Voluntary Contributions to Personal Pension Plans: Evidence from the British Household Panel Survey

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Abstract

In this paper, we use data from the British Household Panel Survey (BHPS) for the years 1992 to 1998 to study the determinants of saving in the form of voluntary contributions to personal pension plans (PPPs). We first estimate a probit model with selection for the probability of making these voluntary contributions. We then estimate a random-effects tobit regression for the amounts contributed and compare the results with those of a similar regression for conventional saving. Our findings suggest that voluntary contributions to PPPs are made essentially for retirement purposes, whereas conventional saving is undertaken for precautionary motives. The former type of saving is thus unlikely to offset the latter completely.

JEL classification: D12, D91, E21, I38, J32.

I. INTRODUCTION

During the 1980s, the UK pension system was characterised by a significant shift away from public pay-as-you-go towards private funded pension provision. Prior to 1988, employees with income above a lower earnings limit could join the State Earnings-Related Pension Scheme (SERPS), which is a pay-as-you-go earnings-related scheme, for the provision of the second-tier part of their

retirement income.[1] Alternatively, they could contract out of SERPS, into defined benefit occupational pension schemes, which were generally made compulsory by employers to eligible employees.[2]

Following the 1986 Social Security Act, an important reform in the direction of a privately funded pension system was that employees were allowed to contract out of SERPS into personal pension plans (PPPs). Personal pensions are individual retirement accounts (IRAs), directly comparable to the IRAs existing in the US. In these schemes, contributions are accumulated in a fund.[3] In order to contract out of SERPS into a personal plan, a minimum contribution has to be made into the plan. This contribution is made directly by the Department of Social Security (DSS), using a proportion of the individual's NICs. Initially, this proportion was made up of the contracting-out rebate, which was available to members of occupational pension schemes prior to the reform, plus an extra 2 per cent incentive reduction of the NIC rate for not previously contracted-out employees.[4] The part of the PPP that contains the contributions made by the DSS is called an appropriate personal pension (APP) or rebate-only scheme, and it provides 'protected-rights' benefits which stand in the place of SERPS benefits (Blake, 2000). Between the ages of 60 and 75, the funds accumulated in the APP and the investment returns from these funds must be used to purchase an annuity, which must be joint with life, have limited price indexation and be priced on a unisex base.

Another characteristic of the 1986 Act was that occupational pensions were made voluntary in all cases. This gave many employees likely to change jobs

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[1]A first-tier flat-rate state pension can be received by anyone who makes the required National Insurance contributions (NICs). The basic pension for a single person is currently worth £67.50 a week, which represents 16 per cent of average earnings. One problem with this type of pension is that it rises with prices, not with earnings. Given the increase in real wages, a second-tier earnings-related provision is thus necessary to compensate for the reduction in the ratio of first-tier state pension to average earnings. A large number of pensioners also receive means-tested benefits such as income support, housing benefit and council tax benefit (Dilnot et al., 1994).

[2]By contracting out of SERPS into an occupational pension plan, employees (and employers) paid reduced NICs, and the pension scheme initially took responsibility for paying all members a guaranteed minimum pension (GMP) on retirement (see Dilnot et al. (1994)). Since April 1997, however, GMPs no longer accrue. They have been replaced with a new test (the reference scheme test) on the overall quality of the scheme. To be able to contract out of SERPS, the occupational scheme must offer benefits that are broadly the same as or better than the test standard (Tonks, 1999).

[3]These types of schemes are defined contribution schemes.

[4]The contracting-out rebate made available to members of occupational pension schemes was initially set at 5.8 per cent of the employee's earnings between the lower and upper earnings limits. From April 1993, it was reduced to 4.8 per cent. Since April 1997, the DSS rebate has been available on an age-related basis. The 2 per cent extra rebate was aimed at providing an incentive for individuals still in SERPS to contract out of SERPS into personal schemes. It was thus a temporary incentive, which was subsequently reduced to 1 per cent for people over 30 (see Disney and Whitehouse (1992) and Budd and Campbell (1998)). According to Budd and Campbell (1998), in 1992–93, the median contribution of contracted-out rebate into a PPP account was £9 per week for a man and £6 per week for a woman.

often the incentive to take PPPs instead. Being defined contribution rather than defined benefit plans, the latter are in fact 'portable', which means that changing jobs does not affect the value of the personal pension. The reform also allowed workers who decided to contract out of SERPS to take on occupational defined contribution schemes. The latter were, however, much less widely spread than the defined contribution personal pension schemes. As a consequence of the reforms, by 1992, 28 per cent of male and 19 per cent of female employees had contracted out into personal pensions (Dilnot et al., 1994).[5]

Individuals are not required to make any additional contribution into their PPPs on top of those made on their behalf by the DSS. Especially for younger people, a rebate-only personal pension is likely to provide a better pension than SERPS (Disney and Whitehouse, 1992).[6] However, individuals have the option to make voluntary contributions.[7] These contributions are deductible against income tax up to a certain limit, and investment returns are also tax-free.[8] When they retire, individuals can withdraw a 25 per cent lump-sum amount tax-free from the proceeds of that part of their personal pension that is made up of their voluntary contributions. Between the ages of 50 and 75, they can use the remaining 75 per cent to buy an annuity, which is more flexible than the one they can purchase with the protected-rights part of their pension. According to the British Household Panel Survey, in 1992, 73 per cent of those employees who were covered by PPPs made voluntary contributions to the fund. Little attention has been devoted in the literature to these voluntary contributions. The first objective of this paper is to bridge this gap.

