised of 64.2% male and 35.5% female respondents. The modal age of the pre-retiree group was 52 years of age with a range of 45 to 73 years of age compared to a modal age of 62 years of age for the retired group with a range of 55 to 84 years of age. The majority of respondents in both the pre-retiree and retiree groups were married (pre-retirees: 66.3% and retirees: 68.5%) and identified as owners of their primary place of residence (pre-retirees: 54.0% and retirees: 84.5%). A total of 245 usable responses were investigated in this study; and a total of 365 usable responses in studies two and three.

11 For reasons of practicality (and to be consistent with the use of dummy variables with methods appropriate to the conversion and decumulation multinomial models in the next two studies), this accumulation multiple regression model treated questions with three alternatives as separate variables of one group.
Table 1 Accumulation Model Summary Statistics (n=245)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Likert Scale Value</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.4 7.3 7.3 9 8.6 17.1 7.8 5.7 15.1 4.9 7.8</td>
<td></td>
</tr>
<tr>
<td>Funding Priority</td>
<td>2.4 0.4 3.7 1.6 3.7 9 7.3 14.3 22.4 11 24.1</td>
<td></td>
</tr>
<tr>
<td>Adequacy</td>
<td>6.9 2.9 7.3 8.6 9.4 15.9 9 14.7 15.1 5.3 4.9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Value</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estate Planning</td>
<td>None</td>
<td>26.1</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>73.9</td>
</tr>
<tr>
<td>Financial Advice</td>
<td>None</td>
<td>18.4</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>81.6</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>34.7</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>65.3</td>
</tr>
<tr>
<td>Retirement Status</td>
<td>Pre-Retiree</td>
<td>70.2</td>
</tr>
<tr>
<td></td>
<td>Retiree</td>
<td>29.8</td>
</tr>
<tr>
<td>Household Income</td>
<td>Low</td>
<td>86.9</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>13.1</td>
</tr>
<tr>
<td>Full-Time Employment</td>
<td>Yes</td>
<td>75.5</td>
</tr>
<tr>
<td>Self-Employment</td>
<td>Yes</td>
<td>13.1</td>
</tr>
<tr>
<td>Other Employment</td>
<td>Yes</td>
<td>6.1</td>
</tr>
<tr>
<td>Other Superannuation</td>
<td>Main Saving Vehicle</td>
<td>20.0</td>
</tr>
<tr>
<td>Other Savings</td>
<td>Main Saving Vehicle</td>
<td>24.9</td>
</tr>
<tr>
<td>Employer Super</td>
<td>Main Saving Vehicle</td>
<td>29.4</td>
</tr>
</tbody>
</table>

Notes: Neither full-time employment, self-employment and other employment; or other superannuation, other saving or employer super, add to 100% because of data limitations.

Of primary concern to this study is to ascertain that factors that drive the decisions made by individuals in the accumulation of their superannuation lump sum. The following section discusses the reliability of the model, followed by an analysis of the results from the empirical exercise.

Parameter Estimates and Diagnostics

Prior to considering the usefulness of the chosen stepwise multiple regression and interpreting its results, important issues relating to the properties of the data selected must be addressed. If the data does not conform to assumptions underlying the model outlined, the results cannot form the basis for a meaningful discussion of the factors affecting agents’ accumulation of superannuation benefits. A primary consideration is the adequacy of the sample size. Firstly, the 245 observations are consistent with the assumptions of the stepwise procedure with all cell frequencies being greater than one, and no more than 20 per cent of cells with less than five observations (Norusis, 1999).
Table 2 Accumulation Model Parameter Estimates

