

Changes in subjective well-being with retirement: assessing savings adequacy*

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July 2012

Abstract

Does retirement represent a state of relative prosperity or unanticipated hardship? To assess whether individuals are successful in smoothing their well-being across the transition to retirement we analyse measures of subjective wellbeing (SWB) in the HILDA Survey. Specifically, this research examines retirees' current standard of living, financial security and overall happiness relative to their pre-retirement levels. It is found SWB either improves or remains constant for the large majority of individuals as they retire from the labour force. However, there are significant disparities in changes in well-being with retirement among the group of retirees. In particular, the subset of individuals who are forced to retire early due to job loss or their own health, and who find their income in retirement to be much less than expected, report marked declines in their SWB with retirement.

JEL classifications: J26, I31, D91.

Keywords: Retirement, Subjective Wellbeing, Welfare, Expectations.

***Acknowledgements:** This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either FaHCSIA or the Melbourne Institute. Funding from the Australian Research Council Grant LP077495 is gratefully acknowledged.

1 Introduction

Does retirement represent a state of unexpected prosperity or unanticipated hardship? Do individuals make adequate financial provisions for their retirement, and effectively smooth their well-being over this significant labour market transition? Answers to these questions are important for understanding the distribution of well-being at a point in time and over the lifecycle, and for assessing the performance of the national retirement income system. The concern for welfare smoothing and savings adequacy is heightened by population ageing, and has been the motivation for major policy initiatives by governments in many western economies over the past two decades.

Concern for ensuring a minimal level of well-being in retirement has been a primary objective of the Australian retirement income system since the introduction of the Age Pension in 1908. In more recent times, the Australian government has introduced policies to stimulate individuals' own provision for retirement through greater private savings. These policies range from the savings incentives created by the concessional tax treatment of superannuation contributions, subsidies for contributions by low income earners, and compulsory retirement savings mandated by the Superannuation Guarantee. Encouraging greater private provision for retirement remains a continuing concern of policymakers in Australia, as well as in many advanced industrial economies. Much of the policy debate in Australia, as in other economies, is premised on the belief that most households do not adequately anticipate their needs in retirement and do not make sufficient provision for retirement.

There are a number of possible reasons why households may fail to smooth their well-being across the working - retirement stage of the life-cycle. These include potential short-sighted consumption behaviour (households myopically over-consume pre-retirement) and a lack of long-term planning, misunderstanding of the resources required to maintain well-being in retirement, or erroneous information on likely needs (such as medical and care) at later stages of the lifecycle. There may also be institutional constraints - such as incomplete markets - where households do not have sufficient options to insure future, uncertain expenditure needs.¹ Concern for the effective smoothing of welfare across the working and retirement stages of the life-cycle is not unique to Australia, as this is an area of policy activism across almost all developed countries deal with the challenges of an ageing population.

In this study we assess the success of Australian households in smoothing their well-being across the transition into retirement. In doing so, we also provide an assessment

¹The concern for incomplete markets is less compelling in the case of smoothing consumption over the working-retirement transition. The optimal response of an agent to an anticipated income drop is to save more in the current period, which does not require perfectly functioning capital markets (in contrast to an income increase, where borrowing options may not be available).

of retirement savings adequacy based on individuals' ability to maintain their well-being from pre- to post-retirement periods. If an individual is saving 'adequately' then it is not possible to re-allocate their resources over time and make the individual better off. This definition of savings adequacy is based on the thought experiment of whether shifting an individual's resources from the present to the future will improve their lifetime well-being. This definition was applied by Alan, Atalay and Crossley (AAC) (2008) in assessing the adequacy of Canadian retirement savings. This conception of savings adequacy is based on the implications of the simple lifecycle model of consumer behaviour, where individuals act to maximize expected lifetime well-being, and will seek to smooth their expected well-being through time. Like AAC, we use individual reports of changes in subjective well-being pre- and post-retirement to assess the extent to which individuals successfully smooth their well-being over this stage of the lifecycle. The use of relative subjective well-being measures is a novel approach to assessing savings adequacy. Alternative studies have used a more mechanical approach, simulating the proposed income needs of households to fund expenditures in retirement, and comparing this to imputed income replacement from social security and private savings (e.g. Skinner 2007). The use of subjective well-being measures, especially relative measures comparing pre- and post-retirement periods for an individual, has the advantage of allowing for heterogeneity across individuals in their assessment of the welfare generated by a given set of resources, and eschews the need to model the intricate details of income, asset accumulation and expenditure paths.

This study also contributes to the rapidly growing economics literature which uses subjective well-being measures (SWB) to gauge individual welfare. The use of SWB data, which has its own merits and limitations, provides a useful complement to more traditional welfare concepts based on expenditure, income or wealth measures. The multiple SWB questions in the HILDA Survey capture distinct, though related, dimensions of individual welfare. Importantly, the *relative* SWB concepts which are the focus of this study are framed *relative* to pre-retirement levels of well-being. This alleviates the concern over individual heterogeneity in SWB scales - as the form of the questions effectively "differences out" individual variation in absolute levels of SWB.

It is important to emphasize that our analysis of welfare smoothing, and the related notion of savings adequacy, is not an assessment of whether individuals have an adequate level of resources to meet a minimal standard of well-being. An individual may succeed in smoothing their well-being, and save adequate resources to effect this smoothing, while their absolute level of well-being may be very low, even impoverished. Likewise, an individual may have access to an abundance of resources and achieve a comfortable level of well-being, while failing to equalize that well-being through time, which is consistent with inadequate savings. Our assessment of welfare smoothing is focused on individuals' success in equalizing

well-being pre- and post-retirement, rather than evaluating the absolute level of well-being.

