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Involuntary Retirement and the Resolution of the Retirement-Consumption Puzzle: Evidence from Australia

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SEDAP Research Paper No. 275

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Involuntary Retirement and the Resolution of the Retirement-Consumption Puzzle: Evidence from Australia*

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Involuntary Retirement and the Resolution of the Retirement-Consumption Puzzle: Evidence from Australia

Abstract
A substantial body of international research has shown that household expenditure on food and non-durables significantly decreases at the time of retirement – a finding that is inconsistent with the standard life-cycle model of consumption if retirement is an anticipated event. This fall in expenditure has become known as the 'retirement-consumption puzzle.' We analyze rich Australian panel data to assess the Australian evidence on the puzzle. We find strong evidence of a fall in expenditures on groceries, food consumed at home and outside meals with retirement. The observed decline in expenditure is explained by a subset of households experiencing an unanticipated wealth shock, such as a major health event or long-term job loss, at the time of retirement. This finding is corroborated by an analysis of alternative measures of household well-being, including indicators of financial hardship, and self-reported financial and life satisfaction. For the majority of households retirement is anticipated and there is no decline in economic welfare at retirement. However, for an important minority, retirement is 'involuntary' and these households experience a marked decline across all indicators of economic well-being.

JEL classifications: D91, I31, J26,
Keywords: Consumption Smoothing, Household Expenditure, Retirement.

Résumé

De nombreuses contributions scientifiques internationales ont montré que les dépenses des ménages en denrées alimentaires et autres biens non-durables diminuent de manière significative au moment du départ à la retraite ; une observation incompatible avec le modèle standard de cycle de vie de la consommation si la retraite est correctement anticipée. Cette baisse des dépenses est connue sous le nom de « puzzle de la consommation à la retraite ». Nous analysons une riche base de données longitudinale australienne afin de déterminer l'existence d'un tel « puzzle » en Australie. Nous trouvons des preuves solides que le départ à la retraite s'accompagne d'une baisse des dépenses ménagères, des aliments consommés à domicile et des repas pris à l'extérieur. La baisse observée des dépenses provient des ménages qui connaissent des chocs patrimoniaux imprévus, tel un problème majeur de santé ou une perte d'emploi à long terme, au moment du départ à la retraite. Cette observation est corroborée par d'autres mesures du bien-être des ménages comme les indicateurs de difficultés financières, et la satisfaction subjective des ressources financières et de la vie. Pour la majorité des ménages le départ à la retraite est planifié et ces derniers n'enregistrent pas de pertes de bien-être économique lors du départ à la retraite. Toutefois, pour une importante minorité, la retraite est «involontaire», et ces ménages connaissent une baisse marquée de tous les indicateurs de bien-être économique

1 INTRODUCTION

As increasing numbers of workers approach retirement, an issue of growing importance for public policy is whether households have sufficient savings to maintain their standard of living in retirement. A substantial body of research, based on data from a variety of countries and time periods, has demonstrated that household expenditure systematically decreases at the time of retirement. This finding is inconsistent with the simple life-cycle model of income and saving if retirement is an anticipated event. The sensitivity of expenditures to the timing of retirement has become known as the 'retirement-consumption puzzle.'

In this paper we assess the Australian evidence on the retirement-consumption puzzle using Household, Income and Labour Dynamics in Australia (HILDA) panel survey data for the period 2001-2007. The cross-sectional richness of HILDA, combined with the survey's longitudinal structure, allow us to consider multiple dimensions of the 'puzzle' by analyzing a broad range of alternative measures of household well-being. From the empirical analysis there is clear evidence of a fall in grocery and food expenditures with retirement. However, the fall in expenditures is explained by a subset of households forced to retire due to unforeseen circumstances, such as a major health shock or long-term job loss. Once we account for these factors, the retirement effect *per se* looses significance. This finding is corroborated across the array of alternative measures of household well-being examined. For example, retirement is associated with negative effects on household's ability to 'make ends meet' as measured by their ability to pay utility bills and their need to ask for financial help from welfare or community institutions. For these indicators the strong negative effects of unexpected early retirement are the driver of the apparent negative effect of retirement. The same pattern of results is found with self-reported financial satisfaction and life satisfaction. Finally, we account for changes in households' time use patterns following retirement, including time devoted to charitable work. We observe that retired households are more likely to engage in charitable activities compared to their working peers, though the propensity for volunteer activities is also negatively affected by unexpected retirement. Time devoted to other home production activities increases at retirement consistent with substitution away from market work with retirement, while smoothing broadly defined consumption.

The structure of the paper is as follows. In the following section the international literature on the retirement-consumption puzzle is reviewed and used to place this study in context. In section 3 key aspects of the HILDA Survey data are outlined, and in Section 4 the estimation framework is briefly described. In Section 5 the

empirical results are presented, and in Section 6 concluding comments are presented.

2 LITERATURE REVIEW

Standard life cycle theory of consumption, with fully functioning credit markers, predicts that a household's consumption profile should not be affected by predictable changes in income. One important, and substantial, change in income is retirement. According to the simple one-good life-cycle model, households will smooth their consumption over retirement through saving activities. If retirement is associated with a large, anticipated decline in income the optimal response of households is to save in prior periods. Since this policy response is unaffected by liquidity constraints, the behavior of consumption over the retirement threshold is seen a providing a strong test of the standard life-cycle model of consumption. However, the prediction of the model has been contradicted by many empirical studies that observed excess sensitivity of consumption to retirement; examples include the studies by Hamermesh (1984), Mariger (1987), Banks et al. (1998), Attanasio (1999), and Bernheim et al. (2001). The widely observed fall of consumption at retirement is commonly referred to as the 'retirement consumption puzzle.'

That total expenditure falls with retirement is not a contentious assertion. Whether this fall reflects a fall in consumption, and possibly reflects a failure by households to adequately "plan ahead," is more controversial. Recent work has attempted to reconcile this observation with the life-cycle models of intertemporal optimizing behavior.

2.1 Non-durable and Food Expenditures

Laitner and Silverman (2005) estimate a fall in total expenditure upon retirement of 16% based on repeated cross-sections of the United States Consumer Expenditure Survey (CEX). Using the same data source, Fisher et al. (2008) focus on non-durable expenditures and find less evidence of decline in spending at retirement. They observe that most of the decline in non-durable expenditure (between about 1 and 3%) is predominately accounted for by expenditure on food at home and away from home (8% and 16% respectively).

Aguiar and Hurst (2007) take a more detailed look at changes in expenditure components upon retirement. They look at finer non-durable expenditure components including entertainment, transportation, personal clothing and most notably charitable donations. They observe that while the fall in expenditure at retirement is evident at the mean of total non-durable expenditures, the changes to individual

components range widely. The expenditures that can be thought of as complementary to a working life style, such as clothing and transportation, fall while expenditures on purely leisure related commodities, for example entertainment and charitable giving, actually increase over peak retirement ages. However Aguiar and Hurst (2007) also find a fall in food expenditure that at the aggregate level exceeds the amount that could be attributed to a change in lifestyle. Food is the most basic necessity and changes in actual food consumption likely reflect changes in well being. Research on expenditure patterns during retirement based on data from other countries reveals similar conclusions. Banks et al. (1998) working with UK family expenditure survey (FES) data, and Miniaci et al. (2003) and Battistin et al. (2009) working with Italian data, document that the fall in total expenditure over the peak retirement age occurs primarily among food and work related expenditures

2.2 Distinction between Consumption and Expenditure

Food expenditure and consumption are not synonymous. Disaggregation of food expenditure, or even of actual consumption, into individual food categories may account for part of the consumption puzzle. Aguiar and Hurst (2005) analyze actual consumption data in which they observe nutritional intake by individuals. They find that the various quantity-based measures of consumption are not adversely affected by retirement, and therefore the fall in food expenditure does not result in a decline in either quantity or quality of food consumed. This results is rationalized by retired households contributing greater effort to food preparation. Retired household do not face the same opportunity cost of time as working households, and optimally devote more time to home production. Retirees thus spend more time on food preparation and on shopping for low-cost food items. Brzozowski and Lu (2010) replicate Aguiar and Hurst (2005) using Canadian data and their conclusions regarding nutrition and food production are in line with those of Aguiar and Hurst (2005) for the US.

