The relationship between the financial position of pensioners and their working-life earnings levels*

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Abstract

This paper demonstrates the important link between the incomes and wealth of pensioners and their working-life earnings levels. It uses the combination of detailed income and asset information and working-life history information available in the British Household Panel Survey. The proportionality predicted by a simple "stripped down" form of the life-cycle model is supported for pensioner couples and male single pensioners, but not for female single pensioners.

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1. Introduction

The fact that on average pensioner incomes have grown faster over the past 20 years than those of the working population in the UK, despite the decline of the basic state pension relative to average earnings, is primarily due to the growth in occupational pensions and investment income. These two components also account for the majority of the difference between the incomes of the better-off and poorest pensioners. Hence much of the explanation of the differences in the incomes of pensioners is likely to lie in their earlier working lives, in their ability to accumulate pension rights and savings. In addition, assets accumulated during working lives, as well as providing income in retirement, are also decumulated to some degree in the retirement phase of the life-cycle, further boosting the financial position of pensioners with them.

Despite its importance, relatively little is known about the relationship between the incomes and wealth of the elderly and their employment and earnings histories during their working lives. However these links between the financial position of pensioners and economic aspects of their earlier working lives are vitally important and lie at the heart of the pensions debate. They are particularly relevant for the important policy debate on the adequacy of savings for retirement.

In the standard “stripped down” life-cycle model assets accumulated during working life and held at retirement will be proportional to lifetime earnings. This paper provides evidence on these inter-temporal relationships between the pre- and post-retirement phases of the life cycle. In particular it examines the proportionality hypothesis. It also examines the role of an individual’s employment history.

The next section gives a very brief description of the relationship of interest in the context of the life-cycle model. The measurement of the income and wealth variables used is described in Section 3, while that of the working-life earnings level is described in Section 4. Sections 5 and 6 present the results for income and wealth respectively and conclusions are given in Section 7.

2. Working life influences on pensioner income and wealth

The living standards of pensioners depend strongly on asset accumulation during their working lives. This paper looks at the impact of working life history factors on pensioner incomes and wealth. The life-cycle model provides economists' standard framework for thinking about inter-temporal allocation. It has been used to study this allocation at many different frequencies, including across stages of the life cycle, such as between working life and retirement (Browning and Lusardi, 1996, Browning and Crossley, 2000). Saving for retirement plays a central role in Modigliani's original formulation of the life-cycle model. The central feature of the life-cycle model is that economic agents attempt to smooth consumption over time (in the sense of holding marginal utility constant), in particular in the current context to equate the pre- and post-retirement marginal utilities.

In the standard "stripped down" life-cycle model asset accumulation during working life will be proportional to lifetime earnings. Modigliani and Friedman both argued for the proportionality of consumption (and hence saving) to lifetime income. In a world without uncertainty this will result if one assumes inter-temporal additivity in conjunction with the within-period utility function taking the iso-elastic (constant coefficient of relative risk aversion) form (although other combinations of assumptions can also give such proportionality). In the standard model this proportionality of consumption then leads to the level of wealth at retirement also being proportional to lifetime earnings.

The evidence on these predictions is mixed. A number of US studies have found that savings and wealth are disproportionately higher in households with high lifetime incomes, i.e. that the savings-to-lifetime-income and wealth-to-lifetime-income ratios rise with income (Diamond and Hausman, 1984, Dynan et al., 2000, Hubbard et al., 1995, inter alia). Others have found that these ratios do not rise with income (Gustman and Steinmeier, 1999, and Venti and Wise, 1998, inter alia). In addition in the context of a more general model than described above, Engen et al. (1999) find that the distribution of US wealth-earnings ratios has thicker tails at both ends than predicted by their calibrated stochastic life-cycle simulation model.

3. The measurement of income and wealth

The empirical analysis in this paper is based on the British Household Panel Survey (BHPS), which contains a nationally representative sample of households whose members are re-interviewed each year.[1] Wave 5 (1995/6) of the survey is used, since in addition to the information collected at each wave it provides information on financial assets. The analysis in this paper is restricted to "pensioners", defined throughout to be those of state pension age or above (65 for men, 60 for women). This section describes the methods used to construct the income and wealth variables used to test the proportionality hypothesis.

