Pensioner financial well-being, equivalence scales and ordered response models

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Abstract

This paper uses ordered response models of pensioners' subjective evaluations of their financial positions to construct equivalence scales for pensioners. A range of different ordered response models is used. The paper examines the sensitivity of the estimated scale to (a) the econometric model used and (b) the measurement of income. A pensioner couple is found to require on average 1.3 to 1.4 times as much income as a "comparable" single pensioner to experience the same level of financial well-being. This is significantly less than both the McClements equivalence scale value and the ratio of state pension rates.

Key words: equivalence scales, ordered response models, pensioner incomes.

JEL classification: C25, C14, D12, D63, H55, J14.

1 Introduction

What level of household income is required to give a pensioner couple the same level of welfare as a single pensioner on a given level of income? Such equivalence scale questions are of considerable public policy interest, for example for the setting of relative pension rates. However there is considerable disagreement on how to estimate income relativities of this type.

The standard approach to the estimation of equivalence scales uses expenditure data in a revealed preference framework. However this approach requires strong identification assumptions (see for example, Pollak and Wales, 1979, and Blundell and Lewbel, 1991). An alternative approach that has been adopted uses subjective data. Two main types of information have been utilized. The first asks survey respondents how much income they think a family of their type requires to reach a specified level of satisfaction. Analysis of this type of question is associated with what has come to be known as the "Dutch School" (see for example Kapteyn and van Praag, 1976). The second type of data used asks respondents to rate their level of satisfaction with their own income or standard of living. (Dubnoff et al., 1981, is an early example, Melenberg and van Soest, 1995, a more recent one.) This paper is in this latter tradition.

The paper uses information from the British Household Panel Survey on pensioners' evaluations of their financial position to construct an equivalence scale for pensioners.

The information provided is ordinal and therefore an ordered response model is used. A range of such models is considered. The main issues the paper focuses on are the sensitivity of the estimated required income ratio to (a) the econometric model used and (b) the measurement of income.

This paper finds that on average a pensioner couple requires 1.3 to 1.4 times as much income as a "comparable" single pensioner to experience the same standard of living. This compares with a McClements scale ratio of 1.64 and a ratio of state pension rates of 1.60 and is found to be significantly less than both.

The next section lays out the framework for using subjective evaluations of financial well-being to estimate this equivalence scale ratio. Section 3 describes the range of Ordered Response models used in the paper. The data used is described in Section 4, the results presented in Section 5 and conclusions given in Section 6.

2 Equivalence scale framework

Data on individuals' subjective evaluations of their financial position can be used to estimate equivalence scale relativities. In particular this paper focuses on that for pensioner couples relative to single pensioners. The approach supposes that a monotonic function of an individual's welfare level, w, can be modeled by the following linear function:

$$g(w_i) = \gamma_1 \ln z_i + \gamma_2 d_i + s_i'\delta + \varepsilon_i \tag{1}$$

where z_i is household income, d_i is a dummy variable taking the value 1 for pensioner couples and 0 for single pensioners and s_i is a vector of other influences. The equivalence scale relativity for the two groups is then given as follows. Define the ratio λ to be such that, holding all other factors constant, a pensioner couple with income λz^o would have the same level of welfare as a single pensioner with income z^o. Then

$$\gamma_1 \ln z^o + s'\delta + \varepsilon = \gamma_1 \ln(\lambda z^o) + \gamma_2 + s'\delta + \varepsilon$$

and hence

$$\lambda = \exp\left(-\frac{\gamma_2}{\gamma_1}\right). \tag{2}$$

This gives an equivalence scale value for a pensioner couple relative to a single pensioner. In fact the standard specification (for non-pensioners) uses not equation (1), but either an equation of the form

$$g(w_i) = \gamma_1 \ln z_i + \gamma_2 a_i + \gamma_3 c_i + s_i'\delta + \varepsilon_i \tag{3}$$

where a_i is the number of adults in the household and c_i is the number of children in the household, or the same under the restriction that $\gamma_2 = \gamma_3$, i.e. simply using the variable household size. Although they incorporate different assumptions, the estimate of λ is still given by equation (2) for both formulations.