There is an ongoing debate in the US on whether contributions to pension plans such as IRAs and 401(k)s[9] crowd out other personal saving (see, among others, Bernheim (1999) for a survey, Engen, Gale and Scholz (1996), Gale (1998) and Poterba, Venti and Wise (1995 and 1996)). This is a crucial issue in

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[5]The very rapid (and unexpected) take-up of personal pensions can also be explained by the so-called 'mis-selling' of personal pensions. For instance, thousands of members of occupational pension plans were persuaded to switch out of them into personal pensions, even though they would have been better off staying with their original plans. Another factor that might have pushed employees to shift from an occupational pension plan to a personal pension is the trade-off of current for future consumption implied in some cases by the shift. As explained by Barrientos (1998), workers who were required by their occupational pension schemes to make contributions above the NI contributions could reduce these to the NI contributions by shifting to a personal pension (also see Disney and Stears (1996)).

[6]However, note that, given the high charges that characterise rebate-only personal pensions, individuals often choose to have a personal pension, while not contracting out of SERPS. In this way, they can take advantage of the tax privileges associated with saving through pensions without giving up the SERPS benefits.

[7]The proceeds of these voluntary contributions represent the third-tier part of the individuals' retirement income.

[8]Before July 1997, dividend tax credits were payable at a rate of 20 per cent on shares held in private pensions. In July 1997, these dividend tax credits were abolished, making the tax-favoured position of personal pensions slightly worse. As shown in Emmerson and Tanner (2000), every £1 of dividend income was in fact worth £1.25 before July 1997, but only £1 thereafter.

[9]401(k)s are voluntary corporate pension plans, where employees can decide how their money is invested.

determining whether contributions to PPPs represent new saving. Because they have a more favourable tax treatment than other forms of saving, personal pensions increase the net return to saving. This generates an income effect, which should reduce overall saving, as well as a substitution effect, which should work in the opposite direction, leading to an ambiguous overall effect. In addition, being illiquid, pensions should raise the saving of those households that face binding liquidity constraints (Gale, 1998). As Samwick (1998, p. 134) puts it, 'the disadvantage of the retirement account relative to other savings accounts is that it cannot be used prior to retirement if needed to buffer consumption against random falls in income'. It is therefore reasonable to assume that agents use saving in the form of voluntary contributions to PPPs to ensure a comfortable living standard in retirement, while taking advantage of the tax incentives,[10] and conventional saving to buffer current consumption against income shocks. The two forms of saving, being undertaken for different reasons, are thus unlikely to be interchangeable and to offset each other totally (Gale, 1998). In such circumstances, one can expect voluntary contributions to PPPs to be at least partially financed with reductions in consumption or increases in labour supply. To this extent, these contributions represent new saving.

The second objective of this paper is to shed some light on this issue. We initially focus on the determinants of tax-favoured saving in the form of voluntary contributions to PPPs and see how they compare with those of more conventional savings vehicles. Our results, based on data from the British Household Panel Survey for the years 1992 to 1998, show that, while saving in the form of voluntary contributions to PPPs tends to increase with age, saving in more liquid vehicles is strongly affected by earnings variability. This confirms that the two types of saving are indeed accumulated for different purposes: the former to ensure a comfortable retirement and the latter for precautionary reasons. Together with the fact that controlling for unobserved individual heterogeneity we find no evidence of a negative relationship between the two types of saving, this result corroborates the hypothesis that the two types of saving are unlikely to offset each other completely.

The rest of the paper is laid out as follows. In Section II, we illustrate our dataset and present some descriptive statistics. In Section III, we first describe the results of a probit regression with selection, which sheds some light on the determinants of the probability of making voluntary contributions to PPPs. We then estimate a random-effects tobit regression for the amounts contributed, which we compare with a similar regression for conventional saving. Section IV presents some concluding remarks.

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[10]Laibson, Repetto and Tobacman (1998) provide an alternative explanation for why workers save in the form of voluntary contributions to PPPs. They argue that short-run discount rates are much higher than long-run rates (hyperbolic discounting); consumers would thus like to save more than they in fact do, and they use commitment devices such as pension plans to achieve this purpose.