2.3 The Role of Expectations

Whether retirement is anticipated, or unexpected, also plays a role in determining changes in expenditure. Hurd and Rohwedder (2003), Smith (2006) and Haider and Stephens (2007) all find that households forced to take early retirement due to an unforeseen shock, typically illness or job loss, experience substantially greater falls in expenditure than households which retire according to a long term plan. The importance of unforeseen shocks triggering retirement is further confirmed by Hurst (2008) who examined the 1992 wave of the United States Health and Retirement

Survey. When respondents are asked about changes in their standards of living after retirement, individuals who retired involuntarily are overrepresented among those who report a decrease in well being. Similarly, Alan et al. (2008) observe that Canadian households which retired involuntarily, especially due to health reasons, are much more likely to report dissatisfaction with their post-retirement financial situation than households who retired as planned.

Haider and Stephens (2007) also make an important methodological point. The expenditure regressions typically used in this literature, such as in Banks et al. (1998) and Aguiar and Hurst (2005), focus on the coefficient on the retirement indicator variable, where the latter is instrumented by age of the individual. This procedure recognizes that the timing of retirement can be correlated with unaccounted for events that affect the household's expenditure decisions. This instrumental variable strategy assumes retirement plans are a function of age (while expenditures *per se* are not). Haider and Stephens (2007) argue this practice is far from optimal, and propose using subjective retirement expectations as an instrumental variable. Their results suggest minimal changes in food expenditures with retirement. An alternative, though related, strategy is to use the information on reasons for retirement to construct a covariate indicating whether retirement is 'voluntary' or 'forced' by an unexpected contraction in the opportunity set. This strategy was adopted in Smith (2006) and is applied in this paper where we explicitly account for differences between the effects of expected and unexpected (or involuntary) early retirement. The indicator of involuntary retirement in essence captures a negative wealth shock at the point of retirement, signalling the households which need to adjust their optimal consumption path due to an expectations error.

The research presented in this paper addresses these key main themes in the literature. Using the HILDA survey data we examine non-durable expenditures; specifically groceries, and the sub-category of food purchased for consumption at home and expenditure on food purchased for consumption outside of home. We exploit the cross-sectional richness of the HILDA survey by examining a broad array of alternative indicators of well-being, which include indicators of financial hardship as well as subjective measures of life satisfaction and financial satisfaction. In addition, we consider broader concepts of consumption by analyzing time devoted to charitable work and other components of home production. Furthermore, the panel structure of the HILDA survey data allows us to control for additional forms of unobserved heterogeneity that may confound the observed impact of retirement on the economic well-being of households.

3 DATA AND SAMPLE CONSTRUCTION

The analysis focuses on the household expenditure items recorded in waves 1-7, which were collected between 2001 and 2007.[1] The HILDA Survey has tracked approximately 7,000 Australian households, comprising 13,000 individuals, through time since the first wave collected in 2001. The survey data consists of a number of linked household and persons files. Individuals within the same household are linked within a wave, and individuals are tracked across waves.

The analysis sample was constructed through a sequence of steps. First, a household 'reference' person was defined for each household in wave 1. The reference person was selected by applying the following criteria in order: (i) one partner of a couple (ii) lone parent (iii) single person (iv) the person with the lowest 'person number' on the household questionnaire.[2] The household reference person from wave 1 was tracked subsequent waves to create a longitudinal record for the household. As a series of key questions on reasons for retirement were only asked of persons aged 45 years and over, we restrict the sample to households where the reference person is aged 45 years or older in the initial wave. To minimize the impact of major demographic changes on expenditure patterns, we further restrict attention to the subset of stable households which remained intact over the first seven waves of the HILDA Survey. Those restrictions result in a sample of 1517 household observations.

Part of the analysis is performed using the subsample of households where the reference person was not retired in wave 1. This subsample of 770 households represents the set of households 'at risk' of retirement during the observation period. This subsample provides a clearer picture of expenditure changes at the time of retirement. A comparison of spending patterns by retirement status based on the full sample may reflect differences between households at distant points in their life cycles (for example, workers in their mid-40's relative to individuals in their late 70's who have been retired for over a decade). The 'at risk' sample allows us to track a more homogenous set of individuals as they make the retirement transition, which may more sharply highlight any discontinuity in spending at the time of the transition. For the 'at risk' sample we focus on the first year of the retirement experience, thereby forming an unbalanced panel of observations.

The key economic variables in the analysis are household expenditure on groceries, food purchased for consumption at home, and food purchased for consumption outside

[1] Wave 2 (2002) of HILDA did not collect household expenditure information.

[2] In the large majority of cases this method also selected the person who supplied most of the information recorded on the Household Questionaire, which recorded the expenditure information up to wave 5.

of the home. These items explicitly exclude spending on alcoholic beverages. The expenditure items correspond to usual spending over a week. Missing values for the expenditure items are imputed using regression methods. Each expenditure item is regressed on a series of indicator variables for the age of the household reference person, family type, number of children by age category, number of family members with chronic health conditions, indicators for location (state and regional or remote area), a quadratic in disposable income and retirement status, separately by year. The regressions are estimated using the sample of valid responses, and the estimates then used to generate predictions for observations with missing expenditure values. This imputation method is equivalent to assigning cell means to the missing values with the cells defined by the detailed set of explanatory variables in the regression.[3] Nominal expenditures and income were inflated to 2007 prices using the national consumer price index.[4]

The grocery and food expenditure items measured across waves 1-7 in HILDA have potential limitations. The expenditure information in the HILDA Survey is collected through recall questions rather than using diary methods as in some specialized expenditure surveys such as the Australian Bureau of Statistics Household Expenditure Survey (HES). One concern is that recall data may be less reliable than data collected through the diary method. Results vary as to the extent of any difference. Some studies find the differences to be minimal, for example Browning et al. (2003) provide a comparison of 'food at home' expenditure recorded using recall and diary methods across a variety of Canadian surveys. They find that the information collected through interview recall questions is closely aligned with the information obtained through diary methods. Another issue is that the set of grocery and food expenditures measured in HILDA is more narrow than the set of nondurable commodities usually employed in distributional studies based on specialized expenditure surveys. Such studies typically includes expenditure on household utilities, such as fuel and telephone bills, and transport services. However, Browning et al. (2003) found that 'food at home' expenditure proved to be very useful in inferring total household nondurable expenditures. Furthermore, since much on the retirement-consumption puzzle literature has focused on relatively narrow food or grocery bundles, it is instructive to work with a comparable expenditure concept from HILDA.