3 Ordered response models

The responses on financial well-being that are analyzed in this paper to provide estimates of the parameters in equations (1) or (3) are discrete and the categories are ordered. Thus an ordered response model is required. A range of such models will be used.

3.1 Cumulative response probability models

By far the most commonly used ordered response models are the ordered probit and ordered logit models. These (and others) fall into the cumulative response probability class of models. They can be viewed as being based on a linear equation for a latent dependent variable. It can be specified as

$$y_i^* = x_i'\beta + \varepsilon_i \tag{4}$$

for $i = 1, \ldots, n$, where x is a vector of regressors (in terms of equation (1) it will contain $\ln z, d$ and s), β is a vector of unknown parameters and ε_i is a random error term independently distributed with distribution function F. The observed dependent variable, y_i takes one of the values $\{1, 2, \ldots, J\}$, and is related to y_i^* as follows:

$$y_i = \begin{cases} 1 & \text{if } y_i^* < \alpha_1 \\ 2 & \text{if } \alpha_1 \leq y_i^* < \alpha_2 \\ \vdots & \\ J & \text{if } \alpha_{J-1} \leq y_i^* \end{cases} \tag{5}$$

with the α_j being constants such that $\alpha_1 < \alpha_2 < \ldots < \alpha_{J-1}$. Thus the range of y^* is partitioned into J mutually exclusive and exhaustive intervals and the variable y indicates the interval into which a particular observation falls.

The probability of a particular observed outcome is given by:

$$\Pr[y_i = j] = \begin{cases} F(\alpha_1 - x_i'\beta) & \text{if } j = 1 \\ F(\alpha_j - x_i'\beta) - F(\alpha_{j-1} - x_i'\beta) & \text{if } 2 \leq j \leq J-1 \\ 1 - F(\alpha_{J-1} - x_i'\beta) & \text{if } j = J \end{cases} \tag{6}$$

where F is the cumulative distribution function of ε_i and is assumed to contain no additional unknown parameters, so that, for example ε_i has a known variance. This assumption fixes the scale of the measurement of y^*, but not the origin. Identification can be achieved by assuming that x_i does not contain a constant term or by fixing one of the α_j. The former route is adopted here. The Ordered Probit and Ordered Logit models take F to be the CDF of standard Normal and Logistic random variables respectively.

In this class of models the cumulative probabilities are given by

$$\Pr[y_i \leq j] = F(\alpha_j - x_i'\beta) \tag{7}$$

Thus in these models a known transformation of the cumulative probabilities is taken to be a linear function of the x-variables and only the intercept in this function differs across the categories:

$$F^{-1}\left\{\Pr[y_i \leq j]\right\} = \alpha_j - x_i'\beta \tag{8}$$

The impact of a particular x-variable on the transformed cumulative probability is taken to be the same for each threshold.

Given a specification of F the parameters of the model can be estimated by Maximum Likelihood. The Ordered Probit model takes F to be the CDF of a standard Normal random variable. The Ordered Logit model (known in the statistics literature as the Proportional Odds model) takes ε to have a Logistic distribution and (apart from scaling since it implies that $\text{var}(\varepsilon) = \pi^2/3$ whereas in the Ordered Probit model $\text{var}(\varepsilon)$ is normalized to 1) tends to give very similar estimates to the Ordered Probit model.

The distributions underlying the Ordered Probit and Ordered Logit models are both symmetric. An alternative choice of F which has been used (e.g. McCullagh, 1980) for which this is not the case is the Extreme Value distribution

$$\Pr[y_i \leq j] = 1 - \exp\{-\exp(\alpha_j - x_i'\beta)\} \tag{9}$$

which gives a Proportional Hazards model. Both symmetric and asymmetric cumulative response probability models will be considered in Section 5 below.