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardised $\beta$</th>
<th>Standardised $\beta$</th>
<th>S.E</th>
<th>Partial Correlations</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequacy</td>
<td>0.096**</td>
<td>0.188</td>
<td>0.028</td>
<td>0.216</td>
<td>1.201</td>
</tr>
<tr>
<td>Funding Priority</td>
<td>0.069**</td>
<td>0.123</td>
<td>0.031</td>
<td>0.146</td>
<td>1.153</td>
</tr>
<tr>
<td>Budget</td>
<td>-0.052**</td>
<td>-0.113</td>
<td>0.024</td>
<td>-0.139</td>
<td>1.090</td>
</tr>
<tr>
<td>Gender</td>
<td>0.462*</td>
<td>0.159</td>
<td>0.028</td>
<td>0.216</td>
<td>1.125</td>
</tr>
<tr>
<td>Retirement Status</td>
<td>-1.046*</td>
<td>-0.347</td>
<td>0.160</td>
<td>-0.392</td>
<td>1.101</td>
</tr>
<tr>
<td>Household Income</td>
<td>0.720*</td>
<td>0.176</td>
<td>0.217</td>
<td>0.211</td>
<td>1.104</td>
</tr>
<tr>
<td>Other Employment</td>
<td>-0.797*</td>
<td>-0.139</td>
<td>0.306</td>
<td>-0.167</td>
<td>1.108</td>
</tr>
<tr>
<td>Other Savings</td>
<td>-0.471*</td>
<td>-0.148</td>
<td>0.166</td>
<td>-0.182</td>
<td>1.064</td>
</tr>
</tbody>
</table>

* Significant at the 1% level; ** Significant at the 5% level; *** Significant at the 10% level

All coefficients are significant at the 5% level (a result of the stepwise procedure). However, the standardised errors of some of the $\beta$ coefficients are quite high warranting further investigation of multicollinearity in the data. The variance inflation factors (VIF)12 indicate no multicollinearity, with only minimal inflationary impact on the standard error of the regression coefficients. All variables’ VIF’s are well below a value of five (5) which generally indicates confidence in the stability of the coefficients. The correlation matrix does not produce any bivariate correlations greater than .90, and hence no bivariate multicollinearity is explicitly found between the variables (Garson, 2003).

Table 3 Accumulation Model Descriptive Statistics and Correlations

<table>
<thead>
<tr>
<th></th>
<th>LS</th>
<th>A</th>
<th>FP</th>
<th>B</th>
<th>G</th>
<th>RS</th>
<th>HI</th>
<th>OE</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lump Sum (LS)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequacy (A)</td>
<td></td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funding Priority (FP)</td>
<td>0.32</td>
<td>0.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget (B)</td>
<td>-0.22</td>
<td>-0.23</td>
<td>-0.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (G)</td>
<td>0.29</td>
<td>0.18</td>
<td>0.12</td>
<td>-0.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retirement Status (RS)</td>
<td>-0.37</td>
<td>0.15</td>
<td>-0.16</td>
<td>-0.01</td>
<td>0.02</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household Income (HI)</td>
<td>0.29</td>
<td>0.18</td>
<td>0.14</td>
<td>-0.1</td>
<td>0.16</td>
<td>-0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Employment (OE)</td>
<td>-0.29</td>
<td>-0.11</td>
<td>-0.24</td>
<td>0.13</td>
<td>-0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Savings (OS)</td>
<td>-0.15</td>
<td>0.06</td>
<td>0.07</td>
<td></td>
<td>*</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean 11.52 5.35 7.36 4.98 0.65 0.30 0.13 0.06 0.25
Standard Deviation 1.38 0.43 0.48 0.46 3.01 2.45 2.70 0.34 0.24

1-tailed significance at the *1% level; **5% level; and ***10% level.

12 The Variance Inflation Factor (VIF), or its reciprocal, tolerance, regress each independent on all others. Note, even when multicollinearity is present, variables which are not collinear with others are not affected.
When examining for multivariate multicollinearity, there are multiple eigenvalues close to 0 indicating an ill-conditioned cross product matrix,\textsuperscript{13} meaning there may be a problem with multicollinearity. However, no condition index is over 15, suggesting there are no data problems due to collinearity (Judge, Griffiths, Hill, Lutkepohl and Lee, 1985). The presence of two or more, large variance proportion values (greater than .50) in a dimension column indicate multicollinearity, and in particular the linear dependent associated with the corresponding characteristic root is adversely affecting the precision of estimation of the associated coefficients (Judge \textit{et. al.} 1985). Table 4 suggests that there is no collinearity between any of the variables in a multivariate analysis.