The standard practice in the literature measures an individual's current economic position by the equivalised 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.

Net income is defined here 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 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.[2] Incomes are adjusted to a consistent pounds per week basis and then equivalised on the basis of household size and composition to allow for differences in household "needs", using the McClements (before housing costs) equivalence scale (see DSS, 1998). The scale reflects the

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[1] See Taylor (1996) for details.
[2] 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'.

extent to which households of different size and composition require different levels of income to achieve the same standard of living.[3]

Summary statistics of total income by family type are given in Table 1, using the DSS-HBAI classification of family types.[4] Pensioner family units have lower incomes on average than the rest of the population. They typically have higher incomes than single parents, but lower than the three other non-pensioner family types. Equivalised incomes are on average lower for single pensioners than for pensioner couples. This is partly due to the fact that single pensioners are on average older (and pensioner incomes decline with age) and more likely to be women (due to differential mortality rates by gender): single pensioners have a mean age of 75 compared with 70 for pensioner couples and 77% of single pensioners are women.

The financial position of pensioners can also be considered in terms of assets. The three most important categories of wealth are housing wealth, pension wealth (including both private and state pensions) and financial assets. These categories play different roles in the process of accumulation and decumulation over the life-cycle. Pension wealth is non-tradable, financial wealth is typically fairly liquid and housing wealth lies somewhere in between.

Net financial wealth is calculated as the sum of savings and (financial) investments less any non-mortgage debt.[5] 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. For couples equivalised joint wealth is used.[6]

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[3] A single person household is taken as the reference point. This contrasts with the practice in HBAI reports which use a couple without dependents as the reference point.

[4] See Department of Social Security (1998) for details. A family is defined to be a single adult or a couple plus any dependent children. A household may contain more than one family unit.

[5] Respondents unable or unwilling to give an exact amount receive supplementary questions providing ranges. These are allocated conditional weighted median values in the analysis here. See Juster and Smith (1997) for evidence on the benefits of this type of question in the context of US survey data.

[6] Equivalisation is on the basis of the McClements scale, as for incomes, but at a family unit rather than household level. This involves taking 61% of joint wealth for couples, viewed as putting them on a comparable basis to singles. This is a similar factor to one calculated from basic state pension values.

One in eight pensioners have zero or negative net financial wealth. In all 27% have net financial wealth of less than £1,000. The median level is £5,000. Thus many pensioners have little or no liquid wealth. At the other end of the distribution, over a quarter of pensioners have individual net financial wealth of £20,000 or more, one in ten over £55,000. The distribution of financial wealth is heavily skewed. Pensioners who are part of a couple typically have greater (equivalised) financial wealth than single pensioners. Among single pensioners, men typically have greater financial wealth than women.

Net housing wealth is calculated for home owners as the estimated value of their home less the estimated value of any outstanding mortgage debt. 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. 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.[7] 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. Around half of single pensioners have housing wealth, with women have slightly more than men. Pensioner couples are both more likely to have housing wealth than single pensioners and typically have more of it when they do.

To complete the measurement of total wealth a measure of that held in pension entitlements is required. Pensioner wealth is calculated as the expected present discounted value (EPDV) of future pension entitlements. This involves multiplying the level of pension income by an annuity 'factor' (Dilnot et al., 1994), this factor being the inverse of the implied annuity 'rate'. This is broadly equivalent to the approach taken to valuing annuities in a number of recent papers (e.g. Mitchell et al. (1999), Finkelstein and Poterba (1999, 2000)). Under the assumption that pension

[7] 6% of single pensioner home owners own their homes jointly with someone else. In this case equal shares are assumed.

income is indexed to prices, the EPDV for a pensioner of age *A* in discrete time is given by

$$V_A = Y_A \sum_{t=A}^{T} S_t (1+r)^{-(t-A)}$$

where Y_A = pension income at age *A*, *r* = expected real rate of return,[8] *T* is the longest life with non-zero probability,[9] and S_t = the survival probability to age t for someone of current age *A* (S_A = 1). This survival probability is then given by:

$$S_t = \prod_{j=A}^{t-1} (1-q_j)$$

where q_j = the mortality rate at age *j* defined to be the probability that someone aged *j* will die before they reach age *j+1*.[10]