3.2 Continuation ratio models

In this class of models a transformation of the continuation probability is taken to be linear in x with intercepts varying across the categories.

$$\Pr[y_i > j | y_i \geq j] = F(\theta_j - x_i'\beta) \tag{10}$$

The Proportional Hazards model is a link between the two classes of model. The model given by (9) is equivalent to (10) with F an Extreme Value distribution and

$$\exp(\theta_j) = \exp(\alpha_j) - \exp(\alpha_{j-1}).$$

This equivalence does not hold for Normal or Logistic choices of F, leading in these cases to a different interpretation of β. Estimates will also be considered based on these models in Section 5 below.

3.3 Generalizations of the Ordered Probit model

The Ordered Probit model is restrictive in a number of ways. Three in particular will be considered here. It assumes that ε in equation (4) has a constant variance, it assumes that only the intercept in (8) differs across categories, i.e. that the thresholds are constant, and of course it assumes that F is a Normal distribution function. Relaxations of each of these within the class of single index models will be used. All the generalizations considered nest the Ordered Probit model, which therefore provides useful starting values for their Maximum Likelihood estimation.

A convenient relaxation of the homoskedasticity assumption is to take $\mathrm{var}(\varepsilon_i) = \exp(2\theta x_i'\beta)$. In this model the cumulative probabilities are given by

$$\Pr[y_i \leq j] = \Phi\left(\frac{\alpha_j - x_i'\beta}{\exp(\theta x_i'\beta)}\right) \tag{11}$$

A specification that allows the thresholds to vary whilst preserving the single index form of the model takes

$$\Pr[y_i \leq j] = F(\alpha_j - \phi_i x_i'\beta) \tag{12}$$

Alternatively this can be viewed as a model in which the α_j thresholds in (5) are taken to be linear functions of $x_i'\beta$. An identifying normalization is required. $\phi_{J-1} = 1$ is used here.

A convenient way to relax the normality assumption is to use the family of distributions proposed by Ruud (1984). This approach is also used by Melenberg and van Soest (1995). In this specification the cumulative probabilities are given by

$$\begin{aligned} \Pr[y_i \leq j] &= G(\alpha_j - x_i'\beta) \\ G(w) &= \Phi(w + \psi_1 w^2 + \psi_2 w^3) \end{aligned} \tag{13}$$

Monotonicity requires that $\psi_1^2 \leq 3\psi_2$.

Finally the semi-nonparametric estimator of Gallant and Nychka (1987) is applied. This uses a series approximation for the unknown density of the form

$$g(w) = \left(\sum_{k=0}^{K} \alpha_k w^k \right)^2 \phi(w) \tag{14}$$

with $\alpha_0 = 1$. In addition $g(w)$ must be scaled (by a function of the α_k parameters) to ensure that it integrates to 1. This estimator is also used by Melenberg and van Soest (1995).

The full range of models described in this section is considered in Section 5 below, in particular to allow examination of the sensitivity of the estimate of λ to the choice of econometric model.

4 Data

The empirical analysis in this paper is based on data from the British Household Panel Survey (BHPS), which contains a nationally representative sample of households whose members are re-interviewed each year.[1] Wave 5 of the survey (conducted mainly in 1995) is used, since in addition to the information collected at each wave it provides information on financial assets, which will be used in the extended constructions considered below.

BHPS respondents are asked: "How well would you say you yourself are managing financially these days?" and given a 5-point scale of answers to select from, ranging from "living comfortably" to "finding it very difficult". The distribution of responses in the pensioner sample is given in the first row of Table 1.[2] 35% of pensioners respond that they are living comfortably and a further 25% that they are "doing alright". At the other end only 7% say that they are finding it quite or very difficult financially. One in three say that they are "just about getting by". Subjective financial well-being is higher for couples than for single pensioners and higher for single men than single women. However there is relatively little difference between those under and over 70.

4.1 The definition of income

Standard practice in the literature is to measure an individual's current economic position by the equivalised value of weekly net (disposable) *household* income of the household to which he or she belongs. An individual's standard of living depends not only on his or her own income, but also on the income of other members of the household. Thus although the unit of analysis is the individual, the conventional approach takes the equivalised income of a household to represent the standard of living of each individual in the household. The variable z is therefore taken to be weekly net (disposable) household income.