\begin{table}[h]
\centering
\begin{tabular}{lcccccccc}
\hline
\textbf{Collinearity Diagnostics} & \\
\hline
\textbf{Eigenvalues} & 5.10 & 1.09 & 0.88 & 0.63 & 0.60 & 0.31 & 0.23 & 0.11 & 0.03 \\
\textbf{Condition Index} & 1.00 & 2.16 & 2.40 & 2.85 & 2.92 & 4.03 & 4.67 & 6.86 & 12.26 \\
\hline
\textbf{Variance Proportions} & \\
\hline
Retention Status & 0.01 & 0.05 & 0.07 & 0.11 & 0.65 & 0.02 & 0.00 & 0.05 & 0.04 \\
Adequacy & 0.01 & 0.00 & 0.00 & 0.00 & 0.00 & 0.04 & 0.21 & 0.71 & 0.04 \\
Gender & 0.01 & 0.01 & 0.01 & 0.00 & 0.00 & 0.27 & 0.64 & 0.01 & 0.04 \\
Household Income & 0.01 & 0.17 & 0.32 & 0.41 & 0.01 & 0.08 & 0.00 & 0.00 & 0.00 \\
Other Savings & 0.01 & 0.01 & 0.27 & 0.48 & 0.17 & 0.00 & 0.03 & 0.00 & 0.03 \\
Other Employment & 0.00 & 0.47 & 0.12 & 0.15 & 0.14 & 0.08 & 0.02 & 0.00 & 0.01 \\
Funding Priority & 0.00 & 0.00 & 0.00 & 0.00 & 0.01 & 0.00 & 0.04 & 0.32 & 0.62 \\
Budget & 0.01 & 0.00 & 0.01 & 0.01 & 0.03 & 0.44 & 0.08 & 0.15 & 0.28 \\
\hline
\end{tabular}
\caption{Accumulation Model Collinearity Diagnostics}
\end{table}

With the issues relating to multicollinearity considered, it is important to repeat that the model has predictive power with the overall model significant at the 1\% level, and an adjusted $R^2$ of 0.38. The Durbin-Watson statistic (2.02) demonstrates correlation between the residuals is insignificant. The change statistics also reject the null hypothesis that regressions for models with and without independent variables are the same for the two groups.

\begin{table}[h]
\centering
\begin{tabular}{lcccc}
\hline
\textbf{R}$^2$ & \textbf{Adjusted R}$^2$ & \textbf{S.E.} & \textbf{R}$^2$ Change & \textbf{F Change} & \textbf{Significance F Change} & \textbf{Durbin Watson} \\
\hline
0.40 & 0.38 & 1.09 & 0.01 & 4.63 & 0.03 & 2.02 \\
\hline
\end{tabular}
\caption{Accumulation Model Goodness-of-Fit}
\end{table}

Overall, the diagnostics of the accumulation model presented indicate an adequate model specification, considering the exploratory nature of the techniques used. This means analysis of results is useful and meaningful in providing insights into how individuals are reacting to the imposed accumulation framework.

\textsuperscript{13} High eigenvalues indicate dimensions (factors or variables) which account for a lot of the variance in the cross product matrix. Single Eigenvalues close to 0 indicate dimensions which explain little variance.
Analysis
The paper commenced by surveying the literature and synthesizing the variables important to lump sum accumulation. Based on the result of the accumulation model, there is evidence of a significant relationship between the variables measuring attitudes to retirement income accumulation, financial market factors and demographic factors; with the dependent variable, superannuation benefit accumulation size.

A. Attitudinal Factors - Results

Adequacy
This attitudinal variable is important because it measures how confident superannuants are that they will be able to have a good standard of living in retirement. As expected, as individuals more strongly agree that they feel confident of having enough money in retirement to provide a good standard of living, there is a positive relationship to the size of lump sums ($\beta = 0.096$). The result encourages policy makers to view it a key area that can be targeted to improve individuals’ retirement incomes and standards of living. If it is made a priority, encouraged through government education programs and policy incentives, there is a positive relationship to the size of retirees’ superannuation benefit lump sums. This result adds to previous research findings as it ‘measures’ the relationship between agent attitudes towards adequacy and benefit accumulation. This result corroborates the findings of Beal (2000a) that saving for financial independence is a significant and popular motive for saving highlighting the need for future research and understanding in this area.