II. MAIN FEATURES OF THE DATA AND DESCRIPTIVE STATISTICS

1. The Dataset

The data used in this paper consist of waves 2 to 8 of the British Household Panel Survey (BHPS), covering the years 1992 to 1998. A representative sample of 10,000 individuals living in Britain were interviewed in 1991. These individuals, together with their co-residents, were interviewed again each year thereafter. The BHPS provides information on respondents' demographic, occupational, educational, income and saving characteristics.[11] We limit our analysis to all employees aged between 20 and 65, excluding the self-employed.[12] We thus have an unbalanced panel, made up of 8,608 workers and corresponding to 33,478 person-year observations.

2. Descriptive Statistics

In each wave of the BHPS except wave 1, individuals are asked the following question on their participation in PPPs: '*In the past year, ... have you paid any contributions or premiums for a private personal pension, or had such contributions paid on your behalf by the DSS?*'. Column 1 of Table 1 shows that, on average, 21.82 per cent of employees were covered by a PPP over the period 1992–98.[13] The proportion covered is lower for the under-25s and for the over-55s, and higher for those respondents aged between 25 and 29. As explained by Disney, Emmerson and Tanner (1999, p. 10), 'this is not surprising since these people will have longer to accumulate interest in either funds and are also more

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[11]For more details on the BHPS, see Taylor (1994) and Taylor (1996).

[12]Although the self-employed are the main participants to PPPs (see Disney, Emmerson and Tanner (1999)), we have excluded them from our sample for the following reasons. First, it was crucial to include within the explanatory variables of our equations for voluntary contributions to PPPs and for more conventional saving a measure of expected earnings variability to capture the precautionary motive for saving, but data on earnings are not provided for the self-employed. Second, for the self-employed, it is particularly difficult to separate personal saving from saving invested in the firm. Third, the self-employed are typically characterised by severe problems of under-reporting (Alessie and Lusardi, 1997).

[13]Sometimes, individuals state that they belong to a company pension scheme and make contributions into a PPP. This can happen in four cases. First, individuals could contribute to a PPP as part of self-employment and be on an occupational pension as part of employment: for instance, an academic could contribute to a PPP out of consulting income while still being in the University Superannuation Scheme (USS). Second, members of occupational schemes might be allowed to make additional contributions to their pensions. In most cases, the contribution facility is arranged by the pension scheme itself, and the contributions are called additional voluntary contributions (AVCs). In other, less frequent, cases, the facility may be arranged by some other provider, and the contributions are referred to as free-standing additional voluntary contributions (FSAVCs). Both AVCs and FSAVCs are considered as personal pensions (see Blake (1995) and Tonks (1999)). Third, individuals could have a contracted-in occupational scheme and contract out with a personal pension, in which case, however, voluntary contributions are not allowed. Finally, when asked about their employer's pension scheme, individuals might actually be referring to a group personal pension scheme, which would obviously allow for voluntary contributions.

TABLE 1

Participation in PPPs and Voluntary Contribution Patterns

	(1) Percentage participating in PPPs[a]	(2) Percentage of PPP members making voluntary contributions[b]	(3) Average non-zero weekly voluntary contributions (£)	(4) Average non-zero weekly saving in conventional forms[c] (£)
All	21.82	73.38	14.92	8.56
Males	25.86	75.45	16.89	9.73
Females	18.09	70.68	12.14	7.47
Age				
20–24	14.00	60.40	6.99	7.42
25–29	24.56	71.73	11.26	8.81
30–34	23.94	74.78	12.41	8.57
35–39	23.33	73.79	14.92	8.13
40–44	23.65	72.81	16.19	9.51
45–49	23.63	73.59	16.90	8.37
50–54	22.11	78.73	19.57	8.86
55–59	18.77	79.55	27.08	9.45
60–65	13.78	89.66	18.71	8.40
Education				
University degree or higher	20.33	80.18	22.94	12.63
A levels / professional qualns	23.62	73.44	15.91	8.54
O levels / vocational qualns	21.23	71.92	11.19	7.08
No qualifications	19.84	69.42	11.19	6.81
Earnings				
Decile group 1 (lowest)	6.66	59.90	6.53	4.56
Decile group 2	13.28	67.00	7.11	6.38
Decile group 3	16.73	64.80	8.05	5.61
Decile group 4	23.94	66.48	9.73	6.20
Decile group 5	23.41	71.41	9.76	7.26
Decile group 6	25.84	73.38	11.21	6.66
Decile group 7	26.00	75.35	12.42	7.86
Decile group 8	26.50	77.11	14.24	9.03
Decile group 9	25.97	78.01	18.92	9.52
Decile group 10 (highest)	29.39	81.92	31.06	17.07
Financial situation and saving				
Finl situation perceived as good	22.95	74.39	16.01	9.50
Finl situation perceived as bad	16.50	66.30	11.25	3.51
Savers	24.34	75.21	15.96	—
Non-savers	19.08	71.06	13.43	—