In the basic construction of z used, net income is defined as in the Department of Social Security's Households Below Average Income (HBAI) reports. Full details of the construction of this variable on the BHPS are given in Bardasi et al. (1999). It is the sum

[1] See Taylor (1996) for details.

[2] Throughout the analysis in this paper a pensioner is taken to be a person of state pension age or above (65 for men, 60 for women).

across all household members of: cash income from all sources (income from employment and self-employment, investments and savings, private and occupational pensions, and other market income, plus cash social security and social assistance receipts and private transfers (e.g. maintenance)) minus direct taxes (income tax, employee National Insurance Contributions, local taxes such as the community charge and the council tax) and occupational pension contributions. Income components are measured over the month prior to the interview or the most recent relevant period (except for employment earnings which are 'usual earnings'). All income variables are adjusted to a consistent pounds per week basis.

If this income measure is equivalised using the McClements scale, there is a clear association with the responses on financial well-being (Table 1). 13% of those in the lowest income quintile are finding it quite or very difficult financially. This falls steadily through the quintiles with only about 1% of those in the highest quintile in this category. 17% of those in the lowest income quintile are living comfortably compared with 64% of those in the highest quintile.

4.2 Assets and extended definitions of income

Assets accumulated during working life are likely to be an important influence on the financial well-being of pensioners as well as current income. The three most important categories of wealth are housing wealth, pension wealth (including both private and state pensions) and financial assets. There are important differences between these categories. Pension wealth is non-tradable, financial wealth is typically fairly liquid and housing wealth lies somewhere in between. They therefore play different roles in the process of accumulation and decumulation over the life-cycle and potentially have different influences on the financial well-being of pensioners.

There is also a clear association between the responses on financial well-being and the presence or absence of each of the main components of wealth. Those without any (non-state) pension wealth are far more likely to be finding it quite or very difficult financially and far less likely to be living comfortably than those with a pension. There is a similar contrast between those without and with some financial wealth and between those without and with some housing wealth. Among those without any wealth of any of these three types, 23% are finding it quite or very difficult and three quarters are in this category or just about getting by. In contrast only 3% of those with all three types of wealth are finding it difficult. At the other end, nearly half of those with all three types of wealth are living comfortably compared with 1 in 13 of those with no wealth (excluding state pension rights).

Two specific additions to the definition of income are considered in the analysis below with a view to examining the sensitivity of the estimates to the definition of income used. The first is an estimate of imputed rent. The second concerns financial wealth that is not currently generating income.

Net housing wealth is calculated for home owners as the estimated value of their home less the estimated value of any outstanding mortgage debt.[3] 78% of pension couples and 47% of single pensioners own their own home. Of these, about one in ten have some outstanding mortgage debt. The value of the property is derived mainly from the respondent's expectation of what they would expect to get for their home if sold today. There is then some imputation of missing values from other available information.

[3] For more details on the wealth variables used in this paper see Stewart (2001).

The outstanding mortgage debt is estimated from information on the amount originally borrowed, the year the mortgage on the property started and the years left to run on the mortgage.[4] About 5% of pensioners own other property that they are not currently living in. The value of the property net of any outstanding mortgage is calculated in a similar way and included in net housing wealth.

Imputed rent (or more accurately the net imputed return on housing equity) can be estimated as the income flow from converting the housing equity into an annuity, net of property taxes and mortgage interest. In practice 6% of net housing equity is a commonly-used construction.

The second issue concerns how to treat assets, particularly financial assets, that may not generate current income, but are available for future consumption if required or could be turned into an annuity. If the estimated potential income flow from net financial wealth (again using a 6% interest rate) exceeds the reported investment income, then the difference is taken as an estimate of the imputed income from the part of net financial wealth not generating income. The income variable is then augmented by this factor.

Net financial wealth is calculated as the sum of savings and the value of (financial) investments less any non-mortgage debt. Savings includes bank, building society and post office accounts. Investments include shares, unit trusts, PEPs, premium bonds, national savings certificates, national savings / building society / insurance bonds, government and company securities and other investments. Non-mortgage debt includes hire purchase, mail order purchase, credit card debt, personal loans, DSS Social Fund loans and any loans from individuals.