[3]The number of unique cells given by the set of discrete explanatory variables alone is $23,000$ which allows for substantial variation in imputed values.

[4]Using a food-specific price series has no effect on the results of the empirical analysis.

One novel aspect of our study is our examination of the prevalence of financial hardship. The reference person's response to the following series of questions are examined:

"*Since January ..... did any of the following happen to you because of a shortage of money:*

a. Could not pay electricity, gas or telephone bills on time,

b. Could not pay the mortgage or rent on time,

c. Went without meals,

d. Was unable to heat home,

e. Asked for financial help from friends or family,

f. Asked for help from welfare / community organizations."

An important feature of this question is the qualifier that the hardship arose from a binding resource constraint - *because of a shortage of money* - ruling out pure preference heterogeneity. The prevalence of an individual hardship is relatively low, and the various hardships are correlated, so we also consider composite measures such as an indicator of at least one hardship being experienced, and the total number of hardships experienced.

In addition we examine the effect of retirement on individual self-reported levels of financial satisfaction and general life satisfaction. There is a burgeoning literature devoted to the analysis of such measures of subjective well-being (SWB): see, for example, recent surveys by Layard (2005), Di Tella and MacCulloch (2006) and Kahneman and Krueger (2006). There is a body of evidence supporting the validity of self-reported satisfaction data as a measure of well-being, albeit with empirical modelling challenges, such as with adaptation and cardinality, that do not arise with observed expenditure data. We contribute to this literature by examining changes in reported satisfaction levels over the retirement threshold. The breadth of the HILDA Survey data is further exploited by analyzing the relationship between household's time use and retirement status. We examine time devoted to charitable activities, which represents an in-kind charitable donation, and home production. The information on time use provides insights into an additional dimension of household consumption smoothing activities across the retirement transition.

Retirement status is based on an individual's reported current labour market status. We define as retired those households where the reference person either self-reports as retired or has been out of work and unable to find employment for at least two years.[5] The indicator of involuntary retirement is constructed from the informa-

[5]Long-term unemployment represents small component of the retirement group, accounting for less than two percent of the sample in any given wave.

tion on the reason for leaving the last job. We consider two definitions of involuntary retirement. The first, 'strict' definition sets the involuntary dummy variable to one for those households where the reference person was either laid off, left the job for medical reasons (sickness, disability, injury) or the individual was self employed and the business closed. The 'broad' definition includes all individuals who left their last job for any reason other than planned retirement.[6] Additional explanatory variables used in the analysis include the reference person's age, family structure, family size, number of persons in the household with chronic health conditions, housing tenure and location.[7]

Descriptive statistics for the samples are presented in table 1. For the full sample, the average age of the household reference person in 2001 was 62.9 years, of who just under a half were retired. Conditional on retirement, 27% are involuntarily retired by the strict definition, and 40% based on the broader definition. The majority of households were either single individuals or couples without children - which together comprised more than 90% of observations. Average weekly grocery expenditures were $127, of which approximately three-quarters represented expenditures on food for consumption at home. Grocery expenditures on average accounted for 13.5% of weekly disposable income. The proportion of families reporting financial hardship varies across the specific indicators, ranging from a low of 2.1% for seeking help from a welfare or community organization, to a high of 9.2% for being late with payment of utility bills. The fraction of the sample that reports any of the six financial hardships is 15.8%. Summary statistics for the 'at risk' sample of mature workers in 2001 show that, on average, this group is significantly younger, more likely to have dependents in the household, have better self-assessed health, higher incomes and expenditures though more likely to have experienced a financial hardship and marginally less satisfied with the life and financial situations, compared to the full sample.

It is instructive to compare summary statistics by retirement status. Table 2 presents sample means by retirement status and year. Not surprisingly, at a point in time the set of retirees is significantly older - 13 years on average - than those still

[6]This definition includes among involuntary retirees individuals who left temporary jobs, were unhappy with their last job, left in search of a better job, left to take care of family members, and other changes of lifestyle.

[7]In addition, a dummy variable equal to 1 if the survey year equals 2006 or 2007 (and equal to zero otherwise) is included in the groceries and food away from home regressions. This variable is included to account for changes in survey design starting in 2006 - the first year when household yearly, rather than weekly, expenditure was recorded in the self-completion questionaire rather than in the household interview.

attached to the labour market. On average, net income is a substantial 55% lower among retirees compared to non-retirees in 2001. However, grocery expenditures are approximately 15% lower among retirees compared to non–retirees in 2001. Similar patterns are present in the final survey year for both the full and 'at risk' samples. The sample means indicate that retired households are less likely to experience hardship than working households. Mean levels of reported life satisfaction and financial satisfaction do not to decline with retirement. While both groups rarely report low levels of either life or financial satisfaction (less than 5 out of 10), the proportion of households reporting very high levels (9 or 10) is considerably higher for retired than working households.

4 METHODS

4.1 Model

The modelling framework is based on the prototypical model of intertemporal consumer choice.[8] Individuals choose consumption (c_t) and leisure (l_t) to maximize the value functional

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

subject to the budget constraint

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

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, w_t is the wage rate and h_t is hours worked in time period t. Solving for the first order conditions

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

gives expressions for the marginal utility of consumption and the marginal utility of wealth, represented by the multiplier λ_t. These conditions imply $U_c(c_t, l_t, \mathbf{x}_t) = \rho E_t [\lambda_{t+1}(1+r)]$ so that optimizing individuals allocate consumption over time periods to equate the marginal utility of consumption to discounted expected marginal utility of wealth. The consumption demand function is implicitly defined as

$$c_t = C(\lambda_t, w_t, \mathbf{x}_t) \tag{4}$$

[8] For a more detailed exposition see, for example, Adda and Cooper (2003).

where consumption demand c_t depends on current individual characteristics and the marginal utility of wealth which summarizes all expected future information. The marginal utility of wealth will include the effect of retirement, and the concomitant decline in earnings, to the extent it is anticipated.

Uncertainty is captured by innovations to the marginal utility of wealth over time. Individual consumption at a point in time can be expressed as a function of individual characteristics $(w_t, \mathbf{x}_t)$, the marginal utility of wealth corresponding to an individual specific effect (α_i) and a random error term representing an expectations error in the current period (e_{it}) :

$$\log(c_{it}) = \mathbf{x}'_{it}\boldsymbol{\beta} + \alpha_i + e_{it} \tag{5}$$

This specification is derived from the decomposition of the contemporaneous marginal utility of wealth term (λ_t) into an individual effect (α_i) and a function of age (absorbed into $\mathbf{x}_{it}$).

4.2 Continuous Dependent Variables

The empirical implementation of the model for expenditures is based on the random effects regression model with specification given by:

$$\begin{aligned} \log(c_{it}) &= \delta_1 Retired_{it} + \delta_2 Involuntary_{it} + \mathbf{x}'_{it}\boldsymbol{\beta} + \alpha_i + e_{it}, \\ & \qquad i = 1, .., N; \quad t = 1, ..., T \end{aligned} \tag{6}$$

where $\mathbf{x}_{it}$ are observed explanatory variables, α_i is an individual specific variable and e_{it} is an idiosyncratic error term assumed to be independent of $\mathbf{x}_{it}$ and α_i. The characteristics composing $\mathbf{x}_{it}$ include the reference person's age, sex, marital status, state of residence, family size, partner's labour force status, partner's health status and partner's disability status. It is assumed that the unobserved individual specific variable α_i is independent of the included covariates, $E[\mathbf{x}_{it}|\alpha_i] = 0$, and is distributed $N(\alpha, \sigma^2_\alpha)$. This corresponds to the random effects panel regression model. The fixed-effects regression model is an alternative estimator which does not place restrictive distributional assumptions on the unobserved individual effect. The fixed effects estimator is identified by within-household variation in covariates over time. Given the data requirements of the fixed effects estimator, and the relatively small sample of households observed to make the transition to retirement during the observation window (283 households), the random effects specification is the primary estimator used for the analysis. As discussed below, the qualitative results and point estimates are very similar for the random and fixed effects estimators; however, the standard errors are substantially greater for the fixed effects estimator.