Differences between this study (examining persons aged 45+) and previous work suggest researchers must show caution in how ‘adequacy’ is defined or measured, and the sample tested. For instance, survey work by Cameron (2001) found that amongst Australian 30-69 year olds, some 70 per cent estimate they will need a minimum of A$30,000 p.a. in retirement.\footnote{This is around three times the existing pension, and is commonly agreed as the minimum baby boomer retirement income expectation. Cameron (2001) reports that some 62 per cent think they will achieve this; although in reality, 33 per cent of people are deluded in believing that their current saving habits are adequate with an additional 38 per cent to be disappointed at not having what they want in retirement.} Although previous research indicates a significant proportion are optimistic in their expectations of having a sufficient retirement income (for instance, see Cameron 2001), overall, the results of this paper suggest there is a positive relationship between adequacy and superannuation benefit size. Perhaps individuals are correctly relating adequacy positively to accumulated balances, but this understanding is not translating into their assessment of retirement incomes during decumulation. Future research can perhaps consider how attitudes towards adequacy are related to outcomes in all three stages of the retirement income is warranted.
Funding Priority
This attitude measures how agents feel about the need to self-fund their retirement, providing some quantifiable insights for policy makers of what effect promoting self-sufficiency in retirement may have. As expected, this variable is positively related to the size of lump sums ($\beta = 0.069$), indicating respondents had larger lump sums as they more strongly agreed self-funding for retirement was important. One conclusion drawn here is the role of expectations where respondents who have a priori intentions to increase the size of their expected lump sum take action based on this attitude.

The result that funding priority is important aligns with previous attitudinal work by Wirthlin Australia (2001) that most respondents consider superannuation should be a model of mutual obligation, but feel the government should do more to help. This result also agrees with Beal’s (2000a, 2000b) analysis that saving to provide for retirement is a significant and popular motive for saving, most likely for 45-54 year old males with middle to high incomes and assets. The finding of Loundes (2001) similarly found the retirement motive is the single most important reason for saving for 45-64 year olds (before declining in importance to be second behind the precautionary motive after retirement age of 65).

These results are interesting for two reasons. Firstly, other survey work by Beal (2000b) found 90 per cent of respondents have a savings plan or general intention to save, indicating the broad shift policy makers can enact by influencing funding priority. Second, 45-54 year old males have the largest accumulated superannuation balances on average, and small changes to their attitude to funding priority can have positive effects on superannuation accumulation.

This Section’s results highlight the importance of this influential variable for policy makers. Policy makers can target particular groups (i.e. 45-54 year old males) or make broader initiatives to increase superannuation accumulation by influencing agent attitudes to funding priority. These results draw conclusions for policy makers that they can, and should, do more to improve agent attitudes to being self-sufficient in retirement by encouraging superannuation accumulation.

Budget
As expected the budget variable is negatively related to lump sum size ($\beta = -0.052$). This is in line with a priori expectations as respondents who more strongly agree their living expenses do not leave room for saving, are less likely to be able to make saving contributions in excess of compulsory levels to build their superannuation balances. Rational, self-seeking agents are making inter-temporal consumption choices that are individually efficient and are unable or unwilling to sacrifice current consumption during their working life for future increased savings, perhaps in the expectation of receiving the public pension upon retirement. This may suggest that there are insufficient incentives in place by government to change individuals’ inter-temporal consumption choices to accumulate retirement savings.
This finding also confirms previous work on saving attitudes for the U.S. by Yuh, Hanna and Montalto (1998) that household budgeting (measured as spending being greater than income), is significantly related to the adequacy of retirement income. This result also aligns with Olsberg and Ferris (2001) that “most Australians show low levels of commitment to retirement savings and often forgo opportunities to make long term savings due to a disinclination to sacrifice current spending for future savings”. Such findings suggest that there are significant interactions between the ‘set’ of attitudinal characteristics of individuals that collecting affect retirement income accumulation. These results confirm that attitudes are important retirement income accumulation, with all three tested found to be significant, providing guidance to policy makers as to the need to fully consider them.

B. Financial Market Factors - Results
Following on from attitudinal variables, this study turns its attention to how agents are reacting to the imposed framework by ‘operating’ these attitudes with decisions in financial markets. Estate planning and financial advice can be viewed as providing a link between attitudes and accumulation as they can alter agent decisions that would have been made otherwise, based solely on attitudes. However, both estate planning and financial advice were removed by the stepwise regression procedure as insignificant variables to retirement income accumulation, and hence no further analysis or results are provided. We return to consider these factors again in the conversion and decumulation studies.