The structure of the paper is as follows. In the following section the literature on consumption and welfare smoothing over retirement, and the intersection with SWB measures, is briefly reviewed. Section 3 presents a model of intertemporal choice which informs the empirical analysis. In section 4 key properties of the data are outlined, and descriptive statistics presented. In Section 5 the econometrics methods are outlined. Section 6 contains the presentation of the empirical results, and Section 7 concludes by drawing out the policy implications of the main findings.

2 Literature Review

In assessing changes in the well being of individuals as they move into retirement, economists have often analyzed the paths of expenditure and consumption at this point in the life-cycle and have sought to explain the observed fall in consumption at retirement. Browning and Crossley (2001) argue that the various changes that households experience at retirement contribute directly to decreasing spending (through, for example, the costs associated with going to work, or a smaller household size). Retirement is also associated with an increase in available time for non-market activities, such as home production, which may be a substitute for market expenditures. Aguiar and Hurst (2005) demonstrate that individuals are able to smooth consumption at retirement by spending more time searching out bargains and increasing time devoted to food preparation. Aguiar and Hurst (2005) find that caloric intake and food quality does not decline at retirement, despite a fall in food expenditures, due to an increase in home production. Smith (2006) explains this fall in consumption by an unanticipated wealth shock caused by involuntary retirement - as food spending decreases significantly only when retirement is involuntary. Similarly, Barrett and Brzozowski (2010) examine household food and grocery expenditures as individuals enter retirement using the HILDA Survey data, and find that the fall in spending is concentrated among individuals who retire unexpectedly early due to long term job loss or a major health shock.

Given the various changes that occur at retirement, including available resources (and expected future resources) as well as time use and health status, the use of SWB measures has been advocated by a number of economists as being able to provide useful information on the living standards of retirees. The use of SWB measures is rising in economics, as highlighted in the recent survey by Layard (2005), and there is support in the literature for their use as measures of welfare, as discussed in Kahneman and Krueger (2006). Dolan, Peasgood, and White (2008) provide a survey of SWB correlates that have been found in the literature; these include income, education, marital status, health, and unemployment, as well as a range of social capital and “community” indicators. The main concerns in using

SWB measures relate to potential biases in survey responses, and the interpersonal comparability of individual reports. For example, responses to SWB questions may depend on mood, personality traits, and the scales applied in a particular survey. There is also a concern for habituation or ‘hedonic adaptation’ - whereby the longer an individual experiences a state of well-being, the more he/she adapts to that state and responds with ‘normal’ levels of well-being - which implies that long-term shocks to welfare may only have transitory impacts on reported SWB. In terms of measuring SWB, Frey and Stutzer (2002) stress that SWB data should be treated ordinally, thus not comparing levels in an absolute sense. Di Tella and MacCulloch (2006) further emphasize the value of longitudinal data for individuals combined with panel data methods which allow for individual differences in the ordinal scale of SWB responses.

There are several recent studies that consider SWB in retirement. Charles (2002) finds a positive correlation between retirement and SWB in the US when discontinuous retirement incentives and social security eligibility rules are used to allow for an exogenous retirement effect. Baker, Gruber, and Milligan (2009) find that income security programs in Canada increase income and decrease poverty among retirees, though find no conclusive evidence on SWB impacts. Similarly, Panis (2003) does not find a correlation between social security benefits and life satisfaction, but does find that those who finance more consumption in retirement from pension annuities are more satisfied. AAC (2008) find that most Canadian retirees report enjoying life more in retirement and being at least as satisfied with their finances in retirement compared to the year before they retired. Involuntary retirement, especially in conjunction with bad health, is found to have the strongest negative effect on life satisfaction. Bender (2004) uses the US Health and Retirement Study to analyse the determinants of overall well-being of retirees and also finds involuntary or ‘forced’ retirement to be the strongest predictor of low well-being among retirees. Using the same data, Rohwedder (2006) finds that bad health, as well as deteriorating health, has the most significant negative effect on satisfaction in retirement, and also identifies social isolation as important in lowering satisfaction among retirees.

3 Economic Framework

The framework for structuring the empirical analysis and interpreting the results is the canonical model of intertemporal consumer choice.² Individuals choose consumption (c_t) to maximize the value functional

$$v(A_t, w_t) = \max U(c_t, \mathbf{x}_t) + \rho \mathbf{E} [v(A_{t+1}, w_{t+1})] \quad (1)$$

²For a more detailed exposition see Deaton (1992) or Adda and Cooper (2003).

subject to the budget constraint

$$A_{t+1} = (1 + r)A_t + n_t + w_t - c_t \quad (2)$$

where \mathbf{x}_t is a set of exogenous characteristics, ρ is the consumer's discount rate, A_t is total wealth, r is the interest rate, n_t is non-labour income and w_t is labour income which is stochastic, due to shocks facing the individual. In this formulation, there is a positive probability that $w_t = 0$ (for example, due to forced retirement) and the budget constraint is therefore a stochastic constraint which holds with probability 1. Solving for the first order conditions gives

$$\begin{aligned} U_c(c_t, \mathbf{x}_t) &= \lambda_t \\ \lambda_t &= \rho \mathbf{E}_t [\lambda_{t+1}(1 + r)] \end{aligned} \quad (3)$$