The coefficient on the *Retired* indicator, δ_1, measures the proportional difference in mean consumption expenditures for retired households relative to working households, other things equal. The inclusion of the *Involuntary* indicator allows for separation of the effects of retirement into voluntary and involuntary components, where the latter is equivalent to an expectations error, an unanticipated negative wealth shock, at the time of retirement. This specification follows Smith (2006) which is also derived from the marginal-utility-of-wealth-constant, or Frisch, commodity demand function. An implication of the life-cycle model is that there will be a significant decline in expenditures only when retirement is involuntary ($\delta_2 < 0$) and that retirement *per se* should be insignificant ($\delta_1 = 0$).

4.3 Discrete Dependent Variable

The random effect probit model is used for analyzing the effect of retirement on the various indicators of financial hardship. Given the binary nature of the outcome variable this corresponds to the model.

$$\Pr(Hardship_{it} = 1) = \Phi\left(\delta_1 Retired_{it} + \delta_2 Involuntary_{it} + \mathbf{x}'_{it}\boldsymbol{\beta} + \alpha_i + e_{it}\right)$$

$$i = 1, .., N;\ t = 1, ..., T \tag{7}$$

where α is the unobserved effect with $\alpha_i|\mathbf{x}_{it} \sim N(0, \sigma^2_\alpha)$.

Rather than present point estimates or the marginal effect, we present the average partial effect (APE) of a covariate on the expected probability of the outcome. The APE is found by integrating the marginal effect over the distribution of α, as discussed in Wooldridge (2002: 472).

The random effects regression estimator in (6) is applied to the composite index of the total number of hardships experienced by the household, and for the time devoted to various household production activities. The regression estimator is also used to analyze the financial and life satisfaction measures. A limitation of the estimator for the satisfaction responses is that it treats the response scale as cardinal. An estimator which takes account of the ordinal nature of the satisfaction responses is the random effect ordered probit model. Let y^*_{it} represent the latent satisfaction level, x_{it} is a set of exogenous characteristics, α_i is the individual random effect and e_{it} is an idiosyncratic error term distributed as standard normal with

$$y^*_{it} = \mathbf{x}'_{it}\boldsymbol{\gamma} + \alpha_i + e_{it} \tag{8}$$

Let y_{it} be the reported level of satisfaction based on the 11-point scale, such that

$$y_{it} = \begin{cases} 0 \text{ if } y_{it}^* \leq \mu_0 \\ 1 \text{ if } \mu_0 < y_{it}^* \leq \mu_1 \\ \vdots \\ 10 \text{ if } \mu_9 < y_{it}^* \leq \mu_{10} \end{cases}$$

where $\{\mu_j\}_{j=0}^{10}$ are the cut-points defining the discrete segments for the satisfaction scale. Inclusion of the individual random effect allows for individual heterogeneity in the underlying ordinal satisfaction scale. Conditional on α_i and x_{it}, the probability of observing response J for observation i in period t is given by $\Phi(\mu_J - \mathbf{x}_{it}'\boldsymbol{\gamma} - \alpha_i) - \Phi(\mu_{J-1} - \mathbf{x}_{it}'\boldsymbol{\gamma} - \alpha_i)$, which forms for the basis for the likelihood function. The parameters of the model are estimated using maximum likelihood methods, and the APE of the retirement indicators on a range of response categories are reported.

5 EMPIRICAL RESULTS

5.1 Expenditure

5.1.1 Groceries

Table 3 summarizes the regression results for grocery expenditures. The top panel presents results for the full sample of households. Model (1), corresponding to the first column of the table, is an OLS regression of retirement status on the log of grocery expenditure, treating the sample as pooled, independent cross-sections. The regression results shows that mean grocery expenditures are approximately 19% lower for retired households, relative to working households, which is consistent with international evidence on the retirement-consumption puzzle. The random effects panel estimator is used to estimate model (2) which included a rich set of covariates. The coefficient estimate on the retirement indicators implies that, conditional on the covariates and taking account of the panel structure of the sample, retired households on average spend approximately 2.6% less on groceries than households in which the reference person is in the labour force. This coefficient is statistically significant at the 10% level.[9] The estimates of σ_α and σ_ε shows that the individual-specific component of the error term is comparable in magnitude to the idiosyncratic error, and the intra-household correlation $\rho = .453$ implies that there is relatively high autocorrelation in grocery expenditures.

[9]Without including any other covariates, the point estimate for the effect of retirement is -5.3%, and is statistically significant at the 5% level.

The involuntary retirement indicator was then added to the specification. The strict definition of 'involuntary' retirement is used in Models (3), and the broad definition in model (4), respectively. In these models the coefficient on retirement indicator therefore captures the effect of anticipated or voluntary retirement on household grocery expenditures. The coefficient on the 'involuntary' retirement indicator therefore picks up the additional effect for retirees who exit the labour force due to an unexpected wealth shock, relatively to those who retired as planned. The estimates for these two models illustrates the central result of our paper. After accounting for expectation errors, we observe that the retirement indicator looses economic and statistical significance, while the involuntary indicator is statistically and economically significant. Our results are in line with those of Smith (2006) for the UK. A key element of the retirement-consumption puzzle is the role of household expectations and the impact of an unanticipated shock precipitating early retirement. Households which retire as planned, on average do not experience a decrease in their grocery expenditures in retirement. However, households forced into retirement either due to a long-term unemployment or the onset of a major health shock, do respond by significantly lowering expenditures in retirement.

An alternative specification to models (3) and (4) is presented in model (5). For this model the involuntary retirement indicator is replaced by the number of years since retirement. Two competing hypotheses motivate this specification. It may be that retirement per se constitutes an income shock that takes time for households to fully adjust to. Households may over-react to the change in income, and may gradually adapt by increasing expenditures back toward pre-retirement levels as their uncertainty over post-retirement income is resolved. Alternatively, upon entering retirement households may maintain expenditures at unsustainable levels, rapidly running down their savings, leading to adjustment of expenditures level later on in retirement. If the first hypothesis is true, then we should observe a positive coefficient on the number of years since retirement. If the second hypothesis is correct, then that coefficient should be negative. The coefficient on the number of years retired is found to be statistically insignificant, and the coefficient of the retirement dummy is largely unaffected relative to the base specification presented in model (2). It appears that neither hypothesized effect of time-in-retirement is dominant.