Two sets of mortality rates are used, with separate mortality tables for men and women in both cases. The first set, for the population (of Great Britain) as a whole, is that from the Government Actuary's Department (GAD).[11] The second set is compiled by the Continuous Mortality Investigation Bureau of the Institute of Actuaries (1999) and is for "life office pensioners", that is to say those in insured occupational pension schemes.[12] The rates are for normal retirements and are based on the experience of the 1991-94 quadrennium from offices in the United Kingdom and the Republic of Ireland. The base specification here uses the GAD mortality rates and a real interest rate of 3%.[13] Variations from this base are then considered. Over two-thirds of pensioners have (non-state) pension wealth and the overall median

[8] This calculation ignores the term structure of interest rates. See Finkelstein and Poterba (1999) on this in the context of calculating the money's worth of annuities.
[9] T needs to be at least as large as the highest age with a non-zero survival probability. It is effectively set here by the limit of the life table used. In the calculations used below it is set to either 100 or 120 depending on the life table used.
[10] Rowlingson et al. (1999) use a simplified formulation that assumes a fixed age of death and survival probability of 1 up to that point.
[11] These are the 'Interim Life Tables' for 1997-99 and are ungraduated: see www.gad.gov.uk.
[12] These are the mortality rates used by Finkelstein and Poterba (1999) for their annuity worth calculations.
[13] This is the same rate as used by Disney et al. (1998), while Rowlingson et al. (1999) use a rate of 7% in their construction.

(equivalised for couples) is £7,700. Both the proportion with any and the magnitude are higher for couples than singles and for men than women.

Finally a similar calculation for state pensions (and other state benefits) is conducted to give total wealth. Summary statistics on the total wealth (joint and equivalised) held by pensioners in wave 5 of the BHPS are given in Table 2. It has an overall median of about £85,000. Mean wealth compares reasonably well with that calculated by Rowlingson et al. (1999) using data from the 1995/6 Family Resources Survey.[14] Pensioner couples have higher total wealth (joint and equivalised) than single pensioners. There is a less clear difference between single men and women: women have a higher mean but a lower median. The underlying calculations indicate that on average about half of pensioners' total wealth is held in the form of future pension entitlements, about a third as housing wealth and about a sixth as net financial wealth.

4. The measurement of working-life earnings level

The estimates of earnings during working life used in this paper are constructed from the retrospective information on work histories collected on waves 2 and 3 of the BHPS.[15] The BHPS does not provide historical information on the wages or earnings received during their working lives for current pensioners, and such information would probably be very unreliable gathered retrospectively if it was sought. Instead the construction used here combines BHPS information on the occupational classification of the jobs held during their working lives with earnings information from the New Earnings Survey (NES), with the matching done using information on 3-digit ("unit group") occupational classification, age, gender and full-time/part-time status. The aim is to provide a measure of the smoothed or "permanent" level of earnings over an individual's working life.

The first stage of the process uses the unified BHPS work-life history files (Halpin, 2000) to construct a month-by-month panel containing the above variables for each

[14] They estimate a mean pension wealth among pensioners that is about £4,000 higher than that calculated here and their estimate of mean non-pension wealth is closer to, but slightly lower than, that calculated here.

individual's entire working life (giving a sample of around 1.8 million person-month observations).

The second stage constructs estimated earnings using the NES. A significant part of the pensioners' work histories of course took place before the New Earnings Surveys started being conducted. In addition the occupational classification system used in the NES has changed over time. The currently used Standard Occupational Classification (SOC), which is also used to code occupations in the BHPS work-history files, was only used to classify occupations on the NES from 1991 onwards. Prior to 1991 the earlier KOS system was used (and in its early days an even older system). Thus using NES earnings data by occupation prior to 1991 requires the use of at least a KOS-to-SOC mapping. This would introduce considerable measurement error. It is an open question whether this is greater or smaller than the benefit from using earnings data referring to an earlier date.