C. Demographic Variables - Results

Gender
Gender measures the difference between the superannuation accumulation of males and females. As expected, the gender dummy variable found that men have a strong positive relationship to superannuation benefit lump sum size ($\beta = 0.462$). This result is not entirely unexpected because men typically have earnings than women (see summary statistics), and would be expected to have higher superannuation contributions than women. As the SG is calculated as a percentage of income, it favours those with higher incomes who are also relatively more able to make voluntary contributions towards their lump sums. This result also confirms the fairly broad consensus in the literature that, as Rosenman and Wellen (2002) highlight, women still carry the major responsibility for family care, which contributes to lower lifetime incomes and earning capacities. With almost universal mandatory superannuation, ways of guaranteeing economic provision for surviving partners (as on average, women live longer than men) is now becoming necessary.

The inherent bias in superannuation towards males is due to the gender differences from the effects of voluntary and involuntary absence from the labour force and divorce. This result reinforces the themes of the current literature on the gender inequality for accumulation, supporting the position of Bernasek and Shwiff (2001) and Clark-Murphy and Gerrans (2001b, 2001c) who found women inherently more risk averse than men in investment decisions in the allocation of their DC pensions. This results in lower saving accumulations and lower retirement incomes. This paper concurs with the previous
literature that suggests that attempts to privatise retirement income make retirement income more heavily dependent on risk taking and are more likely to disadvantage women in their efforts to ensure adequate retirement income.

**Retirement Status**
This variable measures differences between pre-retirees aged 45+ and retirees aged 55+.
This dummy variable is strongly negatively related ($\beta = -1.046$) to lump sum size as superannuants who have already retired would be expected to have drawn down, to varying extents, their lump sum available for retirement. Although it can be argued that retirees have had a longer period of time to save, this ‘time’ effect is more than offset by the fact that current retirees have already drawn down their lump sum balances, and also that the pre-retirees minimum age is still 45. This result is encouraging for policy makers as it demonstrates a trend of increasing average lump sum balances for agents entering retirement, although this is not necessarily representative of future trends.15

**Household Income**
The variable measures the difference in accumulation between households whose income is above A$101,000 (high) or below A$101,000 (low). As expected, household income is strongly positively related to the size of lump sums ($\beta = 0.72$) as superannuants with higher incomes are intuitively more able to save and invest to accumulate lump sums for retirement. This result demonstrates the strong connection between increasing levels of income with larger superannuation balances. However, this makes a marginal contribution to the literature by measuring the size (or degree) of this positive relationship and gives some ideas of the breadth of the effect of the surcharge on accumulation.

**Other Employment**
This variable attempts to measure the group of employed persons most likely not to be captured by the otherwise high coverage of the SG. Individuals whose employment status is best described as an employee in ‘other employment’ (i.e. not fully or self-employed), displayed a strong negative relationship to the size of their lump sums ($\beta = -0.797$). As hypothesised, persons not fully or self-employed would be expected to have relatively lower incomes over the accumulation stage of working life and hence, with lower lump sums, may not by captured by the SG. This result supports the position of Dell and Milne (2002) by demonstrating the nexus between full-time work and superannuation accumulation as the smaller lump sums of those who work only part-time, are more likely to not be large enough to provide satisfactory retirement incomes. The estimated results suggest that those in ‘other employment’ are at a decided disadvantage in accumulating superannuation benefits. The significance and size of the coefficient reveals the importance this issue should take with policy makers where shifts

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15 This result is also consistent with broader wealth estimates of accumulation by Kelly (2003) that persons aged 50-64 have average wealth of A$240,000 that is considerably above the adult population of A$149,000. Persons aged 50-64 years old have average superannuation balances of A$56,000 - although not directly comparable to retirees, would be expected to be higher due to draw down effects at retirement. This is especially considering that the logical first preference for most retirees’ wealth decumulation is to draw on superannuation, rather than housing wealth.
in labour market patterns to part-time and causal employment can bear negatively on agents in these categories in their attempts to accumulate sufficient retirement incomes.

**Other Savings**

Other savings represent a contribution vehicle for saving for retirement available for all agents, not just those captured by superannuation arrangements. Those whose main saving contribution vehicle for retirement was ‘other savings’ (i.e. not employer or voluntarily contributed superannuation; such as shares, bank savings and property), were significantly negatively related to the size of their lump sums ($\beta = -0.471$). This result suggests that individuals who use saving vehicles outside the superannuation environment as their main saving source produce relatively smaller lump sums for retirement.