which are expressions for the marginal utility of consumption and the marginal utility of wealth, represented by the multiplier λ_t . These conditions imply $U_c(c_t, \mathbf{x}_t) = \rho \mathbf{E}_t [\lambda_{t+1}(1 + r)]$ - the Euler equation of the permanent income model - which is the result that optimizing individuals allocate consumption over time periods to equate the marginal utility of consumption to the discounted expected marginal utility of wealth. The marginal utility of wealth will include the effect of retirement to the extent it is anticipated. This simplified model generates the classic prediction that optimising individuals will act to maximize expected utility and, by implication, equalize the discounted expected marginal utility of wealth across time. Placing more structure on preferences by assuming quadratic utility, and if the personal discount rate is equal to the inverse of the interest rate ($\rho = (1 + r)^{-1}$), results in the stronger prediction that $c_t = \mathbf{E}_t c_{t+1}$: that households smooth the expected level of consumption through time. In turn, this tightly specified model generates the prediction that first-differences in consumption will be a martingale process; that changes in consumption will not be correlated with contemporaneous changes in income that are known in advance, such as planned retirement.

Our approach in this paper is to use SWB measures to represent $U(c_t, \mathbf{x}_t)$ to assess whether individuals make appropriate saving choices (or allocation of the $\{A_\tau\}$ sequence through time) in smoothing their consumption and maximizing their welfare. This approach eschews the need to model the sequence of $\{c_t, A_t\}$ choices with attendant measurement issues. In the analysis we examine direct reports of SWB, and relative SWB, which offers a parsimonious alternative for assessing the success of individuals in smoothing their well-being through time.

4 Data and Sample Construction

The HILDA Survey has tracked approximately 7,000 Australian households, comprised of over 13,000 individuals, through time beginning with the first wave collected in 2001. Individuals within the same household are linked within a wave, and individuals are tracked across waves. Each wave of the HILDA Survey contains a module of questions focused on a specific topic, with the topics generally repeated on a four-year cycle. In waves three (2003) and seven (2007) the special module focused on retirement plans and experiences. The analysis focuses mainly on responses to questions in the 2007 retirement module. Key questions on retirement experiences were asked only of persons aged 45 years or older who had completely retired from the labour force and worked at some point since 1990 (i.e. individual who made the transition from employment to retirement during the previous 17 years). These restrictions resulted in a sample of 1344 individual retirees drawn from 1074 households.

Information provided from respondents to the Retirement Module in 2007 is supplemented by information drawn from earlier waves of the HILDA survey. The dependent variables in the analysis are drawn from a series of questions asked of retirees based on self-reported current well-being *relative* to their pre-retirement well-being. In particular, the set of questions analyzed in this study are from the Continuing Person Questionnaire which asks:

Would you say the following are better or worse since you retired:

- i) Your standard of living?
- ii) Your financial security?
- iii) Your overall happiness?

The response categories are {1=much worse, 2=worse, 3=same, 4=better, 5=much better.} To restrict attention to the purely ordinal information, the responses are grouped into the three possibilities of (*worse, same, better*). In doing so, we do not distinguish between degrees of deterioration (much worse, worse) or improvement (better, much better), and thereby avoid imposing interpersonal cardinality on the magnitude of changes in the well-being.³

It is useful to consider the notion of well-being underlying each of these SWB questions. The standard of living is related to material well-being and is likely to be strongly influenced by economic factors, such as consumption activities. Financial security is more narrowly

³We explored the sensitivity of the results to this decision and find little information is lost, which is unsurprising given the low incidence of responses in the extreme categories.

focused on a financial domain, relating to access to monetary or liquid resources. Security refers to confidence, certainty or surety of access to such resources. Financial security may be seen as one component or dimension of an individual’s standard of living. Further, the third concept of SWB considered - overall happiness - is a broad, global conception of well-being. The domain of happiness aggregates material living standards and interpersonal and social relations, and has been interpreted by some researchers as equivalent to utility. Indeed, Easterlin (2005: 29) argues that “the terms well-being, utility, happiness, life satisfaction, and welfare [are] interchangeable.” The three domains of well-being underlying the questions on SWB may therefore be ordered with financial security \subset standard of living \subset overall happiness.

As part of the sensitivity analysis, we examine how closely changes in SWB as captured by these measures correspond to observed changes in disposable income. Income is a more traditional economic measure of individual welfare, and we consider the correlation of the relative SWB responses with reported changes in disposable income for the subset of individuals who retire during the observation period of the HILDA Survey. In brief, we find that although the three SWB measures are mutually consistent, income changes over the retirement transition are not systematically related to any of the SWB measures.

An important feature of these three SWB questions is that they are explicitly asked as *relative* to pre-retirement levels of well-being. This framing of the questions is important as it removes individual heterogeneity in the scale used in assessing own well-being. In essence, this framing of the questions differences out individual-specific differences in the cardinal scale used to assess own subjective well-being. This framing of the questions elicits ordinal information on the *direction of change* in SWB with retirement which is comparable across individuals.

A strength of the HILDA Survey data is the rich set of individual and family characteristics of respondents that is recorded. The explanatory variables used in the analysis include the respondent’s age, gender, social marital status, educational attainment, housing tenure and location. In addition, years spent in retirement is controlled for, which we also use to assess the possibility of adaptation bias in reports of relative SWB. However, we note adaptation is less likely to be an issue with the relative SWB measures used in this study, as opposed to the more commonly used absolute measures of SWB such as life satisfaction, given the pre-retirement anchor point in the framing of the relative SWB measures.