5.1.2 Food (At Home)

The sequence of models where estimated with log-food expenditures as the dependent variable. Expenditure on food purchased for at-home consumption is arguably

a better measure of well being that expenditure on groceries as the latter includes some durable items. Waves 6 and 7 of HILDA do not contain information on expenditure on food at home, hence there is some loss of precision due to the shorter observation period for food at home expenditures relative to the grocery bundle. The regression results are summarized in the middle panel of table 3, and are very similar to those reported for groceries. The estimated proportional drop in food expenditure at retirement is somewhat larger in magnitude for the full sample, though broadly comparable, to that found for grocery expenditures. Importantly, the drop in spending on food for consumption at-home, like grocery expenditures, with retirement is attributable to the subset of retirees who experienced an unexpected, early exit from the labour market.

5.1.3 Outside Meals

Patterns of expenditure on food consumed away from home may not react to retirement in a manner similar to food at home. Aguiar and Hurst (2005) and Brzozowski and Lu (2010) document that the drop in expenditure on food away from home is also consistent with changes in lifestyle and time use upon retirement. Model (1) in the lower panel of table 3 supports this hypothesis, where retirement is associated with 32% lower mean level of spending on food at restaurants and cafes for retirees. The inclusion of the covariate set and use of the random effect estimator lowers the estimates coefficient in retirement in model (2) to a 4.2% decline. Adding the involuntary retirement indicator in models (3) and (4) reduces the magnitude of the retirement effect, and it is no longer significant. The involuntary retirement coefficients are not individually statistically significant, although the two retirement indicators are jointly significant. The evidence from analyzing expenditures on food for consumption outside home add further support to the finding that it is not retirement *per se*, but involuntary retirement, that leads to the downward adjustment of expenditures, and therefore household welfare.

The set of regression models were re-estimated using the 'at risk of retirement' sample. For those that do exit the labour market for retirement, only information from the first year in retirement is retained so that the estimated retirement effect is solely identified from changes associated with the initial transition to retirement. This approach is intended to highlight any discontinuity in spending patterns at the time of retirement when expectations regarding future lifetime wealth may be significantly revised.

The estimation results for the at-risk sample are summarized in table 4. The

results show a sharper decline in spending across the three commodity bundles, and more strongly indicate that it is not retirement *per se* but specifically involuntary retirement that is associated with declining expenditures. The large, and significant, coefficient on the involuntary retirement indicator show that it is the negative expectational error associated with unanticipated early retirement that leads households to adjust their spending patterns at retirement. The evidence for this subsample of observations reinforces the results drawn from the broad sample. Further, these results also reveal that the decline in non-durable expenditures with retirement is not an artefact from comparing households at disparate points in their life cycle. The decline in grocery and food expenditures is concentrated among households forced into retirement by long-term layoffs or a negative health event.

As mentioned in the previous section, the random effect (RE) estimator imposes strong conditions on the form of unobserved heterogeneity; particularly, the orthogonality condition $E[x_{it}|\alpha_i] = 0$. A less restrictive estimator is the fixed effect (FE) regression model which only uses within-observational unit (household) variation to identify the impact of covariates on the conditional mean of the dependent variable. As a consequence, the data demands of the FE estimator are much greater than that of the RE estimator. This is particularly relevant for the analysis of the HILDA panel as only 283 households are observed to make transition into retirement during the survey period. The results from the FE specification for the grocery expenditures, based on at risk sample, are presented in Appendix table 1. The pattern of point estimates, with the small magnitude of the retirement coefficient and the relatively large, negative coefficient on the involuntary retirement, is comparable to the RE estimation. However, the standard errors are substantially larger for the FE estimator, and the point estimates are not statistically significant. Given the limited sample available for the FE estimator, and the resulting imprecision of estimates, the RE estimator is used for the empirical analysis.

5.2 Financial Hardship

The literature on the retirement-consumption puzzle is focussed on whether households are able to smooth consumption, and ultimately their well-being, across the transition to retirement. Whether households successfully smooth well-being across the transition has no direct implication for the actual level of household welfare, apart from the fact that a failure to smooth implies lower discounted life-time welfare than what may otherwise be achieved. Successful smoothing activities can be consistent with a relatively low level of material well-being, while a failure to smooth does not

imply impoverishment. In this section we broaden the analysis by considering indicators of hardship which provide a more absolute measure of well-being. The hardship indicators directly measure the inadequacy of household resources and are a guide to the absolute level of well-being. The inability to 'make ends meet' as signaled by going without meals, or an inability to pay for basic necessities such as housing or utilities, indicates severe economic deprivation.

The panel random effects probit model APE estimates are summarized in table 5. Model specifications analogous to those used for analyzing the effects of retirement on expenditures are implemented for the hardship measures.[10] The results from this section generally reinforce the conclusions drawn from the analysis of expenditures. The key findings may be summarized as: (i) The greater likelihood of not being able to pay utility bills in retirement can be entirely explained by whether retirement was involuntary or not, (ii) Neither voluntary nor involuntary retirement have statistically significant effects on the ability to pay mortgage or rent, (iii) The likelihoods of going without meals and being unable to heat the home both increase with retirement, and are substantially higher for the involuntary retired, (iv) Retirement, and not specifically involuntary retirement, is associated with a greater likelihood of asking for help from friends or family, and (v) The need to ask for financial help from welfare or community organizations is significantly higher for the involuntarily retired. Finding (iv) stands out as difficult to reconcile with the patterns we have documented so far. One way to account for this result is that retirees in most financial trouble - often those who retired unexpectedly - may be more able to access financial assistance from community organizations, indicated by result (v), through public assistance programs. That is, this result may be rationalized by the coverage of the Australian social safety net across the poorer segments of retirees. The third result listed above is also somewhat puzzling, as the effect on voluntary retirement continues to have a significant, albeit small, association with these hardships in the expanded model specification. This finding may in part be a reflection of the over-consumption of housing services by the elderly in Australia. Features of the Australian Age pension means test, and the capital gains tax regime, significantly favour investment in owner-occuppied housing. Elderly households may be over-consuming housing, with the implication that they lack the requisite resources to adequately heat, and maintain, that asset.

An issue with analyzing each hardship indicator separately is the relatively low in-

[10]We only report results for models comparable to specifications (2) and (3) in Table 3, where specification (3) includes the strict definition of involuntary retirement indicator. Results for all model specifications are available from the authors upon request.

cidence of that outcome among retired and working households. There is the further issue that the separate hardship outcomes are correlated. To address these concerns we examined alternative combinations of the hardship indicators. First, we estimated random effect probits for the incidence of *any* hardship. Secondly, we ran regressions on a hardship index which is a simple count of hardships experienced by the household. Results for these models are presented in table 6. For the probit on the any hardship indicator, we observe no effect of retirement itself; however, we observe a highly significant 3% increase in the likelihood of suffering a hardship associated with involuntary retirement. No significant effects of either retirement *per se* or involuntary retirement are evident from regressions on hardship index for the broad sample. The results for the 'at risk' sample for the any hardship probit models, and the hardship index regressions, are comparable to the findings for the broad sample.

5.3 Subjective Well-Being

In this section we turn to consider two measures of SWB: self-reported financial satisfaction and life satisfaction. HILDA respondents were asked to rank how satisfied they are with their lives and their financial situation on the scale of zero to ten (ten being the highest). Table 7 summarizes the random effect regression results for these SWB measures. We report results for both the full and the 'at risk' samples. First, consider the results regarding the effect of retirement on financial satisfaction. Full sample households report a significant and substantial fall in financial satisfaction in retirement as apparent from model (1). The results for the 'at risk' sample, shown in model (3) indicate a comparable decline in financial satisfaction with retirement; however, the estimate is not statistically significant. Models (2) and (4) include the involuntary retirement dummy variable - based on the strict definition. The effect of unexpected retirement on financial satisfaction is strongly negative and significant in both samples. Adding the unexpected retirement indicator variable to the model results in the effect of retirement *per se* becoming insignificant.