Estimates are considered in the next section based on income augmented by each of these components as well as on the basic HBAI definition.

5 Results

This section presents estimates of the models outlined in Section 3 using the data described in Section 4. First simple Ordered Probit model estimates are considered. Table 2 presents results for two basic models for pensioners and also (for comparison) non-pensioners. Equivalent estimates are also presented for all family types together. The standard specifications with either number of adults and number of (dependent) children or just household size are considered first. Income is defined in terms of the standard HBAI definition described in Section 4. Control variables are included for age, gender and region of residence. A focus of attention is the implied estimates of λ as given by equation (2). Its asymptotic standard error is constructed using the following variance approximation:

$$\text{Asym Var}(\widehat{\lambda}) = \frac{\lambda^2}{\gamma_1^2}\left\{\frac{\gamma_2^2}{\gamma_1^2}\sigma_{11} - 2\frac{\gamma_2}{\gamma_1}\sigma_{12} + \sigma_{22}\right\}$$

where σ_{11} and σ_{22} are the variances of γ_1 and γ_2 respectively and σ_{12} is the covariance between them.

The estimate of λ for the combined sample at 1.3 is similar to that for non-pensioners only. This is significantly below the McClements scale value of 1.64. The estimate, on this specification, for pensioners is somewhat larger at 1.6 and very similar to both the

[4] 6% of single pensioner home owners own their homes jointly with someone else. In this case equal shares are assumed.

McClements scale ratio and the ratio of state pension rates (1.60). The restriction to a single model for pensioners and non-pensioners is strongly rejected.

The next table considers the appropriateness of using this standard specification of variables in the case of pensioners. Column (2) of Table 3 distinguishes between households with two adults and the number of adults in households with more than two (households with a single adult are the comparison group). Otherwise the specification is as in the bottom half of Table 2. (The number of children is included as a control variable from here on.) The previous specification, which imposes equality of the coefficients on the two new variables, is included in Column (1) for comparison. The estimated effects of the two new variables are very different. That on additional adults after the first two is more than four times as great as that for the two-adult household. Equality of coefficients is clearly rejected (a $\chi^2(1)$-statistic of 9.48). The estimate of λ (based on a two-adult household versus a one-adult household) falls from 1.6 to 1.3. In contrast the income required for a three-adult household is insignificantly different from three times that for a one-adult household to give the same evaluation of financial position.

The third column distinguishes pensioner couples. This specification also rejects equality of coefficients (a $\chi^2(1)$-statistic of 20.5) and dominates the specification in Column (2) in likelihood terms. The estimate of λ falls slightly relative to Column (2), but is still around 1.3. This is considerably less than both the McClements equivalence scale value (1.64) and similar ratio of state pension rates (1.60). The significance of the difference is best tested using a linear Wald test of the hypothesis $\gamma_2 = -\gamma_1 \ln(1.64)$. This gives a $\chi^2(1)$-statistic of 8.60 (p-value = .0034). So the estimated income ratio is significantly less than that implied by the McClements scale values. Similarly it is also significantly less than the ratio of state pension rates.

The lower half of the table presents a set of diagnostic score test statistics. The tests are those given in the appendix to Machin and Stewart (1990), based on applying the general approach of Chesher and Irish (1987) to the Ordered Probit model. The null of a correctly specified functional form (in a RESET type test) is rejected. However the other tests do not give evidence of heteroskedasticity, threshold heterogeneity or non-normality. These tests, while useful, should be treated with caution given the low power often found for score tests of this type in simulation experiments in other settings.

Table 4 presents estimates for alternatives to the standard Ordered Probit model using the same specification of variables. The second column gives results for a cumulative response probability model based on the Extreme Value distribution. (As stated in the previous section, it is equivalent to a Proportional Hazards model and to an EV continuation ratio model.) Its log-likelihood is inferior to that for the Ordered Probit model and the estimate of λ changes little. An Ordered Logit model (results not presented) gives estimates very similar (once scaled) to those for the Ordered Probit model as expected and an estimate of λ of 1.3.