Additional explanatory variables used in the analysis include the reason for retirement, an indicator of whether retirement was voluntary or forced, and indicators of the degree to which expectations of income in retirement were met; these latter covariates may be interpreted as indicators of the realization of an expectations error regarding retirement income. We also control for self-reported change in retirees’ health since retiring, with the

categories ranging from health being perceived as “worse”, “the same” or “better” since retiring. The intertemporal changes measured by these variables aligns with the pre- and post-retirement comparison explicit in the relative SWB measures analyzed.

Descriptive statistics for the sample are presented in Table 1. The average age of respondents is 67 years, slightly less than half of the respondents are female and over 70 percent are partnered. Over 85 percent of the respondents are home owners, reflecting the high incidence of home ownership in Australia generally, which is also more prevalent over older ages.

Respondents to the retirement module had been retired for 7.4 years on average, which given an average of 67 years implies an average age at retirement of approximately 59.5 years. The more common reasons for retirement relate to own health (25.5%), work stress (12.7%) and job loss (12.4%), along with being financially able (16.1%) and wanting to spend more leisure time (14.7%). These reasons for retirement reflect varying degrees to which respondents were able to choose to exit the labour force or were constrained by (possibly unanticipated) events such as an adverse health shock or job loss. To reflect whether respondents felt they had discretion in timing their retirement, individuals were asked whether retirement was voluntary or forced, with almost two-thirds indicating that retirement was voluntary.⁴

A large majority of retirees report that their well-being in retirement is the same or better than that experienced prior to retirement. Specifically when comparing their current standard of living to that prior to retirement, 19% indicate it is now worse, 56% state it is the same and 25% indicate it is better. In regards to the more narrowly defined concept of financial security, a significant and larger fraction of retirees feel this is worse relative to pre-retirement (27%), half feel it is the same, while a smaller fraction report financial security to have improved (23%). Turning to the broadest measure of subjective wellbeing considered - overall happiness - the sample proportions more strongly highlight that retirement is not associated with a deterioration in well-being. Over 60% of retirees report that their overall happiness is better in retirement, one-third indicate overall happiness to be the same, and 7% indicate that overall happiness has declined with retirement. The sample averages indicate that although some households may experience a decline in their standard of living and financial security, their overall happiness does not decline (and even improves) with retirement. This is consistent with factors such as the increase in leisure time, home production and family and social networking activities, contributing to stable or improving sense of wellbeing with retirement. The descriptive statistics suggest that for a

⁴Approximately 11 percent of respondents indicated retirement was partly voluntary / partly forced. In all the models estimated and presented below, this groups was not significantly different from the fully voluntary set of respondents.

very large majority of Australians, retirement is not associated with a marked deterioration in their overall level of well-being, which in turn implies that the large majority of Australian retirees effectively smoothed their well-being across this important labour market transition. Consistent with success in smoothing welfare, the raw data suggest most retirees saved adequately for their retirement.

Table 2 presents a breakdown of the sample according to the responses to the relative well-being questions. The cross-tabulations provide a guide to the important correlates of the reported changes in SWB with retirement. The first three columns report the sample proportion according to the change in standard of living. Comparing across the columns, the set of respondents who experience a worse standard of living, compared to those who experience no change or an improvement, tend to be younger and have been retired longer (hence retired at a younger age), marginally more likely to be female and substantially more likely to be single, and not a home-owner. There is a not a strong difference across the levels of educational attainment, although those who report a worsening of their standard of living with retirement are more likely to not have completed high school to year 12, and have a lower incidence of completing a degree or higher qualification. Further, this group of retirees are more likely to have retired due to reasons related to their own health or job loss, rather than due to their financial ability or wanting to spend more leisure time. Consistent with these reasons, the group experiencing a worsening of their standard of living strongly indicate (69%) that retirement was forced, compared to those who report no change (44%) or an improvement (32%) in the standard of living.

Comparing across the columns of Table 2 for the relative financial security and overall happiness, outcomes generally reflect the patterns outlined for the relative standard of living. The small, though significant, minority who report a worsening of their well-being with retirement tend to be younger, retired earlier in life, are single and do not own their own home, have lower education and were forced to retire due largely to their poor health or job loss. This set of retirees indicate, *ex-post*, that they were not successful in smoothing their well-being over the transition to retirement. Even for this group, this possible failure to successfully smooth may reflect the arrival of a large, unanticipated shock - such as a major health event - which precipitated labour force exit, rather than an *ex ante* failure to plan ahead.

The next step of the analysis is to use multivariate methods to control for multiple factors simultaneously in determining changes in SWB. This is necessary for disentangling the influence of alternative factors potentially related to the relative SWB outcomes.

5 Methods

5.1 Ordered Response Model

The empirical analysis is based on the well-known ordered probit estimator. Let the latent change in well-being following retirement, ΔSWB_i^* , be a function of individual determinants \mathbf{x}'_i and an idiosyncratic error term e_i :

$$\Delta SWB_i^* = \mathbf{x}'_i \beta + e_i \quad (4)$$

where β are parameters to be estimated. Although the actual ΔSWB_i^* is not observed, individuals report ΔSWB_i which indicates that ΔSWB_i^* falls into one of 3 rank ordered categories $\Delta SWB_i^* \in \{\text{worse} \prec \text{same} \prec \text{better}\}$ or, without loss generality, $\Delta SWB_i \in \{1, 2, 3\}$. Hence

$$\Delta SWB_i = \begin{cases} 1 & \text{if } \Delta SWB_i^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < \Delta SWB_i^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < \Delta SWB_i^* \end{cases} \quad (5)$$

where $\{\mu_1, \mu_2\}$ partition the ΔSWB^* scale into three segments. Assuming the distribution of the idiosyncratic error term e_i is standard normal:

$$\begin{aligned} \Pr(\Delta SWB_i = 1) &= \Pr(\Delta SWB_i^* \leq \mu_1) = \Phi(\mu_1 - \mathbf{x}'_i \beta) \\ \Pr(\Delta SWB_i = 2) &= \Pr(\mu_1 < \Delta SWB_i^* \leq \mu_2) = \Phi(\mu_2 - \mathbf{x}'_i \beta) - \Phi(\mu_1 - \mathbf{x}'_i \beta) \\ \Pr(\Delta SWB_i = 3) &= \Pr(\Delta SWB_i^* < \mu_2) = 1 - \Phi(\mu_2 - \mathbf{x}'_i \beta) \end{aligned} \quad (6)$$

where Φ is the standard normal CDF. The parameters of the model $\{\beta, \mu_1, \mu_2\}$ are estimated by maximum likelihood methods. A property of the model is that the sign of β_j reveals whether the latent change in subjective wellbeing is increasing with the covariate x_j ($\beta_j > 0$), implying a positive change in the probability that subjective well-being increased (and lowering the probability the change was for the worse). As the magnitude of the coefficient is not directly interpretable, in order to gauge the economic significance of the magnitude of the covariate effect, the marginal effect of a change in \mathbf{x}_i on the probability of each potential outcome is presented.

The analysis considers three measures of relative subjective well-being: the standard of living, financial security and overall happiness. The three outcomes form a trivariate ordered probit system with latent error $\mathbf{e} \sim \mathbf{N}(0, \Sigma)$. The system is estimated using full information maximum likelihood (FIML) methods. The FIML estimator for the trivariate ordered probit model is presented in Appendix 1. The log-likelihood function is globally concave in the unknown parameters, and maximisation routine based on the Berndt-Hall-Hausman algorithm quickly locates the unique maximum (the asymptotic standard errors are based on the inverse of the Hessian estimated by the outer product of the gradient

vector). The FIML estimator recovers all the parameters of the system, including the full correlation matrix for the latent error terms $\Sigma = \begin{bmatrix} 1 & & \\ \sigma_{21} & 1 & \\ \sigma_{31} & \sigma_{32} & 1 \end{bmatrix}$. The correlation terms reveal the strength of the linear relationship among the latent factors influencing the different measures of well-being, and can be used to test whether the outcomes are orthogonal.

The HILDA Survey is based on a household sample frame, the 1344 retired respondents are drawn from 1074 families, with 270 families contributing two individual-level observations. The responses from individuals within families are likely to be correlated, and the clustering of observations at the level of household is taken into account in the estimation and inference procedures.

6 Empirical Results

6.1 Reliability and Comparability of the Relative Subjective Well-being Measures

The reliability and time consistency of SWB measures is an important issue in understanding the time pattern of SWB (Pudney, 2011). Before examining the determinants of relative SWB of retirees, we use the panel structure of the HILDA Survey to assess the reliability of the relative SWB measures with changes in contemporaneous reports of SWB over the retirement transition. In particular, we perform two tests with the relative SWB measures used in this study. First, we assess the reliability of the relative SWB measures by considering the subsample of individuals who were retired in both waves in which the relative SWB questions were asked; waves 3 and 7. For this subsample, we compare the change in reported relative SWB with changes in individuals' responses to the contemporaneous SWB questions on life satisfaction and financial satisfaction, as well as disposable income, between the two waves. For this group, changes in relative SWB over time should reflect changes in current circumstances if individual reports are reliable over time. To see this, the relative SWB measure ΔSWB_i^t reported at time t captures $SWB_i^t - SWB_i^{preR}$, where SWB_i^t denote the absolute level of well-being and *preR* refer to the pre-retirement period. That is, ΔSWB_i^t corresponds to the difference in SWB today and SWB pre-retirement. With the wave 3 and wave 7 modules, we have ΔSWB_i^{03} and ΔSWB_i^{07} , respectively. For the set of respondents retired in both waves, the change in ΔSWB_i^t over time is given by:

$$\begin{aligned} \Delta(\Delta SWB_i^t) &= \Delta SWB_i^{07} - \Delta SWB_i^{03} \\ &= (SWB_i^{07} - SWB_i^{preR}) - (SWB_i^{03} - SWB_i^{preR}) \\ &= SWB_i^{07} - SWB_i^{03} \end{aligned}$$

As long as individuals are consistent in their assessment of pre-retirement SWB, for the group of continuously retired respondents reported changes in relative SWB between waves 3 and 7 should reflect changes in contemporaneous SWB between those two points in time.

The results of the first series of tests of the reliability of the relative SWB measures are presented in Table 3, panel (a). For each relative subject well-being measure we estimated three separate ordered probit models. Each model included a single explanatory variable. For example, the first cell in the first row of Table 3 (a) reports the results for the univariate ordered probit regression of ΔSoL_i on $(LifeSatisfaction_i^{07} - LifeSatisfaction_i^{03})$. Reading across the row indicates that contemporaneous changes in life satisfaction are not related to changes in relative Standard of Living or relative Financial Security but are significantly, and strongly, related to relative Overall Happiness. Further results in the panel show that the change in relative standard of living and relative financial security are significantly positively correlated with changes in the contemporaneously reported financial satisfaction. The change in relative overall happiness from wave 3 to wave 7 is also significantly positively correlated with changes in contemporaneous changes in financial satisfaction, though this is not as strong as the correlation with changes in life satisfaction. This series of estimates demonstrates the reliability of the relative SWB responses - as changes in relative SWB are systematically and consistently aligned with changes in contemporaneous reports of SWB for this subsample of respondents. The pattern of results also accords with individuals' interpreting standard of living and financial security as referring to the domain of material wellbeing, and overall happiness as more encompassing and including both financial and life satisfaction.