This result also ties in with the need for agents to understand that superannuation is an asset ‘vehicle’ as opposed to an asset ‘class’. The work of Loundes (2001) illustrates although employee contributions have slightly higher effective tax rates than employer contributions, both still provide better effective returns than either shares or bank savings. Interestingly, both employer and other superannuation contributions are not significantly related to the size of agents’ lump sums. This inability of the model to significantly relate superannuation contributions to accumulation corresponds with the hypothesis of Morling and Subbaraman (1995) that there might be different degrees of substitution expected between saving types depending on the source of the superannuation saving, which may be skewing the results.\(^{16}\)

The negative relationship between other savings and lump sum size may also be a reflection of both the inherent taxation disadvantage it faces compared to employer and other contributions within the superannuation system. Policy makers must ensure agents are able to identify superannuation as a concessional saving vehicle, and are sufficiently attracted towards it so they do not inefficiently substitute personal contributions for other savings.

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\(^{16}\) For example, personal contributions, and to a lesser extent employer funded contributions, may be regarded as reasonably good substitutes for other forms of saving with increased superannuation saving, where higher net contributions are offset by some reduction in other saving.
Concluding Comments

The principal findings of this study related accumulation outcomes to the significant effects of attitudes to saving, as well as financial market and demographic factors. The results of the adequacy, funding priority and budget variables suggest that if policy makers are able to promote individuals interest in, and ability to, being self-sufficient in retirement, individuals will take appropriate action to increase benefits during the accumulation phase. The insignificance of the financial advice and estate planning variables indicates the range of agents seeking advice results has no particular significant relationship to lump sum size and the reasons for this is an area for future research.

The fact that males, pre-retirees and high household incomes have larger superannuation balances confirms existing research on these factors. Of interest though is the finding that there is clearly significant relationships between those who are in other employment (not full-time or self-employed) and whose main contributory saving vehicle is other savings (not employer or other superannuation), indicating evidence of the significant disadvantage these individuals face in accumulating superannuation benefits. It is hypothesised that this is most likely a product of the SG system which heavily favours uninterrupted full-time employment.

The results presented have salient implications for retirement income policy makers in Australia. The accumulation model suggests there is a significant positive relationship between: those with favourable attitudes to adequacy, funding priority, and budgeting; those who are male, not retired, on high household incomes, and not in other employment; and not contributing to retirement savings mainly through other savings outside superannuation; to achieving higher superannuation balances. This raises important issues concerning the responsibility of policy makers to target these particular groups to ensure agents’ accumulation is efficient and adequate for terminal retirement incomes.

We continue the research agenda in two future papers that consider retirement wealth decisions in the conversion and decumulation stages.
References


Beal, D. and Delpachitra, S. (2003b) ‘How Much Does the Australian Community Know About Its Superannuation System?’, mimeo, Faculty of Business, University of Southern Queensland.