The next column gives the results for the continuation ratio model based on a normal distribution. The log-likelihood improves only very slightly and the estimate of λ remains at 1.3. (An equivalent model based on a logistic distribution is also very similar and gives an estimate of λ of 1.3.)

The final column of Table 4 presents the results for an Ordered Probit model with heteroskedasticity. The null hypothesis of a constant variance is not rejected (which is consistent with the score test in Table 3).

Table 5 gives results for a number of generalizations of the Ordered Probit model that were presented in Section 3.3. (Those for the basic Ordered Probit model are given in the first column for comparison.) The second column gives the estimates for the single index varying threshold generalization of the Ordered Probit model. The restrictions to the Ordered Probit model are rejected at the 5% level, but not at the 1% level. The estimate of λ increases, but only slightly. The estimates of the additional parameters are $\widehat{\phi}_1 = .571$, $\widehat{\phi}_2 = .668$, $\widehat{\phi}_3 = .925$ (ϕ_4 is normalized to 1). All are significantly greater than zero, the first two are also significantly less than 1.

The next column gives the results from estimating the model based on the Ruud generalization of the normal. The additional parameters are jointly insignificant. The Ordered Probit model is not rejected against this model. The estimate of λ is similar to that in the Ordered Probit model.

The final column gives the semi-nonparametric estimates based on the Gallant-Nychka series approximation. This too makes relatively little difference to the estimate of λ. In this case at significance levels of 8% and above the Ordered Probit model restrictions would not be rejected. Of the generalizations considered, the single index varying threshold Ordered Probit model is the only one that produces a significant improvement in the log-likelihood (at the 5% level).

The remainder of this section is concerned with examining the sensitivity of the estimates to the definition of income used. Two specific additions to income are considered, as described in the previous section. The first concerns the importance of housing equity and is addressed by adding an estimate of imputed rent to income.. The second concerns financial wealth that is not currently generating income.

As noted in the previous section, a commonly-used construction for imputed rent is to take 6% of net housing equity. Income augmented by imputed rent constructed in this way is used in the estimated model presented in Column 2 of Table 6. The estimate of λ is increased to close to 1.4. Alternative interest rates could of course be used. A grid search gives the Maximum Likelihood estimate of this interest rate as 4.79% in the context of the current model. However use of this rate only increases the log-likelihood by 0.57 and the estimate of λ changes only from 1.391 to 1.393.

The second augmentation considered concerns the estimated potential income flow from financial assets that do not generate current income. This factor is estimated as described in the previous section. Estimates for the model with income augmented by this factor are given in Column 3 of Table 6. Use of this augmented income measure increases the estimate of λ slightly, but not by as much as incorporating imputed rent. The final column of Table 6 augments income by both factors. There is a further increase in the estimate of λ.

Finally Table 7 presents the single index varying threshold Ordered Probit model estimates for the equivalent specifications to those used in Table 6. In all cases the estimate of λ is increased slightly. In this more general econometric specification with income augmented by both the above factors the estimate of λ is 1.42, indicating that a pensioner couple requires 42% more income than a comparable single pensioner to achieve the same level of subjective financial well-being. Although it has increased, the estimate of λ is still significantly less than both the McClements equivalence scale value (1.64) and the similar ratio of state pension rates (1.60).

6 Conclusions

This paper has used a range of different ordered response models to model pensioners' subjective evaluations of their financial positions and construct equivalence scale relativities for pensioner couples relative to single pensioners (λ).

A heteroskedastic ordered probit model, a generalization of the ordered probit model based on Ruud's (1984) family of distributions and the semi-nonparametric estimator of Gallant and Nychka (1987) all produce estimates which do not reject the restrictions to give the simple ordered probit model. The only specification giving a significant improvement in the log-likelihood is a new specification referred to here as the Single Index Varying Threshold Ordered Probit model. However even this model only increases the estimate of λ slightly.