Notes to Table 1
[a]The percentage of employees participating in PPPs represents the number of employees who answered yes to the question '*In the past year, ... have you paid any contributions or premiums for a private personal pension, or had such contributions paid on your behalf by the DSS?*' divided by the total number of employees who were asked the question.
[b]The percentage of PPP members making voluntary contributions is given by the proportion of the sum of all post-1988 and pre-1988 PPP participants who respectively answered yes to the question '*Since September 1ˢᵗ [of last year], over and above those contributions paid on your behalf by the DSS, have you yourself made any extra contributions towards your personal pension?*' or gave a non-zero response to the question '*How much was your last contribution or premium?*'.
[c]This type of saving includes saving in bank, building society or Post Office accounts, accumulated for reasons other than to meet regular bills, as well as share purchase schemes and personal equity plan schemes.
Source: BHPS, waves 2 to 8.

likely to benefit from their flexibility'. Personal pension coverage is higher for males than females and for people with A levels or professional qualifications than employees with higher or lower educational qualifications. It also tends to increase with net monthly earnings: only 6.66 per cent of employees in the lowest salary decile are covered, compared with 29.39 per cent of those in the highest decile. This might be due to the high upfront charges that characterise PPPs, making them inappropriate for workers with low earnings (Disney, Emmerson and Tanner, 1999). Similarly, of the individuals who perceive their present financial situation as good, 22.95 per cent are covered, compared with 16.50 per cent of those who perceive it as bad. Finally, 24.34 per cent of the individuals who save in more conventional vehicles (the savers) are covered by PPPs, compared with 19.08 per cent of those who do not save.[14] The pattern of workers' participation in PPPs is not regular. If we consider the workers who were present in all seven waves (balanced sample), we can see that 51.84 per cent never participated in a PPP while only 7.85 per cent participated in all waves.[15]

If the answer to the question on participation in a PPP is positive, individuals are then asked whether their policy was taken out before 1 July 1988 or since then. Respondents whose pensions started before 1 July 1988 are then asked '*How much was your last contribution or premium?*' and '*How long did that cover?*'.

Personal pensions taken out before 1 July 1988 were essentially retirement annuities, also known as Section 226 policies.[16] These are no longer available as

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[14]The individuals who save in more conventional vehicles are those who answered yes to the question '*Do you save any amount of your income, for example by putting something away now and then in a bank, building society, or Post Office account other than to meet regular bills? Please include share purchase schemes and Personal Equity Plan schemes.*'.
[15]Contrary to Disney, Emmerson and Tanner (1999), who define individuals as having a personal pension over the entire period considered if they say that they belong to a personal pension at least once during the period, we allow individuals' pension status to change from one year to the next.
[16]Retirement annuities were generally taken by the self-employed and by those employees whose employer did not provide a pension. These policies had been created as a result of the Income and Corporation Taxes Act of

new investments, but if an individual already has one, he or she can keep it. One difference between pre- and post-1988 personal pensions is that only for the latter does the DSS make contributions directly into the fund. Since the contracting-out option does not apply to retirement annuities, all the contributions in those plans are voluntary. On average, about 25 per cent of the employees covered by a PPP between 1992 and 1998 had a pre-1988 pension plan.

Respondents whose pension started after 1 July 1988 are asked '*Since September 1st [of last year], over and above those contributions paid on your behalf by the DSS, have you yourself made any extra contributions towards your personal pension?*', '*How much was your last contribution?*' and '*How long did it cover?*'.

Column 2 of Table 1 looks at the proportion of employees covered by either pre- or post-1988 PPPs who made voluntary contributions to their PPPs.[17] We can see that between 1992 and 1998, this proportion was 73.38 per cent. The proportion tends to increase with age, going from 60.40 per cent for the 20–24 age-group to 89.66 per cent for the 60–65 age-group. Of the males belonging to PPPs, 75.45 per cent made voluntary contributions, compared with 70.68 per cent of the females. The proportion of PPP members making voluntary contributions generally rises with educational qualifications and with real monthly earnings, and it is higher for those individuals who save in more conventional vehicles.

The average non-zero weekly voluntary contribution to a PPP over the period 1992–98 was £14.92. It increased from £12.96 in 1992 to £16.32 by 1998. Column 3 of Table 1 shows that the average contribution increases gradually with age for employees aged 20 to 59. The highest average contribution, made by people in the 55–59 age-group, is £27.08. Males generally contribute more than females, and more-educated people more than the less-educated. The average weekly voluntary contribution also goes up with real earnings. Finally, the average contribution of the savers (£15.96) is higher than that of the non-savers (£13.43).

For comparison purposes, we report in column 4 the respondents' average non-zero weekly saving in more conventional vehicles. These figures are obtained by dividing by four the answer to the question '*About how much on average do you manage to save a month?*', which was asked of those individuals who answered yes to the question on whether they saved any amount of their income, spelled out in footnote 14. We can see that, over the sample period, the average non-zero weekly saving in conventional forms (£8.56) is smaller than

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1970. Before 1970, there were approved deferred-annuity contracts written under the 1956 Finance Act (Blake and Orszag, 1999).