Appendix 1: Survey Questions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lump Sum Size</td>
<td>How much do you estimate your lump sum will be/was</td>
<td>Log of dollars</td>
</tr>
<tr>
<td><strong>Independent Variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequacy</td>
<td>I feel confident I will have enough money in retirement to provide a good</td>
<td>0-10 likert scale</td>
</tr>
<tr>
<td></td>
<td>standard of living</td>
<td></td>
</tr>
<tr>
<td>Funding Priority</td>
<td>Saving or investing to fund my retirement is a priority for me</td>
<td>0-10 likert scale</td>
</tr>
<tr>
<td>Budget</td>
<td>My living expense don't leave room for saving</td>
<td>0-10 likert scale</td>
</tr>
<tr>
<td>Estate Planning</td>
<td>1 = I think it is important to structure my affairs so as to leave a large</td>
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<td></td>
<td>proportion of the assets I will have/had on retirement as an estate even</td>
<td></td>
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<tr>
<td></td>
<td>if it means a lower income in retirement; 2 = I think it is important to</td>
<td></td>
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<tr>
<td></td>
<td>leave some, but not a large proportion of the assets I will have/had on</td>
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<tr>
<td></td>
<td>retirement as an estate, and I will structure my affairs to ensure this is</td>
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<td></td>
<td>the case; 3 = Leaving an estate is not important to me. I don’t/didn’t</td>
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<tr>
<td></td>
<td>intent to structure my affairs to ensure there are assets left over to go</td>
<td></td>
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<tr>
<td></td>
<td>into an estate</td>
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<tr>
<td>Financial Advice</td>
<td>Which one of the following statement best describes how you chose to</td>
<td></td>
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<tr>
<td></td>
<td>structure your finances to give you money to live on in retirement: 1= I</td>
<td></td>
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<tr>
<td></td>
<td>made the decision myself or with my partner and will not seek advice from</td>
<td></td>
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<tr>
<td></td>
<td>anywhere else; 2 = I got advice from one or two outside sources; 3 = I got</td>
<td></td>
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<tr>
<td></td>
<td>advice from a lot of sources; 4 = I am currently getting professional</td>
<td></td>
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<tr>
<td></td>
<td>financial advice</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1 = Male; 2 = Female</td>
<td>0/No; if category 2</td>
</tr>
<tr>
<td>Retirement Status</td>
<td>2 = Pre-retirees are where the main household income earner is</td>
<td></td>
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<tr>
<td></td>
<td>45 or over and is in paid employment for more than 25 hours a week; 3 =</td>
<td></td>
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<tr>
<td></td>
<td>Retirees are where in the last 5 years, the main household income earner</td>
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<tr>
<td></td>
<td>has either fully or partially retired from the paid workforce, and now</td>
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<tr>
<td></td>
<td>works less than 10 hours in paid employment per week and is over 55.</td>
<td></td>
</tr>
<tr>
<td>Household*</td>
<td>Which on of the following best describes your pre-tax</td>
<td></td>
</tr>
</tbody>
</table>

| 21 |
Income
household income from all sources? 1 = Less than A$20,000 per year; 2 = A$20,000 to A$30,000; 3 = A$31,000 to A$40,000; 4 = A$41,000 to A$50,000; 5 = A$51,000 to A$60,000; 6 = A$61,000 to A$70,000; 7 = A$71,000 to A$80,000; 8 = A$81,000 to A$90,000; 9 = A$91,000 to A$100,000; 10 = A$101,000 plus

Employment Status
Which of the following best describes your employment status: 1 = self employed; 2 = full time permanent employee (work 30 plus hours per week); 3 = full time casual employee (work 30 plus hours per week); 4 = part time permanent employee (work less than 30 hours per week); 5 = part time casual employee (work less than 30 hours per week); 6 = other

Full-time Employee
If category 2 or 3, full-time employee = 1; otherwise = 0

Self-employed
If category 1, self employed = 1; otherwise = 0

Other Employee
If category 4,5 or 6, other employee = 1; otherwise = 0

Contribution Saving Vehicle
Which of the following would be the one main way you are currently saving or investing for retirement: 1 = Employer contributions to superannuation; 2 = Your own contributions to an employer based superannuation plan; 3 = Other contributions via a personal superannuation fund; 4 = contributions to superannuation via a self managed superannuation fund; 2 = Your own contributions to an employer based superannuation plan; 3 = Other contributions via a personal superannuation fund; 4 = contributions to superannuation via a self managed superannuation fund; 5 = bank savings, including term deposits; 6 = investments in shares; 7 = investments in managed funds/life insurance company products; 8 = property investment; 9 = building your own business; 10 = collections of art, antiques and jewellery; 11 = Inheritance; 12 = anything else

Employer Superannuation
If category 1, employer superannuation = 1, otherwise = 0

Other Superannuation
If category 2, 3 or 4; other superannuation = 1, otherwise = 0

Other Savings
If category 5, 6, 7, 8, 9, 10, 11, or 12; other savings= 1, otherwise = 0

* Although in the logistic and multinomial models household income was split into low, medium and high categories, in SPSS if the variable is split into a 0,1,2 dummy variable scheme, there is insufficient data to have confidence in the coefficients. To examine ‘low’, ‘medium’, and ‘high’ income cases as three separate independent variables in the same regression causes multicollinearity. Hence, although the variable could theoretically be split into various groupings, for practical and intuitively because the survey treats any responses of household income above A$100,000 as one continuous response, it was decided to split incomes A$101,000 plus as ‘high’, and those below as low.