For the second series of tests, we considered the subsample of individuals who retired during the observation period of the HILDA Survey. Specifically, we took the subsample of individuals working in wave 3 but retired in wave 7 (thereby answering the relative SWB questions in wave 7) to determine whether the reported relative SWB measures aligned with individuals' contemporaneous reports of absolute SWB pre- and post-retirement. That is, using the subsample of retirees who make the transition into retirement during the observation period of the survey, we assess whether the change in contemporaneous reports of financial satisfaction are aligned with the response to the relative financial security question post-retirement. Similarly, we assess whether contemporaneous reports of life satisfaction are consistent with the response to the relative Overall Happiness question. Results of the statistical tests are present in Table 3, panel (b). The results show that changes in contemporaneous reports of life satisfaction and financial satisfaction are significantly correlated with the stated relative standard of living. Reported relative financial security is significantly related to changes in contemporaneously reported financial satisfaction, and the reported change in overall happiness is correlated with changes in contemporaneous

reports of life satisfaction. Thus, the retrospective SWB measures are longitudinally consistent with the changes across the retirement transition for the subsample of respondents we observe retiring, supporting the reliability of the relative SWB measures. This comparison of relative SWB responses with changes in contemporaneous reports of absolute SWB over time further supports the validity of the relative SWB measures. In the following analysis, the two subsamples are combined to assess the determinants of relative SWB in detail. Further, in both experiments, changes in contemporaneous reports of the level of disposable income were found to be uncorrelated with the relative SWB responses, highlighting that current income is a limited summary measure of well-being.

6.2 Standard of Living

Table 4 reports the results of the ordered probit model for retirees' standard of living now relative to that prior to retirement. The model estimates in column (1) control for basic demographic characteristics. The age profile estimates indicate that retirees in the youngest age group, 45-54 years of age, tend to experience a decline in the standard of living with retirement, there is no significant difference for retirees aged 55-74 years, while older retirees are more likely to report an improvement. Individuals who have been retired for 5 years or more are not significantly more (or less) likely to report a change in their standard of living with retirement.⁵ The insignificance of the years retired variable suggests that 'habituation' - or adaptation to the current state the longer one has spent in the state (which implies a positive coefficient point estimate) - is unlikely to be a major influence on the results. Given the cross-sectional variation in these variables, it is not possible to determine whether the pattern by age primarily reflects birth cohort differences or age-at-retirement effects.

Additional estimates from model (1) indicate that partnered retirees are significantly more likely to report an improvement in their standard of living with retirement, which is consistent with complementarity in leisure time and home production activities. Residents outside the major cities - in rural areas - are also significantly more likely to report an improvement in their standard of living with retirement. This may reflect factors such as differential changes in cost of living between urban and rural areas, differences in the amenities available for leisure time activities or systematic differences in social networks by location. There is no significant pattern of differences in relative standard of living across educational categories. Home ownership is associated with a significantly higher probability of a positive change in relative standard of living, with a magnitude comparable to that of being partnered, which may reflect a wealth effect and the availability of resources to smooth well-being across the retirement transition.

⁵A number of alternative specifications of the years retired effect - including a polynomial in years retired - were also statistically insignificant.

In model (2) a set of categorical variables indicating the detailed reasons for retirement were added to the specification. As a group, these variables are highly jointly significant. The omitted category is “retired because financially able” - and represents the comparison group for the impact of the alternative reasons for retirement. A number of important effects are apparent. First, a number of reasons for retirement are not statistically different from ‘financial ability.’ These reasons include work stress, the health of other family members, partner retired and wanting to spend more leisure time. These reasons are found to be equivalent to having the financial ability to retire, which implies that the exercise of these choices to retire are premised on having the financial capacity to do so. Second, both own health and job loss reasons are associated with significant and large reductions in the probability of a positive change in the standard of living with retirement. Both of these factors are consistent with a substantial contraction in the opportunity set of individuals. To the extent that the events associated with job loss and a major decline in own health are unanticipated, these are consistent with a significant reduction in expected lifetime wealth in terms of the lifecycle model. Retiring due to pension eligibility (access to public income support) and partner’s health are also associated with a lower probability of a positive change (and higher probability of a worsening) in relative standard of living - though of a smaller magnitude than the effects of own health or job loss reasons.

The pattern of the effects of different reasons for retirement on changes in relative standard of living are consistent with varying degrees to which retirement occurred at the individual’s discretion. At one end of the spectrum is having the financial means to exercise that discretion, to the opposite end of the spectrum where retirement was effectively imposed due to a health-related incapacity or an unexpected contraction in job opportunities. That is, cutting across the different reasons for retirement is the degree to which labour market exit was ‘voluntary’ or whether it was involuntary or ‘forced’ due to external circumstances. In model (3) the binary variable indicating whether retirement was forced was added to the specification. As shown in Table 4, the coefficient is highly statistically significant. Including this variable appreciably reduced the magnitudes of the coefficients on the separate reasons for retirement. The proportional decline in the magnitude of the coefficient estimates was greater for the own health and job loss reasons indicators, although these coefficients remained statistically significant (along with reasons due to pension eligibility and partner’s health). Inclusion of the forced retirement indicator also resulted in the set of age indicators no longer being statistically significant. From this, it can be concluded that the age pattern found in model (1) reflected differences in the incidence of forced retirement by age - with those retiring at the youngest ages more likely to have been forced to retire, rather than retiring at their own discretion and with the financial capacity to do so.