Four alternative income variables have been considered, incorporating an estimate of imputed rent and/or an estimate of the potential income flow from financial wealth not generating current income. Both increase the estimate of λ slightly. Using income augmented by both these factors and the Single Index Varying Threshold Ordered Probit model gives an estimate of λ which implies that a pensioner couple requires on average 1.4 times as much income as a "comparable" single pensioner to experience the same level of financial well-being.

All income definitions and all model specifications examined give estimates of λ significantly less than both the McClements equivalence scale value and the ratio of state pension rates.

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TABLE 1

Financial Well-being of Pensioners

%

	(5)	(4)	(3)	(2)	(1)
All pensioners	34.9	24.6	33.6	4.8	2.1
Couples	41.4	21.6	32.1	3.6	1.3
Single men	36.0	30.2	25.9	6.4	1.6
Single women	26.4	26.7	37.8	6.0	3.2
Aged under 70	36.4	20.8	35.2	5.6	2.1
Aged 70 and over	34.0	26.8	32.7	4.4	2.1
Bottom income quintile	16.9	22.9	47.3	8.5	4.4
2nd income quintile	20.3	27.2	42.4	6.6	3.5
3rd income quintile	27.3	29.5	36.4	5.3	1.6
4th income quintile	45.9	25.0	25.6	3.1	0.3
Top income quintile	63.8	18.6	16.4	0.6	0.6
No pension wealth	21.7	22.9	42.5	8.9	4.0
Some pension wealth	40.8	25.4	29.6	3.0	1.2
No financial wealth	6.9	18.2	56.0	11.3	7.6
Some financial wealth	38.8	25.1	31.2	3.9	1.0
No housing wealth	19.6	26.1	43.1	6.7	4.5
Some housing wealth	43.4	23.3	28.7	3.8	0.8
None of these	7.6	17.7	51.9	13.9	8.9
All three	48.9	22.8	25.5	2.4	0.3

Notes:
Question asked: "How well would you say you yourself are managing financially these days?"
Responses:
(5) Living comfortably
(4) Doing alright
(3) Just about getting by
(2) Finding it difficult
(1) Finding it very difficult.

TABLE 2

Ordered Probit model estimates

	All family types	Non-pensioners	Pensioners
ln(income)	.689	.681	.807
	(.021)	(.023)	(.053)
# persons	-.175	-.167	-.407
	(.011)	(.012)	(.053)
Sample size	7567	5979	1588
log L	-9781.28	-7779.66	-1946.97
$\widehat{\lambda}$	1.290	1.278	1.656
	(.020)	(.021)	(.092)
ln(income)	.708	.697	.799
	(.022)	(.025)	(.054)
# adults	-.207	-.191	-.383
	(.017)	(.018)	(.060)
# children	-.152	-.150	-.526
	(.015)	(.015)	(.147)
log L	-9778.20	-7778.02	-1946.60
$\widehat{\lambda}$	1.339	1.316	1.614
	(.028)	(.030)	(.102)
L-R test [$\chi^2(1)$]	6.15	3.28	0.75
[p-value]	[.013]	[.070]	[.388]

Notes:

1. All models contain controls for age, gender and region of residence.
2. Asymptotic standard errors in parentheses.
3. p-values for test statistics in square brackets where included.

TABLE 3

Ordered Probit model estimates: Pensioners only

	(1)	(2)	(3)
ln(income)	.799	.775	.800
	(.054)	(.054)	(.054)
# adults	-.383		
	(.060)		
2 adults		-.222	
		(.070)	
# adults > 2		-.923	
		(.129)	
couple			-.221
			(.070)
# other adults			-.615
			(.079)
Sample size	1588	1588	1588
log L	-1946.60	-1941.86	-1936.35
$\widehat{\lambda}$	1.614	1.331	1.318
	(.102)	(.111)	(.106)
Diagnostic score tests:			
Incorrect functional form	13.23	22.45	22.78
[p-value]	[.004]	[.000]	[.000]
Heteroskedasticity	0.21	0.14	0.15
[p-value]	[.644]	[.711]	[.697]
Threshold heterogeneity	5.25	4.17	3.91
[p-value]	[.263]	[.384]	[.419]
Non-normality	2.64	2.16	3.08
[p-value]	[.267]	[.339]	[.214]

Notes:

1. All models contain controls for age, gender and region of residence.
2. Asymptotic standard errors in parentheses.
3. p-values for test statistics in square brackets where included.