[17]From this point on, we shall consider PPPs in a broad sense, including APPs, retirement annuities and other personal pensions. It is important to note that, although this is not possible for APPs, one can have a personal pension without necessarily being contracted out (also see footnote 6).

the average non-zero weekly voluntary contribution to PPPs (£14.92). Considering these figures as a percentage of weekly earnings, the corresponding numbers are 4.61 per cent and 6.43 per cent respectively. The differences in conventional saving across age-groups are less evident than the differences in voluntary contributions to PPPs. Like the voluntary contributions, conventional saving generally increases with education and earnings. It is interesting to see that the difference between average voluntary contributions to PPPs and average conventional saving also tends to increase with education and earnings. For instance, for those individuals belonging to the lowest earnings decile, this difference amounts to about £2, whereas for the individuals belonging to the highest decile, it amounts to about £14.

III. EMPIRICAL RESULTS

In this section, we will initially estimate a probit equation for the probability of making voluntary contributions to PPPs. Since data on these contributions are only available for those individuals who participate in a PPP, there is a potential sample selection bias. Failure to account for sample selection is likely to lead to inconsistent estimation of the parameters determining the probability of making voluntary contributions to PPPs, as these might be confounded with parameters determining the probability of participating in PPPs. To correct for the sample selection bias, we use the maximum likelihood methodology illustrated in Van de Ven and Van Pragg (1981). We subsequently analyse the determinants of the amounts that people contribute to their pensions, focusing on how they compare with the determinants of saving in more conventional and more liquid forms. By doing this, we aim to shed some light on whether and to what extent the two types of saving tend to offset each other.

1. Probit Regression with Sample Selection for the Probability of Making Voluntary Contributions to PPPs

In order to analyse what determines the probability of making voluntary contributions to one's PPP, we will initially consider the following regression model:

$$(1) \qquad y_{it}^* = x_{it}' \beta_1 + u_{1it},$$

where: y_{it}^* represents the net benefit of making a voluntary contribution for individual i at time t and is unobservable; and x_{it} represents a set of characteristics of individual i at time t, including age, educational and occupational dummies, gender, number of children and number of adults present in the household, marital and health status, and a home-ownership dummy.

These variables are assumed to affect the individual's preferences. x_{it} also includes the respondent's expectations about his or her financial situation in the year to come and a proxy for his or her permanent income.[18] The former variable is included to see whether, in accordance with the permanent income hypothesis, individuals save to offset expected declines in income, while the latter is included because there is evidence that saving varies with permanent income (Carroll and Samwick, 1997 and 1998).[19]

Having assumed that y_{it}^* represents the net benefit of making a voluntary contribution and is unobservable, we focus on the binary variable indicating whether individual i makes any voluntary contributions at time t, i.e. on the variable y_{it} defined as follows:

$$
\begin{aligned}
y_{it} &= 1 \quad \text{if} \quad y_{it}^* > 0 \\
y_{it} &= 0 \quad \text{if} \quad y_{it}^* \leq 0.
\end{aligned}
\tag{2}
$$

y_{it} is only observed for those individuals who participate in a PPP, because only those are asked questions about the voluntary contributions that they make to their plans. Following Van de Ven and Van Pragg's (1981) method, we therefore estimate equation (1) using a probit model with sample selection. The selection mechanism is determined by the following equation:

$$
z_{it}^* = w_{it}'\beta_2 + u_{2it},
\tag{3}
$$

where z_{it}^* represents the unobservable net benefit of participating in a PPP for individual i at time t. Since we only observe whether individual i participates in a PPP, we only have an indicator of the sign of z_{it}^*, which can be represented as follows:

$$
\begin{aligned}
z_{it} &= 1 \quad \text{if} \quad z_{it}^* > 0 \\
z_{it} &= 0 \quad \text{if} \quad z_{it}^* \leq 0.
\end{aligned}
\tag{4}
$$

z_{it} is the binary variable indicating whether individual i participates in a PPP in year t. w_{it} includes all the variables in x_{it}, together with other variables that are

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[18]Permanent income is calculated by taking the fitted values from a random-effects regression of individuals' real net monthly earnings on demographic variables, a home-ownership dummy, regional, educational and occupational dummies, and interactions of the last two groups of dummies with age and age squared (see Carroll, Dynan and Krane (1999)).

[19]Permanent income and home-ownership can also be seen as proxies for respondents' wealth.

assumed to affect the respondent's decision to take a PPP but not his or her decision on whether to make additional contributions to the plan. These additional variables are mainly related to the individual's job, and more in particular to his or her job mobility.[20] They are the individual's job tenure, the number of different jobs he or she held in year t and dummies indicating whether he or she has a permanent job, works full-time or works in the private sector.