The alternative strategy adopted here is to use only NES data from 1991 onwards. This circumvents the mapping-induced measurement errors, but ignores changes over time in occupational earnings differentials. Data is used from the New Earnings Surveys for 1991-99 inclusive. This gives highly accurate earnings information and a sample of around 1.3 million observations. Earnings data for all years are adjusted to a 1995 basis using average earnings. Averages of gross weekly earnings at the 3-digit occupational level are then combined with 1-digit regression-based adjustments for age, gender and full-time/part-time status.[16] Regression equations for the log of gross weekly earnings are estimated for each of the 9 "major group" (i.e. 1-digit) occupations of the form

$$\ln Y_i = \beta_0^m + \beta_1^m A_i + \beta_2^m A_i^2 + \beta_3^m F_i + \beta_4^m P_i + \varepsilon_i \qquad m = 1,\ldots,9$$

where A is age, F is an indicator for female and P is an indicator for female and part-time. The estimated regression coefficients are then used to scale average earnings in the 3-digit occupation "unit" groups within each "major" group. For each

[15] In particular the construction uses employment status information for each labour market spell collected at wave 2 and occupational information for each employment spell collected at wave 3.
[16] Those earning less than £1 or more than £6000 per week are excluded: about 0.01% of observations.

3-digit occupation *j* and each age *a* and within each of these for men (*f = p = 0*), women working full-time (*f = 1, p = 0*) and women working part-time (*f = p = 1*), predicted earnings are calculated as

$$\hat{Y}_{jafp} = \bar{Y}_j.\exp\left[\hat{\beta}_1^m\left(a-\bar{A}_j\right)+\hat{\beta}_2^m\left(a^2-\bar{A}_j^2\right)+\hat{\beta}_3^m\left(f-\bar{F}_j\right)+\hat{\beta}_4^m\left(p-\bar{P}_j\right)\right] \qquad for\ j\in m$$

where $\bar{Y}_j =$ average weekly earnings in occupation j, $\bar{A}_j =$ average age in occupation j, $\bar{F}_j =$ proportion female in occupation *j* and $\bar{P}_j =$ proportion female and part-time in occupation *j*. This gives predicted gross weekly earnings on a 1995 basis for each of 371 3-digit occupation "unit" groups at each age from 16 to 70 for men, for women working full-time and for women working part-time.[17]

In the third stage of the process these estimated earnings figures (converted from weekly to monthly) are matched into the BHPS month-by-month work-life history panel from the first stage. This provides a synthetic estimated-earnings history for each individual for their entire working life. A number of variables can then be constructed from these earnings histories. Two main work-life history variables are used in this paper. The first is the average value of estimated earnings across those months of the individual's lifetime that the individual worked. This average is taken over the months between entering the labour market and the state retirement age (65 for men or 60 for women).

The second variable considered is the number of months that the individual worked. The product of these two variables is an estimate of pre-retirement lifetime earnings. However it may not be a very good measure of the level of resources or living standards available during working life. Since it is a measure of earnings only, months when the individual is not working (during for example unemployment or early retirement) contribute zero to lifetime earnings. An alternative would be to take the measure of resources to be proportional to earnings averaged across the working

[17] Where needed those below 16 are assumed paid as 16-year-olds.

months.[18] Thus the average earnings measure on its own could also be viewed as a lifetime measure – under complete earnings replacement.

5. Results for income

Estimates are presented for the elasticity of current income with respect to the average value of estimated earnings across the individual's working life.[19] Simple log-linear equations with additional demographic controls are used. Dummy variables are included for couples, for females and the interaction between the two. A full set of age dummies (or equivalently birth cohort dummies) is included. The first row of Table 3 gives OLS estimates of the elasticity (with robust standard errors in parentheses). The first column is for the full sample. The effect of earnings level in working life is highly significant (a t-ratio of 14.0). Income differences between pensioners are strongly linked to earnings-level differences during their working lives.[20] The elasticity is also significantly less than 1.