TABLE 4

Estimates for alternative models

	(1)	(2)	(3)	(4)
ln(income)	.800	.845	.657	.757
	(.054)	(.062)	(.047)	(.127)
couple	-.221	-.214	-.169	-.212
	(.070)	(.079)	(.058)	(.070)
Sample size	1588	1588	1588	1588
log L	-1936.35	-1941.79	-1935.62	-1936.28
$\widehat{\lambda}$	1.318	1.288	1.294	1.324
	(.106)	(.112)	(.105)	(.106)

Notes:

1. Models are:
   - (1) Ordered probit model
   - (2) EV cumulative response probability model
   - (3) Normal continuation probability model
   - (4) Heteroskedastic ordered probit model
2. All models contain controls for age, gender and region of residence.
3. Asymptotic standard errors in parentheses.

TABLE 5

Estimates for alternative models

	Ordered Probit	SIVTOP	Ruud	SNP
ln(income)	.800	.907	.803	.665
	(.054)	(.068)	(.053)	(.049)
couple	-.221	-.269	-.214	-.187
	(.070)	(.078)	(.070)	(.058)
Sample size	1588	1588	1588	1588
log L	-1936.35	-1931.52	-1935.29	-1932.94
$\widehat{\lambda}$	1.318	1.346	1.306	1.325
	(.106)	(.105)	(.106)	(.106)
Test of extra				
parameters:		9.66	2.11	6.82
deg. of fr.		3	2	3
[p-value]		[.022]	[.348]	[.078]

Notes:

1. All models contain controls for age, gender and region of residence.
2. Asymptotic standard errors in parentheses.
3. p-values for test statistics in square brackets where included.

TABLE 6

Ordered Probit estimates for alternative definitions of income

	(1)	(2)	(3)	(4)
ln(income)	.800			
	(.054)			
$\ln(y_2)$		.932		
		(.058)		
$\ln(y_3)$			.890	
			(.056)	
$\ln(y_4)$				.990
				(.059)
couple	-.221	-.307	-.272	-.342
	(.070)	(.071)	(.072)	(.073)
Sample size	1588	1576	1485	1475
log L	-1936.35	-1894.33	-1778.28	-1747.43
$\widehat{\lambda}$	1.318	1.391	1.357	1.413
	(.106)	(.096)	(.100)	(.094)

Notes:

1. Definitions of income:

   y_2 = income + imputed rent [imputed rent = net housing wealth × .06 / 52]

   y_3 = income + estimated non-income-generating financial wealth × .06 / 52

   y_4 = income + both these

2. All models contain controls for age, gender and region of residence.
3. Asymptotic standard errors in parentheses.

TABLE 7

SIVTOP estimates for alternative definitions of income

	(1)	(2)	(3)	(4)
ln(income)	.907			
	(.068)			
ln(y_2)		.993		
		(.068)		
ln(y_3)			1.018	
			(.071)	
ln(y_4)				1.050
				(.070)
couple	-.269	-.335	-.343	-.369
	(.078)	(.076)	(.080)	(.078)
Sample size	1588	1576	1485	1475
log L	-1931.52	-1890.97	-1771.75	-1743.52
$\widehat{\lambda}$	1.346	1.401	1.401	1.421
	(.105)	(.097)	(.100)	(.090)
Test of OP restrictions:	9.66	6.72	13.06	7.82
[p-value]	[.022]	[.081]	[.005]	[.050]

Notes:

1. Definitions of income:

   y_2 = income + imputed rent [imputed rent = net housing wealth × .06 / 52]

   y_3 = income + estimated non-income-generating financial wealth × .06 / 52

   y_4 = income + both these
2. All models contain controls for age, gender and region of residence.
3. Asymptotic standard errors in parentheses.
4. p-values for test statistics in square brackets where included.