The residuals in equations (1) and (3) are assumed to follow a bivariate standard normal distribution with correlation coefficient ρ. Let us denote by P the set of individuals who participate in PPPs, with Φ the standard cumulative normal distribution function and Φ_2 the cumulative bivariate normal distribution function. The log likelihood function for our problem can then be written as follows:

(5)
$$L = \sum_{it \in P; y_{it}=1} \ln\left[\Phi_2\left(x_{it}'\beta_1; w_{it}'\beta_2; \rho\right)\right] + \sum_{it \in P; y_{it}=0} \ln\left[\Phi_2\left(-x_{it}'\beta_1; w_{it}'\beta_2; -\rho\right)\right]$$
$$+ \sum_{it \notin P} \ln\left[1 - \Phi\left(w_{it}'\beta_2\right)\right].$$

The first term refers to those respondents who have a PPP and make voluntary contributions at time t. The second term refers to those who have a PPP and do not make voluntary contributions at time t. The third term refers to those respondents who do not have a PPP and for whom data on voluntary contributions are thus not observed. By maximising this log likelihood function, we obtain consistent and efficient estimates of the vectors of the parameters β_1 and β_2.

The probit estimates of equation (1) corrected for sample selection are reported in Table 2.[21] We can see that the age dummies play a particularly important role in determining whether individuals make voluntary contributions to their PPPs. In particular, although, due to the compound interest effect, the financial value of the contributions is higher for younger people (Disney and Whitehouse, 1992), the probability of making these contributions increases with age. This suggests that the main motivation of this type of saving is to provide for retirement. Older people will in fact reach retirement sooner and are more

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[20]It is, in fact, well known that mobile workers are better off choosing a PPP.

[21]This estimation is performed for the seven available waves pooled together. Although we have panel data, we are not able at this stage to incorporate unobserved individual heterogeneity fully while correcting for sample selection bias. However, we allow the observations to be independent across individuals. We also estimated equation (1) using a simple probit specification and a random-effects probit specification, not correcting for sample selection bias. The results, which we do not report, for brevity, were similar to those in Table 2.

TABLE 2

Probit Estimates for the Probability of Making Voluntary Contributions to PPPs (with Selection)

Dependent variable = 1 if voluntary contributions to PPPs are made; = 0 otherwise

	Coefficient	Asymptotic t-ratio
Demographic variables		
Age:[a]		
25–29	0.167	1.71
30–34	0.228	2.10
35–39	0.247	2.18
40–44	0.249	2.30
45–49	0.254	2.40
50–54	0.462	4.18
55–59	0.469	3.85
60–65	0.968	5.13
Male	0.040	0.68
Number of adults in household	−0.049	−1.89
Number of dependent children in household	−0.027	−0.80
Married or cohabiting	0.0005	0.01
Education[a]		
University degree or higher	0.224	2.12
A levels / professional qualifications	0.091	1.27
O levels / vocational qualifications	0.133	1.86
Occupation[a]		
Professional	−0.034	−0.39
Associate professional and technical	−0.059	−0.75
Clerical and secretarial	−0.163	−2.10
Craft-related	−0.116	−1.40
Personal and protective services	−0.135	−1.43
Sales	−0.160	−1.70
Plant and machine operators	−0.101	−1.14
Others	−0.088	−0.68
Financial variables		
Financial situation expected to deteriorate	0.105	1.66
Financial situation expected to improve	0.064	1.47
Permanent income ($\times 10^{-3}$)	0.098	0.92
Other variables		
Owns a house	0.069	1.14
Health status	0.001	0.05
Sample size	29,021	
Log likelihood	−17,723.11	
Chi-squared	$\chi^2(51) = 150.89$	
Rho	$\rho = -0.248$	

likely to be worried about not having a comfortable living standard when the moment comes. Considering educational background, the probability of making voluntary contributions is highest for people with a college or higher educational qualification. This can be explained by a number of factors such as the lower discount rates and greater job security that these people are likely to face. One could also argue that, being characterised by complex charging structures, PPPs are generally difficult to understand for people with lower educational qualifications.[22] Regarding occupational effects, people working in clerical, secretarial and sales occupations are less likely to make voluntary contributions than the excluded category of managers and administrators.

2. Random-Effects Tobit Regressions for the Amounts Contributed to PPPs and for Saving in Conventional Forms

We next estimate an equation for the weekly voluntary contribution made by individual i at time t to his or her PPP. In this case, the dependent variable is observable but only takes positive values. We perform a similar exercise for weekly saving in more conventional forms.

Since previous research has found that the precautionary motive plays a significant role in determining saving in the UK (see Dardanoni (1991), Merrigan and Normandin (1996), Miles (1997), Banks, Blundell and Brugiavini (1999) and Guariglia (2000)), it is important to include a measure of income risk in both specifications. The measure that we use is expected earnings variability, and it is based on the following question asked in waves 6 and 7 of the survey: '*In the next twelve months, how likely do you think it is that you will become unemployed?*'. The answers that can be given to this question are: very likely, likely, unlikely and very unlikely. After rescaling these responses to 0–1, we can interpret them as a subjective probability distribution of the relevant event. In this framework, an individual loses his or her job with a subjectively evaluated probability of p, in which case he or she earns 0. With a probability of $1-p$, the individual does not lose his or her job and earns *Y*. The individual's earnings can thus be seen as a random variable, with expected value equal to $(1-p)Y$ and variance of $p(1-p)Y^2$. As in Lusardi (1998) and Guariglia (2000), we use the

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[22]It is unlikely that education plays an important role in determining the probability of making extra contributions to PPPs because it proxies for income effects. The latter are, in fact, directly taken into account in the regression through permanent income.

latter as our measure of income risk. Given that the relevant question is only asked in waves 6 and 7 of the BHPS, we only use these two waves in estimation.