Model (4) represents the most comprehensive model specification. This model included

additional controls for whether expectations regarding income in retirement were realized, and for changes in individuals' own health pre- and post-retirement. The HILDA retirement module included questions on whether the retiree's income is more or less than the individual had expected for retirement. This information is a direct indicator of whether the individual's expectations were realized - and if, not, the direction and relative magnitude of the 'income shock' associated with retirement. A separate, though potentially related, factor is the change in the individual's own health before and after retirement. This is likely to be related to being forced to retire due to health related reasons. As evident from Table 4, these two sets of explanatory variables are both highly statistically significant. Including the indicators of income expectations errors and own health shocks reduced the magnitude of the coefficient estimates for the health reasons for retirement (which are no longer statistically significant). Indeed, the only reason for retirement that remains statistically significant is job loss - which represents a shock over and above that captured by the controls for the income expectation error and forced retirement. Interestingly, inclusion of these two sets of controls led to the reduction in the magnitude of the coefficient on the home ownership variable - which is no longer statistically significant; the home ownership variable is essentially a proxy for household wealth and this pattern of results suggests that home ownership may represent a form of self-insurance (or is a proxy thereof) for unanticipated wealth shocks at retirement.

The coefficient estimates from the ordered probit model are not directly interpretable. To better gauge the economic magnitude of the effect of covariates on the smoothing of standard of living outcomes with retirement, the marginal effects calculated from model (4) are presented in Table 4. The important patterns include the magnitude of the effect of retiring due to loss job, and being forced to retire (combined, being forced to retire due to job loss is associated with a 15 percentage point reduction in the likelihood of reporting a better standard of living). Further, there is a large and significant difference across the income expectations error categories: retirees who report that income is much less than expected in retirement compared to those who report it is much more, are, other things equal, 40 percentage points more likely to report a decline, and 45 percentage points less likely to report an improvement, in their standard of living with retirement. The magnitude of the marginal effect of changes in own health since prior to retiring is also economically significant.

6.3 Financial Security

The next set of estimation results are for changes in financial security since retiring. As discussed above, financial security is a more narrowly defined concept of well-being, as it relates specifically to the domain of finances and may be considered as an input for achieving

a desired standard of living, and the notion of risk or assurance in that domain. Table 5 presents the ordered probit model estimates. Results from two model specifications are presented, which correspond to the most parsimonious and comprehensive specifications considered for relative standard of living. Model (1), with main demographics included, indicates improved financial security following retirement is associated with being partnered and being a home-owner. Having a partner is associated with greater family earnings capacity, and greater lifetime wealth, while home ownership is also proxy for family wealth security. Comparing across age groups, retirees who are particularly young (45-54 years of age) are less likely to report an improvement in financial security with retirement, while retirees aged 75-79 years are more likely to report an improvement. The negative relationship between the change in financial security and age for the younger retirees may be a result of the fact that those who retire at a younger age are more financially fragile and face a more uncertain future than individuals who retire at older ages. The coefficient on having been retired for five or more years is also insignificant for relative financial security, suggesting adaptation bias is unlikely to be prevalent with this relative measure of well-being.

The second set of model estimates, and associated marginal effects, are presented in Table 5. In addition to the socioeconomic and demographic variables, this model includes controls for the reasons for retirement, whether retirement was forced (or voluntary), whether there was an error in expectations concerning income in retirement, and for changes in own health since retirement. Interestingly, the magnitude and significance of both partnership status and homeowner status found in model (1) are substantially reduced once these controls are added to the model. There is substantial variation across retirees in terms of their financial security relative to pre-retirement according to the reason for retirement. Relative to retiring because of financial ability, those who retired because of job loss are much more likely to report a worsening of their financial security. Retiring because of own health, pension eligibility or job stress are also with a greater probability of worsening of financial security (and lower probability of improved financial security) with retirement, though not to the same magnitude as the effect of job loss. Forced retirement is also associated with a deterioration in financial security following retirement. The inclusion of this variable did not fully mitigate the effects of the differing reasons for retirement, as found for the relative standard of living outcome.

Not surprisingly, the controls for errors in income expectations for retirement and changes in own health were highly economically significant in explaining relative financial security. The impact of these factors on financial security is more pronounced than their effects on standard of living (in terms of the predicted variation across the three states of the outcome variables). This pattern of results seems reasonable and can be readily rationalized in terms of the lifecycle model of intertemporal choice. On average, individuals are forward looking

and make plans to smooth well-being through time and into retirement. The majority of households are successful in maintaining their standard of living into retirement. However, individuals face uncertainty and, when bad health and job shocks are realized forced retirement is more likely and realized income in retirement is less than that previously expected. These wealth shocks translate into reduced financial security for some in retirement, and for a subset without effective insurance, a reduction in their material well-being in retirement. In the following section, how these outcomes in turn translate into overall happiness is assessed.

6.4 Overall Happiness

Of the three outcome measures examined, overall happiness is the broadest for assessing welfare smoothing and savings adequacy. This concept of subjective well-being incorporates economic or material well-being, as well as interpersonal, community and social domains. It is useful to assess how successful retirees are at smoothing overall happiness across pre- and post-retirement stages of the lifecycle, and the impact of the economic factors on that success. The model estimates for relative overall happiness in retirement are presented in Table 6. In model (1) there is not a strong pattern by age, apart from the negative effect of being in the youngest age group of retirees.