Turning to the broader domain of life satisfaction, we observe that retirement *per se* is associated with a small positive, though insignificant, effect on the overall life satisfaction. However, if households retired involuntarily, then there is a decrease in life satisfaction; in contrast, households which retired voluntarily reported greater life satisfaction, other things equal.

One limitation of the regression model estimator is that it imposes a cardinal scale on the SWB scores. To relax that assumption, random effect ordered probit models were also estimated. Table 8 summarizes the key coefficient estimates and the implied

average partial effects. For financial satisfaction, the highest three response categories are chosen by 40-46 percent of the sample, and for life satisfaction - where generally higher scores are reported - the top three (two) categories were chosen by three-quarters (50 percent) of the sample. Given the concentration of the data at these highest scores, only the APE of the retirement indicators on this subset of response categories is reported. The qualitative pattern of the ordered probit estimates is very similar to the regression results. Involuntary retirement, and not retirement *per se*, has a strong and significant negative effect on the likelihood of reporting high financial satisfaction. Involuntary retirement also has an unequivocal negative impact on the likelihood of reporting higher levels of life satisfaction for the full sample. Therefore, the results regarding the impact of retirement on SWB were robust across the choice of estimator. Overall, the evidence from the measures of SWB reinforces the findings based on the analysis of household grocery and food expenditures. Retiring as planned is instrumental to a household being able to maintain their standard of living into retirement. If households are subject to a significant shock forcing labour market exit then SWB markedly declines.

5.4 Home Production and Time Use

A look at changes in charitable behavior and time use offers a further insight into the relationship between retirement status and the standard of living. Aguiar and Hurst (2007) observe that household charitable giving increases over the retirement age. While we lack information on charitable donations, HILDA includes information on time devoted to charitable activities, which represents a form of in-kind donation. For people in the labor force, charitable efforts involves a trade-off with time devoted to labour market activity. Retired households do not face the trade-off with market activities. It is therefore natural to expect that retired households will be more engaged in charitable and volunteer activities. On the other hand, we have documented that unexpected retirement has negative consequences on the standard of living. It is intuitively reasonable that households which retire unexpectedly are less able to participate in volunteer activities. There are numerous reasons for this negative relationship. Health limitations and disability may be a factor leading to unexpected early retirement, which would also constrain volunteer activities. Volunteering time to a charitable organization may also be bundled with contributing funds. Table 9 summarizes the estimation results for time use activities. We focus on two model specifications - the latter including the strict definition of involuntary retirement - for the full and 'at risk' samples. It is clear that retirement has a significant positive

effect on time devoted to charitable activities in all models. The magnitude of the positive retirement effect is accentuated once we account for unexpected retirement, where the latter has a strong negative effect.

Other dimensions of home production also reveal an increase in time use following retirement. Not surprisingly, as shown in table 9, time devoted to household errands, housework and outdoor tasks all increase with voluntary retirement. These findings are consistent with the substitution of home production for market production reflecting a further dimension of consumption smoothing by household across the retirement transition.

6 CONCLUSION

From the analysis of expenditures using the HILDA survey data it is clear that there is an economically significant decline in expenditures on groceries and food with retirement. The decline in expenditures among Australian households is comparable to that found for other countries including the U.S., U.K. and Italy. The magnitude of the retirement effect is larger for the 'at risk' of retirement sample, for who the initial experience of retirement is observed. The analysis reveals that the observed retirement effect is in fact due to retiring unexpectedly earlier than planned - households that retire as planned report no significant changes in these basic expenditure categories.

The analysis of severe financial hardship indicators and self-assessed financial and life satisfaction supports the conclusions based on the analysis of expenditures. Retirement is associated with an increase in incidence of some individual measures of financial hardship but not others. In almost all cases where present, any apparent retirement effect is largely accounted for by the involuntary component. This is also the case for the composite 'any financial hardship' measure. The analysis of financial satisfaction and life satisfaction strongly corroborate the findings based on the more traditional economic measures of well-being. With these SWB measures the apparent negative retirement effect can also be attributed to a subset of households forced into retirement earlier than previously planned. Analysis of charitable behavior yields a similar conclusion. Intensity of charitable efforts increases with retirement but decreases when the retirement is involuntary. Time use activities indicate a rise in home production following retirement, reflecting further consumption smoothing behavior by households. Overall, the Australian evidence on the retirement-consumption puzzle can be reconciled with straightforward extensions to the life-cycle model which allow for expectational errors and home production substitution activities.

Collectively the empirical findings provide a remarkably consistent explanation of 'retirement consumption puzzle' and paint a multidimensional picture of retirement and household well-being. The hypothesis of retirement in general having adverse effects on economic well-being of households is unequivocally refuted. Households that choose to retire on their own terms tend not to suffer a reduction in their standard of living as defined across a broad array of measures. However, households that are forced into retirement due to long-term job loss or major health shocks experience a marked decline in their standard of living across each set of welfare measures.

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Table 1. Summary Statistics - Balanced Panel, Wave 1 Characteristics

	Full Sample	'At Risk' Sample
Age (years)	62.89	56.71
Female	0.417	0.392
Retired	0.492	0.00
Involuntary Retirement 1	0.133	0.00
Involuntary Retirement 2	0.200	0.00
Net Income (2007$)	943.00	1294.24
Expenditure		
Groceries	127.13	135.48
Food at home	108.46	103.05
Food outside home	35.08	40.40
Financial Hardship		
Late utilities	0.09	0.11
Late rent / mortgage	0.04	0.05
Miss meals	0.03	0.03
Lack heating	0.03	0.02
Financial help from family	0.06	0.07
Help from welfare organisation	0.02	0.03
Any Financial Hardship	0.158	0.182
Hardship Index (0,6)	0.272	0.313
Time Use		
Hours of charitable work	1.42	1.05
Hours of carrying for disabled	0.74	0.84
Hours household errands	4.75	4.32
Hours housework	10.78	9.71
Hours outdor tasks	6.70	5.86
Life Satisfaction (0,10)	8.224	8.084
Financial Satisfaction (0, 10)	6.58	6.45
Family type		
Single	0.435	0.382
Couple, no kids	0.489	0.497
Couple, kids	0.044	0.082
Lone Parent	0.002	0.004
Other	0.030	0.035
Household size	1.70	1.86
Persons with chronic health	0.373	0.309
Observations	1517	770