The remaining columns of the table give estimated elasticities from equivalent equations estimated on demographic sub-samples: pensioner couples and male and female single pensioners. This partitioning reveals clear and significant differences in the elasticity across these groups. For pensioner couples and for male single pensioners the estimated elasticity is not significantly different from 1. For these two groups the proportionality hypothesis is supported by the data. The estimated elasticity is significantly lower for single women at 0.33.

Thus the earlier finding that the overall elasticity is significantly less than 1 is entirely due to single female pensioners. This is likely to reflect the exclusion of the working-life earnings level of any past partner: the current income position of single female pensioners may be more closely related to the earnings level of any past partner than their own. The distribution of the ratio of current income to average working-life

[18] Since the variable is to be used in log form, the constant of proportionality does not need to be specified.

[19] For couples the average earnings values are combined and equivalised to match the income construction.

[20] For an analysis focused on the link between pensioner poverty and earnings in working life see Stewart (2001) and for the link between pensioner poverty and employment history see Bardasi and Jenkins (2002).

earnings is considerably more dispersed for female single pensioners than for pensioner couples and male single pensioners. The coefficient of variation of the ratio is 0.64 for pensioner couples, 0.70 for male single pensioners and 1.02 for female single pensioners.

The remainder of Table 3 presents modifications, either to the estimation method or to the specification of the equation, to investigate the robustness of these findings. In the first of these, the results change very little when a linear age structure is imposed on the large set of age dummies used.

If the equation estimated represents a correctly specified model for current income conditional on average earnings during working life and if any non-response or stratification is exogenous, then weighting is unnecessary (the unweighted estimator is unbiased and efficient) and may induce heteroskedasticity.[21] This is further complicated if, as here, the construction of the available survey weights has involved endogenous variables. In the equation specified here, the results are very similar when sampling weights are used.

Around 1 in 10 of the full sample have missing information that prevents the construction of average earnings in working life (mainly missing work-life histories). These individuals are excluded from the estimated equations described so far. The next line of the table uses an alternative procedure, including dummy variables for cases with no work-life history records, no earnings in lifetime and other reasons for a missing value, setting the log-earnings variable to zero and using all observations. The results are very similar. The proportionality hypothesis is accepted for pensioner couples and male single pensioners and rejected for female single pensioners.

When the log of the number of months over which earnings during working life is averaged is added to the equation, it is insignificant in the combined sample and in each of the three demographic sub-samples. Pensioner incomes are not influenced by the amount of their working lives for which they were employed. The inclusion of

[21] Significant differences between weighted and unweighted estimates would be evidence of misspecification (for example due to parameter variation) and require investigation rather than covering up by the use of weights (DuMouchel and Duncan, 1983).

this variable has little effect on the coefficient on average earnings in working life (the next row Table 3) and the hypothesis that the two coefficients are equal (giving the lifetime measure described above) is strongly rejected by the data.[22]

The next issue considered is the influence of potential outliers in the data. The robust regression estimates, which downweight or remove outliers iteratively on the basis of scaled absolute residuals, are very slightly lower for pensioner couples and female single pensioners. However the estimates are all fairly similar and the main conclusions are exactly the same. Since the median is less sensitive than the mean to outliers, median regression estimates are also examined. Here too, while the estimated coefficients are reduced slightly, the main conclusions receive further support. Overall the conclusions on the elasticity of current income with respect to average working-life earnings are not sensitive to outliers.

Finally, results for a further partitioning of the sample are presented: those above and below 75. For all groups the elasticity is smaller for those aged 75 and above than for the under 75s (although it is only significantly so for female single pensioners). Never-the-less, for both age groups the elasticity is insignificantly different from 1 for couples and male single pensioners and significantly less than 1 for female single pensioners.

This proportionality does not result from proportionality for all components of income, rather there is offsetting. Investment and pension income are the main sources of inequality in pensioner incomes and also form the main link with a person's past working life. Income from these sources alone is examined next. Table 4 presents results from the estimation of log-linear equations for the sum of investment and pension income and in particular gives estimated elasticities with respect to average earnings level during working life.