Estimates and marginal effects for the most comprehensive model specification are presented in the remaining panels of Table 6. With the full set of controls, there is no significant variation across the age groupings of retirees. However, other things equal, overall happiness is more likely to be reported as having improved the longer individuals have been retired. This effect may reflect a true increase in overall happiness as individuals have greater experience being retired or this may be a reflection of adaptation bias. These two hypotheses are observationally equivalent, and cannot be distinguished, with the variation used in this estimation.

In terms of the reasons for retirement, for relative happiness the health factors - both own health and partners health - are more important than that found for the other SWB outcomes considered. Job loss continues to have a negative effect on the likelihood of successfully smoothing well-being over the retirement transition, though it is not as pronounced as found for the other, economic outcomes. Likewise, being forced to retire is associated with a significantly lower probability of reporting greater happiness in retirement relative to pre-retirement, though the magnitude of this effect is more muted compared to its effect on the relative standard of living. Similarly, the indicators of the retirement income expectations error remain significant and important in explaining the smoothness of overall happiness across retirement. However the stronger factor in terms of explaining variation in individuals' effectiveness in maintaining, or improving, happiness into retirement is changes

in own health over the same period. For example, holding the other observed factors constant, an individual who reported their health is now worse compared to pre-retirement, is 38 percentage points less likely to report an improvement (and 11 percentage points more likely to report a decline) in overall happiness with retirement than someone who reported an improvement in their health. Clearly, the health-related factors are more strongly related to the broader concept of overall well-being than the concepts related to more narrowly defined economic and financial domains.

6.5 Error covariance structure

A final component of the estimation is the correlation structure among the latent factors determining relative standard of living, financial security and overall happiness. Estimating the trivariate ordered probit model as a system, using the comprehensive specification for each factor, gave the estimated correlations presented in Table 7. Several important results are apparent. First, even after conditioning on the large set of observed variables in the most comprehensive model specification, the latent SWB factors are clearly related. The null hypothesis that the three domains of subjective well-being are independent (condition on the observed covariates) is strongly rejected at conventional levels of statistical significance. Second, financial security is strongly related to an individual's standard of living but only weakly related to overall happiness. This makes intuitive sense in that financial security is a more narrowly defined concept, representing one input into an individual's material standard of living. Third, an individual's standard of living is a strong influence on their overall happiness; however, there are clearly other factors beyond this concept of material well-being which determine overall happiness for retirees.

7 Conclusion

We have used three different measures of subjective well-being to analyse how the welfare of Australians changes with retirement. The three measures provide different, but complementary, information on well-being - while the relative standard of living may provide the closest measure of the material resources available to retirees, compared to pre-retirement levels, relative financial security is an indicator of whether retirees perceive they have the resources to continue funding a steady stream of consumption into the future. Overall happiness is a measure that encompasses the first two measures, plus includes other factors that contribute to individuals' welfare that are not related to their financial position, such as family and other social relationships, community belonging, and health.

The empirical results accord with the differences in the domains of the subjective well-being measures. While around 19 percent of retirees feel that their standard of living is

worse since retiring, a larger fraction (27 percent) feel that their financial security is worse. On the other hand, over 60 percent of retirees feel that their overall happiness is higher in retirement, highlighting that many other factors which impact on one's happiness, besides finances and material well-being, do improve with retirement. The pattern of these findings is in line with those of AAC (2008), who find that among Canadian retirees, around 45 percent report that they enjoy life more compared to the year prior to retirement, while only one-fifth report being better off financially.

However, our paper is the first, to our knowledge, to systematically examine differences in the domains of the three relative SWB measures considered. The most important factors in explaining a deterioration in living standards with retirement are retiring due to job loss and being forced to retire, which together lead to a 15 percentage point reduction in the likelihood of an improved standard of living. Income expectation errors and own health shocks also significantly affect the relative standard of living, in the expected direction. The factors that lead to a decrease in financial security are similar to those for living standards; however, income expectation errors and health shocks have a stronger effect on relative financial security than on relative living standards. Finally, while job loss and being forced to retire also affect relative happiness in retirement, the magnitude of the effects are much lower than for financial security and living standards. On the other hand, own health and partner's health have a stronger effect on this outcome - confirming the greater breadth of this outcome measure. Moreover, while no ageing effects are found for the living standards and financial security measures, overall happiness is found to improve the longer individuals have been retired.

Further, this paper provides a novel methodological contribution by using the panel aspect of the data to test the reliability and comparability of the SWB measures. Based on two tests, using subsamples of individuals who retire during the survey and those who are retired throughout the survey, respectively, we show that the relative, retrospective measures of SWB that we have used are reliable and longitudinally consistent with contemporaneous reports of SWB. Given the increasing use of such measures in empirical research, we believe this to be an important result for future research and survey design.

Overall, it is apparent that most individuals do successfully smooth their standard of living, financial security and overall happiness across retirement, and do not reveal that opportunities exist to make them better by moving resources forward through time. Nevertheless there clearly exists a small but significant minority who do not succeed in smoothing their well-being. These individuals tend to be those who are not partnered or home owners, those who were forced to retire at younger ages due to own health reasons or job loss and whose income in retirement is much less than they had anticipated. This group experiences major shocks precipitating retirement and lack the insurance opportunities to overcome

these shocks. Again, these results accord with findings in the limited international literature. AAC (2008) report that involuntary retirement, particularly when associated with poor health is strongly correlated with a deterioration in financial satisfaction. In the UK, spending has been shown to fall only among men who retire involuntarily (Smith, 2006). In terms of policy, it appears that targeting assistance to individuals who are less successful in smoothing their well-being across the retirement stage of the life-cycle would be more effective than general policy measures affecting all households.

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