Table 2. Summary Statistics - Balanced Panel

	2001		2007		'At Risk' Sample in 2007	
	Not Retired	Retired	Not Retired	Retired	Not Retired	Retired
Age	56.71	69.27	60.90	73.21	59.92	67.51
Retirement Status						
Involuntary 1		0.270		0.256		0.209
Involuntary 2		0.407		0.353		0.254
Net Income	1294.24	580.95	1519.13	669.83	1596.70	812.88
Expenditure						
Groceries	135.48	115.69	151.30	126.33	154.96	130.23
Food at home	103.05	86.68				
Food outside home	40.40	23.36	48.38	38.03	49.41	49.76
Financial Hardship						
Late utilities	0.108	0.076	0.077	0.047	0.080	0.039
Late rent / mortgage	0.051	0.024	0.038	0.016	0.039	0.011
Miss meals	0.030	0.025	0.023	0.013	0.023	0.021
Lack heating	0.025	0.033	0.011	0.026	0.008	0.021
Financial help from family	0.071	0.055	0.058	0.031	0.055	0.057
Help from welfare organisatior	0.029	0.015	0.024	0.013	0.027	0.007
Any Financial Hardship	0.182	0.134	0.122	0.086	0.121	0.085
Hardship Index (0,6)	0.313	0.229	0.231	0.147	0.232	0.155
Time Use						
Hours of charitable work	1.045	1.797	0.934	1.254	0.850	1.696
Hours of carrying for disabled	0.838	0.639	1.618	0.934	1.450	1.611
Hours household errands	4.323	5.189	3.517	4.695	3.655	5.555
Hours housework	9.712	11.890	8.451	10.504	8.464	11.152
Hours outdoor tasks	5.864	7.564	4.774	6.494	4.774	8.424
Life Satisfaction (0,10)	8.084	8.366	8.048	8.215	8.051	8.180
Financial Satisfaction (0, 10)	6.422	6.707	6.756	7.224	6.755	7.112
Observations	770	747	532	985	487	283

Table 3. Family Expenditure and Retirement Status: Full Sample Estimates[1]

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable: Log(Grocery Expenditure)				
Retired	-0.1892***	-0.0266***	-0.0175	-0.0121	-0.0241**
	(0.0125)	(0.0124)	(0.0135)	(0.0139)	(0.0130)
Involuntary[2]			-0.0330***	-0.0389***	
			(0.0195)	(0.0170)	
Years since retirement					-0.0004
					(0.0006)
δ_α		0.289	0.289	0.289	0.289
δ_ε	0.280	0.318	0.318	0.318	0.318
ρ		0.453	0.453	0.452	0.453
R-squared	0.033	0.342	0.342	0.343	0.342
t	6	6	6	6	6
i	1517	1517	1517	1517	1517
	Dependent Variable: Log(Food at Home Expenditure)				
Retired	-0.1701***	-0.0344**	-0.0198	-0.0006	-0.0303*
	(0.0150)	(0.0175)	(0.0191)	(0.0201)	(0.0182)
Involuntary[2]			-0.0479***	-0.0752***	
			(0.0247)	(0.0220)	
Years since retirement					-0.0007
					(0.0008)
R-squared	0.021	0.327	0.328	0.329	0.328
t	4	4	4	4	4
i	1517	1517	1517	1517	1517
	Dependent Variable: Log(Food Outside Home)				
Retired	-0.3172***	-0.0422***	-0.0361	-0.0339	-0.0621***
	(0.0170)	(0.0228)	(0.0248)	(0.0255)	(0.0239)
Involuntary[2]			-0.0214	-0.0218	
			(0.0344)	(0.0300)	
Years since retirement					0.0032***
					(0.0011)
R-squared	0.071	0.143	0.143	0.143	0.142
t	6	6	6	6	6
i	1517	1517	1517	1517	1517

1. Model (1) is based on the OLS estimator without covariates. Models (2)-(5) are based on the RE estimator with covariates. The covariate set includes the reference person's age, sex, marital status, state of residence, family size, partner's labour force status and partner's health and disability status.

2. In model (3) the strict definition of involuntary retirement is used: model (4) is based on the broader definition of involuntary retirement.

*** denotes statistical significance at the 1% level.

** denotes statistical significance at the 5% level.

* denotes statistical significance at the 10% level.

Table 4. Family Expenditure and Retirement Status, 'At Risk' Sample Estimates[1]

	(1)	(2)	(3)	(4)
	Dependent Variable: Log(Grocery Expenditure)			
Retired	-0.1605***	-0.0506***	-0.0238	-0.0246
	(0.0302)	(0.0229)	(0.0260)	(0.0276)
Involuntary[2]			-0.1001***	-0.0711**
			(0.0460)	(0.0418)
R-squared	0.021	0.384	0.385	0.385
i	770	770	770	770
	Dependent Variable: Log(Food at Home Expenditure)			
Retired	-0.1967***	-0.0404	-0.0064	0.0152
	(0.0381)	(0.0273)	(0.0302)	(0.0332)
Involuntary			-0.1308***	-0.1308***
			(0.0506)	(0.0446)
R-squared	0.014	0.373	0.374	0.375
i	770	770	770	770
	Dependent Variable: Log(Food Outside Home)			
Retired	-0.3085***	-0.1142***	-0.0776	-0.0679
	(0.0471)	(0.0444)	(0.0504)	(0.0535)
Involuntary			-0.137	-0.125
			(0.0890)	(0.0930)
R-squared	0.032	0.092	0.093	0.143
i	770	770	770	770

1. Model (1) is based on the OLS estimator without covariates. Models (2)-(4) are based on the RE estimator with covariates. The covariate set includes the reference person's age, sex, marital status, state of residence, family size, partner's labour force status and partner's health and disability status.

2. In model (3) the strict definition of involuntary retirement is used: model (4) is based on the broader definition of involuntary retirement.

*** denotes statistical significance at the 1% level.

** denotes statistical significance at the 5% level.

* denotes statistical significance at the 10% level.

Table 5. Retirement and Financial Hardship Probit APE Estimates[1]

	(1)	(2)	(3)	(4)
Outcome: Could not pay electricity, gas or telephone bills on time				
Retired	0.0209***	0.0098	0.0268*	0.0157
	(0.0066)	(0.0073)	(0.0183)	(0.0204)
Involuntary[2]		0.0325***		0.0321
		(0.0101)		(0.0385)
Sample	Full	Full	'At Risk'	'At Risk'
Outcome: Could not pay the mortgage or rent on time				
Retired	-0.0020	-0.0017	-0.0120	-0.0051
	(0.0045)	(0.0049)	(0.0078)	(0.0111)
Involuntary[2]		-0.0008		-0.0027
		(0.0055)		(0.0467)
Sample	Full	Full	'At Risk'	'At Risk'
Outcome: Went without meals				
Retired	0.0107***	0.0052**	0.0177	0.0100
	(0.0024)	(0.0024)	(0.0100)	(0.0100)
Involuntary[2]		0.0156***		0.0104
		(0.0051)		(0.0145)
Sample	Full	Full	'At Risk'	'At Risk'
Outcome: Was Unable to Heat Home				
Retired	0.0184***	0.0119***	0.0091*	0.0083
	(0.0031)	(0.0032)	(0.0063)	(0.0073)
Involuntary[2]		0.0180***		0.0012
		(0.0055)		(0.0066)
Sample	Full	Full	'At Risk'	'At Risk'
Outcome: Asked for Financial Help from Friends or Family				
Retired	0.0129***	0.0136**	0.0510***	0.0397**
	(0.0049)	(0.0054)	(0.0194)	(0.0220)
Involuntary[2]		-0.0020		0.0217
		(0.0062)		(0.0293)
Sample	Full	Full	'At Risk'	'At Risk'
Outcome: Asked for Help from Welfare/Community Organisations				
Retired	0.0056	0.0017	0.0133*	0.0199**
	(0.0036)	(0.0041)	(0.0100)	(0.0133)
Involuntary[2]		0.0114**		-0.0078
		(0.0056)		(0.0043)
Sample	Full	Full	'At Risk'	'At Risk'

1. Covariates include controls for age, sex, marital status, state of residence, family size, partner's labour force status, and partner's health and disability status.
Average partial effects (and asymptotic standard errors) are reported.
2. Based on the strict definition of involuntary retirement, as defined in the text.
*** denotes statistical significance at the 1% level.
** denotes statistical significance at the 5% level.
* denotes statistical significance at the 10% level.