Around 10% of pensioners have no income from either of these sources. The first row of the table gives results from OLS estimation of the equation for those with non-zero income from these sources. For all pensioners combined the estimated elasticity

[22] The test gives t-statistics of 10.0 on the combined sample and 8.0, 4.2 and 5.1 on the three sub-samples.

is 1.756 and it is significantly greater than 1. It is also significantly greater than 1 for each of the three demographic sub-groups given in the table. The estimated elasticity is larger for pensioner couples and male single pensioners than for female single pensioners, as was the case for total income, but even for female single pensioners this elasticity is significantly greater than 1.

These estimates are biased downwards by the exclusion of those without income from these sources from the sample. The next row of the table uses a simple transformation to address this issue: ln(y+1) is modelled instead of ln(y) and those with zero values are included.[23] The estimated elasticity increases slightly for each sub-group and for the combined sample. While simple and "robust" (in that no distributional assumptions are required) this method of estimation ignores the special nature of the zeros (as corner solutions in the underlying model). The standard way of tackling this uses a Tobit model. The estimated elasticities from Maximum Likelihood estimation of the Tobit model are given in the next row of the table. The elasticities further increase slightly for each of the sub-groups and for the combined sample.

Tobit model estimation relies heavily on the normality assumption for the error term in the latent equation. To address this the final row of the table uses censored least absolute deviations estimation (Powell, 1984), which does not require distributional assumptions.[24] For single pensioner groups the estimated elasticity is higher than that from the Tobit model. For pensioner couples it is lower. For all groups it is significantly greater than 1. It is still smallest for female single pensioners, but even for them this estimator gives an estimated elasticity of around 2.

The measure of income considered here, while very general and corresponding to the semi-official one, has some deficiencies as a measure of pensioners' financial position. It excludes housing, which is important for their overall financial position. A factor for imputed rent based on the measure of housing wealth described earlier could be incorporated. Instead the approach taken in the next section is to look

[23] Since the mean of y is fairly large, the adjustment required to give an estimate of the elasticity of y evaluated at the mean is negligible.
[24] Bootstrap standard errors are given.

directly at total wealth. This also addresses the issue of non-income bearing investments.

6. Results for wealth

Equivalent estimates to those presented above for total income are also presented for total wealth (including pension and benefit wealth) in Table 5. The same demographic controls are included. The first row of the table uses the GAD mortality rates and r = .03 to construct the pension and benefit components of total wealth. The estimated elasticity for the sample of all pensioners is 0.77, strongly significant (t = 14.9) and significantly less than 1. This latter is due to female single pensioners as it was for income (and presumably for the same reason). For male single pensioners the estimated elasticity is insignificantly different from 1, while for pensioner couples it is significantly greater than 1. For pensioner couples this estimate is based on using an earnings variable that combines that of the two partners. If only the husband's earnings are used, the estimated elasticity (in the next column of Table 5) is reduced and is insignificantly different from 1 at the 5% level.

The remainder of Table 5 presents corresponding estimated elasticities under modifications to the construction of the wealth variable, to other elements of the equation specification and to the estimation method. The results change relatively little if r = .05 or r = .07 are used or if the CMI occupational pensioner mortality rates are used in place of the GAD ones, although for the GAD rates with r = .05 or .07 the elasticity for couples using husband's earnings is insignificantly different from 1 at the 1% level, but significantly so at the 5% level.[25] As for the current income regressions, neither the use of weights nor the inclusion of those with missing values for average working-life earnings together with an indicator variable make much difference to the results. The inclusion of the log of the number of months over which earnings during working life is averaged has little effect and the hypothesis of equality of the two coefficients is again strongly rejected.[26]

[25] The elasticities are also very similar when the CMI rates are used for occupational pensioners and the GAD rates are used for those not in receipt of an occupational pension.

The results are also similar if either robust regression or median regression is used in place of OLS to weaken the influence of outliers.[27] The estimated elasticity for those aged 75 and over is slightly higher than that for the under 75s for male single pensioners and slightly lower for female single pensioners. For all pensioners combined the elasticity is higher for the under 75s than for the older group. However the general conclusions are the same as above for both age groups.