We estimate our equations for the amounts contributed to PPPs and for conventional saving using a random-effects tobit specification, which allows us to control for unobserved individual heterogeneity but not for selectivity bias. A tobit specification is necessary, since both types of saving are censored at 0. Our estimating equation can specifically be written as

$$(6) \qquad s_{it} = x'_{it}\beta_3 + \gamma VAR_{it} + u_{3it},$$

where: s_{it} represents, in turn, saving in the form of voluntary contributions to PPPs and conventional saving for individual i at time t; x_{it} is the vector of time-invariant and time-variant exogenous variables described above; VAR_{it} represents expected earnings variability; and u_{3it} is an unobservable error term. As it stands, this specification assumes that all inter-individual heterogeneity can be captured by the explanatory variables. However, unobserved, and possibly unobservable, attributes (such as tastes) may also influence the individual's decisions on how much to save. Assuming that the heterogeneity across individuals is time-invariant, we can take it into account by including an individual-specific time-invariant effect in the error term. u_{3it} can thus be decomposed as follows:

$$(7) \qquad u_{3it} = v_i + e_{it},$$

where v_i represents the individual-specific effect, which we assume to be random, and e_{it} is an idiosyncratic shock.

Explicit corrections for sample selection bias are not necessary if specifications of this type are estimated over short panels. It is, in fact, reasonable to assume that, in this case, any correction would be time-invariant and would hence be absorbed in the individual-specific component of the error term (Baltagi, 1995). We also provide a formal test for the actual existence of a statistically significant selectivity bias in our two-wave sample, following the procedure described in Verbeeck and Nijman (1992). This procedure consists of including some additional variables in the regression equation and testing for their joint significance. In our context, the additional variables are the number of waves in which individual i answered yes to the PPP participation question and a dummy equal to 1 if the individual participated in a PPP in the previous year. Both variables were both individually and jointly statistically insignificant,

TABLE 3

Random-Effects Tobit Estimates for Voluntary Contributions Made to PPPs and for Saving in More Conventional Forms

	Weekly voluntary contributions to PPPs		Weekly saving in more conventional forms	
Demographic variables				
Age:[a]				
25–29	−1.657	*−0.59*	0.536	*0.15*
30–34	1.531	*0.53*	−0.629	*−0.17*
35–39	3.029	*1.03*	−7.480	*−1.96*
40–44	4.283	*1.46*	−6.704	*−1.77*
45–49	6.353	*2.14*	−7.690	*−2.01*
50–54	8.076	*2.63*	−4.371	*−1.11*
55–59	9.847	*2.76*	−6.118	*−1.32*
60–65	21.739	*4.02*	3.273	*0.53*
Male	−0.975	*−0.72*	−5.721	*−3.38*
Number of adults in household	−1.098	*−1.56*	0.695	*0.78*
Number of dependent children in household	−0.042	*−0.06*	−0.340	*−0.37*
Married or cohabiting	−2.156	*−1.45*	−2.861	*−1.51*
Education[a]				
University degree or higher	4.918	*1.90*	−3.414	*−1.04*
A levels / professional qualifications	2.132	*1.05*	−1.975	*−0.76*
O levels / vocational qualifications	1.190	*0.58*	−1.234	*−0.48*
Occupation[a]				
Professional	−2.081	*−1.04*	−0.409	*−0.16*
Associate professional and technical	−0.324	*−0.17*	0.298	*0.12*
Clerical and secretarial	3.452	*1.75*	2.552	*1.00*
Craft-related	1.373	*0.67*	3.677	*1.42*
Personal and protective services	3.780	*1.55*	3.518	*1.11*
Sales	4.375	*1.65*	2.400	*0.69*
Plant and machine operators	0.558	*0.24*	−0.499	*−0.16*
Others	2.149	*0.67*	9.377	*2.33*
Financial variables				
Financial situation expected to deteriorate	−1.434	*−0.79*	−1.116	*−0.46*
Financial situation expected to improve	1.366	*1.32*	−3.421	*−2.45*
Permanent income ($\times 10^{-3}$)	20.870	*12.68*	19.137	*9.42*
Other variables				
Owns a house	−0.477	*−0.29*	1.217	*0.58*
Health status	−0.150	*−0.24*	0.459	*0.55*
Expected earnings variability	−0.038	*−1.30*	0.075	*2.13*
Sample size (of which censored at 0)	1,432 (371)		1,478 (634)	
Log likelihood	−4,792.14		−4,141.93	
Chi-squared	$\chi^2(47) = 444.91$		$\chi^2(47) = 207.53$	

Notes: See overleaf.

indicating the absence of a precisely determined selectivity bias in our sample.[23] This conclusion further justifies our use of a simple random-effects tobit estimator.