Table 6. Retirement and Financial Hardship Composite Measures[1]

	(1)	(2)	(3)	(4)
Outcome	Any Hardship[3]	Any Hardship[3]	Hardship Index	Hardship Index
Retired	0.0114	0.0001	0.0273	0.0223
	(0.0084)	(0.0093)	(0.0205)	(0.0221)
Involuntary[2]		0.0317***		0.0191
		(0.0118)		(0.0323)
Sample	Full	Full	Full	Full
Outcome	Any Hardship	Any Hardship	Hardship Index	Hardship Index
Retired	0.0169	0.0045	0.0612***	0.0351
	(0.0189)	(0.0211)	(0.0362)	(0.0408)
Involuntary[2]		0.0370		0.1049
		(0.0433)		(0.0755)
Sample	'At Risk'	'At Risk'	'At Risk'	'At Risk'

1. Covariates include controls for age, sex, marital status, state of residence, family size, partner's labour force status, and partner's health and disability status.

2. In models (2) and (4) the strict definition of involuntary retirement is used.

3. Average Partial Effects are reported for the RE Probit models (1) and (2).

*** denotes statistical significance at the 1% level.

Table 7. Retirement and Subjective Well-Being: Regression Model Estimates[1]

	(1)	(2)	(3)	(4)
	Financial Satisfaction	Financial Satisfaction	Financial Satisfaction	Financial Satisfaction
Model	*Regression*	*Regression*	*Regression*	*Regression*
Retired	-0.0990**	0.0112	-0.0812	0.0747
	(0.0558)	(0.0610)	(0.1039)	(0.1177)
Involuntary[2]		-0.4145***		-0.5893***
		(0.0934)		(0.2101)
Sample	Full	Full	'At Risk'	'At Risk'
	Life Satisfaction	Life Satisfaction	Life Satisfaction	Life Satisfaction
Retired	0.0419	0.0740**	0.1114	0.1588***
	(0.0405)	(0.0443)	(0.0708)	(0.0804)
Involuntary[2]		-0.1177**		-0.1785
		(0.0654)		(0.1434)
Sample	Full	Full	'At Risk'	'At Risk'

1. Covariates include controls for age, sex, marital status, state of residence, family size, partner's labour force status, and partner's health and disability status.

2. In models (2) and (4) the strict definition of involuntary retirement is used.

*** denotes statistical significance at the 1% level.

** denotes statistical significance at the 5% level.

* denotes statistical significance at the 10% level.

Table 8. Subjective Well-Being: Ordoered Probit Model Estimates[1]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Financial Satisfaction				Financial Satisfaction			
	Coefficient Estimates	APE			Coefficient Estimates	APE		
		Response(8)	Response(9)	Response(10)		Response(8)	Response(9)	Response(10)
Retired	0.0112	-0.0030	-0.0033	-0.0054	0.0747	-0.0008	-0.0008	-0.0009
	(0.0610)	(0.0030)	(0.0034)	(0.0055)	(0.1177)	(0.0087)	(0.0081)	(0.0096)
Involuntary[2]	-0.4145***	-0.0379***	-0.0349***	-0.0506***	-0.5893***	-0.0600***	-0.0440***	-0.0437***
	(0.0934)	(0.0045)	(0.0036)	(0.0046)	(0.2101)	(0.0189)	(0.0113)	(0.0093)
Sample	*Full*				*'At Risk'*			
	Life Satisfaction				Life Satisfaction			
	Coefficient Estimates	APE			Coefficient Estimates	APE		
		Response(8)	Response(9)	Response(10)		Response(8)	Response(9)	Response(10)
Retired	0.0883*	-0.0043	0.0051	0.0134	-0.0106	-0.0059	0.0134	0.0210
	(0.0474)	(0.0028)	(0.0034)	(0.0088)	(0.0820)	(0.0055)	(0.0101)	(0.0170)
Involuntary[2]	-0.1729**	0.0135***	-0.0212***	-0.0488***	-0.2149	0.0047***	-0.0267	-0.0342
	(0.0723)	(0.0020)	(0.0043)	(0.0085)	(0.1468)	(0.0011)	(0.0207)	(0.0233)
Sample	*Full*				*'At Risk'*			

1. Covariates include controls for age, sex, marital status, state of residence, family size, partner's labour force status, and partner's health and disability status.

2. The strict definition of involuntary retirement is used.

*** denotes statistical significance at the 1% level.

** denotes statistical significance at the 5% level.

* denotes statistical significance at the 10% level.

Table 9. Retirement and Time Use Regression Results[1]

	(1)	(2)	(3)	(4)
Outcome	*Hours of charity work*			
Retired	0.667***	0.789***	0.720***	0.766***
	(0.147)	(0.160)	(0.164)	(0.258)
Involuntary		-0.456***	-0.151	-0.612
		(0.236)	(0.205)	(0.471)
Sample	*Full*	*Full*	*Full*	*'At Risk'*
	Hours of carrying for disabled			
Retired	-0.072	-0.142	-0.135	0.028
	(0.226)	(0.248)	(0.254)	(0.252)
Involuntary		0.269	0.187	0.210
		(0.396)	(0.343)	(0.465)
Sample	*Full*	*Full*	*Full*	*'At Risk'*
	Hours Household errands			
Retired	0.720***	0.791***	0.805***	0.440
	(0.177)	(0.192)	(0.196)	(0.325)
Involuntary		-0.263	-0.241	-0.242
		(0.275)	(0.240)	(0.593)
Sample	*Full*	*Full*	*Full*	*'At Risk'*
	Hours of Housework			
Retired	1.675***	1.668***	1.420***	1.3242**
	(0.324)	(0.353)	(0.361)	(0.530)
Involuntary		0.029	0.727	0.732
		(0.520)	(0.452)	(0.976)
Sample	*Full*	*Full*	*Full*	*'At Risk'*
	Hours of Outdoor Tasks			
Retired	1.816***	2.018***	2.218***	2.778***
	(0.253)	(0.275)	(0.281)	(0.433)
Involuntary		-0.769***	-1.157***	-1.166
		(0.410)	(0.355)	(0.807)
Sample	*Full*	*Full*	*Full*	*'At Risk'*

1. Covariates include controls for age, sex, marital status, state of residence, family size, partner's labour force status, and partner's health and disability status.

2. Models (2) and (4) are based on the strict definition of involuntary retirement, as defined in the text. Model (3) is based on the broad definition of involuntary retirement.

*** denotes statistical significance at the 1% level.

Appendix Table 1. Grocery Expenditure for the 'At Risk' Sample: Alternative Estimators[1]

	(1)	(2)
Retired	-0.0238	-0.0030
	(0.0260)	(0.0322)
Involuntary[2]	-0.1001***	-0.0695
	(0.0460)	(0.0636)
Estimator	RE	FE
R-squared	0.385	0.0298
t	6	6
i	770	770

1. Covariates include controls for age, sex, marital status, state of residence, family size, partner's labour force status, and partner's health and disability status.

2. Based on the strict definition of involuntary retirement, as defined in the text.

*** denotes statistical significance at the 1% level.

** denotes statistical significance at the 5% level.

* denotes statistical significance at the 10% level.

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