As is the case with income, the wealth in state pensions (and other social security benefits) are crucial to the above findings. The corresponding elasticity for wealth excluding this component is examined in Table 6. The results are very different to those for total wealth in the previous table. Even when those without positive non-state-benefit wealth are excluded (6% of the overall sample), the estimated elasticity is significantly greater than 1 for the combined sample and for all three demographic sub-groups. The inclusion of the non-positive values, using a transformation, Tobit estimation or the more robust censored least absolute deviations estimation all reinforce this finding.

7. Conclusions

The source of much of the difference between pensioners' financial positions lies in their earlier working lives, in their ability to accumulate pension rights and savings. This paper finds a strong link between the incomes and wealth of pensioners and their average earnings level during their working lives. The estimated elasticity of income in old age with respect to average earnings during working life is insignificantly different from 1 for pensioner couples and male single pensioners, in line with the prediction of the simple "stripped down" life-cycle model, but is significantly less than 1 for female single pensioners (possibly due to the role of the earnings level of any past partner). The estimates of the elasticity of total wealth with respect to working-life earnings are in line with this, although for pensioner couples this is only the case if only the husband's earnings are considered in the construction.

[26] The test gives t-statistics of 14.1 for the combined sample and 11.3, 3.4 and 9.0 for the three sub-samples.

[27] In this case too the elasticity for couples using husband's earnings is insignificantly different from1 at the 1% level, but significantly so at the 5% level.

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Table 1

Equivalised income by family type

£ per week

	Family Type						
	Single pensioner	Pensioner Couple	Couple with children	Couple w/o children	Single with children	Single w/o children	Overall
Mean	129.11	159.18	167.41	219.44	122.79	177.23	177.29
Median	104.46	128.46	148.08	200.38	96.20	159.35	153.54
Upper quartile	149.36	189.33	197.72	269.97	137.61	221.89	218.87
Lower quartile	80.98	92.34	107.94	143.08	70.88	108.05	104.75

Notes:

1. Data from BHPS wave 5 (1995).
2. Incomes are in £/week and equivalised.
3. Sample size = 7,858.

Table 2

Total equivalised wealth of pensioners

£000

	Single men	Single women	Pensioner couples	All
Mean	95.5	99.2	121.9	109.7
Median	78.3	75.2	95.5	85.8
Upper quartile	120.2	123.1	144.6	133.6
Lower quartile	45.4	47.4	62.3	53.5

Notes:

1. Data from BHPS wave 5 (1995).
2. Total wealth (financial wealth + housing wealth + pension (including state-pension) wealth) measured as joint wealth of pensioner family unit and equivalised.
3. Sample size = 1,476.

Table 3

Elasticities of current income with respect to average working-life earnings

	All	Pensioner Couples	Male Single Pensioners	Female Single Pensioners
OLS with age dummies	.532 (.038)	1.092 (.075)	.960 (.198)	.329 (.042)
OLS with linear age term	.533 (.038)	1.122 (.072)	.909 (.176)	.308 (.043)
Weighted LS	.500 (.039)	1.095 (.071)	.909 (.222)	.297 (.041)
Added missing value indicators	.484 (.037)	1.081 (.075)	.967 (.196)	.333 (.042)
With log(months) added	.542 (.039)	1.087 (.077)	.988 (.189)	.331 (.045)
Robust regression (with respect to outliers)	.502 (.036)	1.063 (.071)	.965 (.192)	.300 (.039)
Median regression (i.e. Least absolute deviations)	.495 (.046)	1.033 (.098)	.930 (.262)	.273 (.061)
OLS, age < 75	.645 (.049)	1.119 (.080)	.984 (.252)	.416 (.058)
OLS, age ≥ 75	.370 (.059)	1.005 (.181)	.931 (.317)	.222 (.059)

Notes:
1. Each cell of the table gives the estimated elasticity from a separate regression.
2. Robust standard errors in parentheses.
3. Controls included: couple, female, the interaction between them, and individual age dummies.
4. Sample size = 1404 (4th. row: 1590).

Table 4

Elasticities of investment plus pension income with respect to average working-life earnings

	All	Pensioner Couples	Male Single Pensioners	Female Single Pensioners
OLS on non-zeros only	1.756 (.120)	2.606 (.215)	2.955 (.562)	1.342 (.149)
OLS on transformed dependent variable (including zeros)	1.989 (.116)	2.867 (.211)	3.463 (.535)	1.598 (.143)
Tobit	2.182 (.130)	2.935 (.225)	3.793 (.634)	1.845 (.180)
Censored least absolute deviations estimation	2.452 (.150)	2.643 (.194)	4.036 (.701)	2.172 (.217)

Notes:

1. Each cell of the table gives the estimated elasticity from a separate regression.
2. Robust standard errors in parentheses.
3. Bootstrap standard errors are given for the CLAD estimates.
4. Controls included: couple, female, the interaction between them, and individual age dummies.
5. Sample size = 1255 in first row, 1408 in remainder.

Table 5

Elasticities of total wealth with respect to average working-life earnings

	All	Pensioner Couples: Joint earnings	Pensioner Couples: Male earnings	Male Single Pensioners	Female Single Pensioners
OLS using GAD mortality rates and r = .03	.767 (.052)	1.431 (.090)	1.185 (.099)	1.151 (.241)	.521 (.059)
r = .05	.793 (.053)	1.471 (.093)	1.220 (.101)	1.190 (.248)	.542 (.061)
r = .07	.817 (.055)	1.508 (.095)	1.251 (.104)	1.225 (.255)	.562 (.063)
CMI mortality rates	.762 (.051)	1.426 (.090)	1.181 (.099)	1.144 (.240)	.518 (.058)
Weighted LS	.739 (.057)	1.448 (.098)	1.209 (.107)	1.107 (.283)	.491 (.063)
Missing value indicators and full sample	.715 (.050)	1.420 (.090)	1.188 (.099)	1.135 (.239)	.517 (.060)
With log(months) added	.811 (.051)	1.411 (.090)	1.191 (.101)	1.155 (.246)	.572 (.059)
Robust regression (with respect to outliers)	.781 (.049)	1.431 (.095)	1.241 (.103)	1.270 (.239)	.509 (.058)
Median regression (i.e. L.A.D.)	.779 (.065)	1.494 (.136)	1.188 (.087)	1.237 (.066)	.484 (.074)
OLS, age < 75	.880 (.055)	1.455 (.095)	1.174 (.105)	.982 (.338)	.636 (.063)
OLS, age ≥ 75	.598 (.096)	1.357 (.225)	1.207 (.228)	1.351 (.342)	.370 (.104)

Notes:
1. Each cell of the table gives the estimated elasticity from a separate regression.
2. Robust standard errors in parentheses.
3. GAD mortality rates and r = .03 used except where stated to the contrary.
4. Controls included: couple, female, the interaction between them, and individual age dummies.
5. Sample size = 1309 (6th. row: 1474).

Table 6

Elasticities of wealth excluding state benefits with respect to average working-life earnings

	All	Pensioner Couples		Male Single Pensioners	Female Single Pensioners
		Joint earnings	Male earnings		
OLS on positive values	1.841 (.153)	2.439 (.189)	2.078 (.189)	2.622 (.572)	1.580 (.206)
OLS,transformed variable (including non-positives)	2.851 (.254)	4.036 (.447)	3.161 (.354)	5.495 (1.310)	2.265 (.323)
Tobit	2.880 (.238)	3.851 (.375)	3.089 (.401)	5.901 (1.207)	2.372 (.336)
Censored least absolute deviations estimation	2.199 (.153)	2.346 (.227)	1.831 (.129)	3.125 (.703)	1.935 (.184)

Notes:
1. Each cell of the table gives the estimated elasticity from a separate regression.
2. Robust standard errors in parentheses.
3. GAD mortality rates and r = .03 used.
4. Controls included: couple, female, the interaction between them, and individual age dummies.
5. Sample size = 1233 in first row, 1311 in remainder.