The first set of results in Table 3 are the estimates of equation (6) for the amounts contributed to PPPs. The explanatory variables included in addition to earnings variability are the same as those used in the probit case. We can see that the coefficients on the age dummies for those individuals aged 45 or over are generally positive and precisely determined. Their magnitudes suggest that, in spite of the fact that the financial value of the contributions is higher for the young, older people tend to make higher voluntary contributions to PPPs. The dummy variable relating to whether workers have at least a college degree is marginally statistically significant and positive. This indicates that those respondents with a college or higher degree contribute more than those with no educational qualifications. Respondents with high permanent income tend to make higher voluntary contributions, and workers employed in the clerical and secretarial sector contribute more than the omitted category of managers and administrators. The coefficient on our proxy for risk is negative, indicating that people with higher expected earnings variability contribute less to their PPPs. It is, however, only significant at the 19 per cent level.

The second set of results in Table 3 are the estimates of a similar random-effects tobit regression for saving in more conventional vehicles, such as bank accounts and Post Office accounts.[24] We can see that the dummies relating to the age-groups 35–39, 40–44 and 45–49 are precisely determined but, contrary to the previous case, they appear with a negative sign. Conventional saving is also lower for males and for respondents who expect their financial situation to improve. It is higher for people who have higher permanent income and for those who work in the 'other' occupational category. The coefficients on the educational dummies are generally poorly determined. Finally, as in Guariglia (2000), the earnings risk variable is positive and statistically significant,

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[23]According to Verbeeck and Nijman (1992), a third additional variable should have been introduced in the regression equation, i.e. a binary variable taking the value 1 if individual *i* answered yes in all waves to the question relating to his or her participation in a PPP. We did not include this variable because, given that we only analyse two waves of the BHPS, it would have been perfectly collinear with the first additional variable that we included.

[24]Note that, to ease comparability between the two sets of results, we run the regressions on the same sample of individuals (i.e. the workers covered by PPPs). Similar results to the second set were obtained from estimating an analogous equation for saving without limiting the sample to those workers who are members of PPPs.

suggesting that precautionary considerations play a key role in determining this type of saving.[25]

The fact that age dummies are an important determinant of saving in the form of voluntary contributions to PPPs, especially for the over-45s, suggests that this particular type of saving is aimed at ensuring a comfortable retirement. On the other hand, earnings risk strongly affects conventional saving, suggesting that the latter is aimed at buffering current consumption against income shocks. Being used for different purposes, the two types of saving are thus unlikely to offset each other totally. To check formally for the existence of an offsetting effect, we included conventional saving as an additional explanatory variable in the regression for voluntary contributions to PPPs. This variable entered with a positive sign and was precisely determined. Similarly in the equation for conventional saving, we entered voluntary contributions to PPPs as an additional explanatory variable. As in the previous case, the coefficient on this variable was positive and statistically significant, indicating no offsetting effect between the two types of saving. These results, which we do not report, for brevity, imply that, controlling for individual unobserved heterogeneity, increments in one type of saving are associated with increments in the other. This suggests that there is no substitution between the two types of saving and that the voluntary contributions to PPPs are likely to represent new saving.[26]

IV. CONCLUSIONS

In this paper, we have analysed the determinants of saving in the form of voluntary contributions to PPPs. This form of saving is tax-favoured, and one frequently asked question is whether it should offset other kinds of saving. The estimates of random-effects tobit equations have shown that, although their financial value is higher for younger people, voluntary contributions to PPPs significantly increase with age for individuals over 45. Conventional saving, on the other hand, is mainly driven by expected earnings variability. This suggests that the two types of saving are used for different purposes: the former to ensure a comfortable life in retirement and the latter for precautionary reasons. They are thus unlikely to be interchangeable and to offset each other completely. In support of this hypothesis, we have also shown that, controlling for unobserved heterogeneity, there does not appear to be a negative relationship between the

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[25]The results reported in both columns of Table 3 were robust to the use of an alternative measure of risk based on the variance of detrended earnings calculated over the available waves, as in Carroll and Samwick (1997) and Guariglia (2000). We do not report these results, for brevity. To check whether the use of a limited number of waves made any significant difference in the parameter estimates, we estimated random-effects tobit regressions for ordinary saving and for voluntary contributions to PPPs excluding the earnings variability term both on all the available waves and on waves 6 and 7 only. The results were generally similar in the two cases.
[26]Using aggregated data for the UK, Blake (1998) reached a similar conclusion, finding that private personal pensions have a direct effect in increasing saving.

two types of saving. Finally, the fact that the main determinants of the two types of saving considered generally differ provides a warning against the use of broad measures of saving and wealth in the study of the motives for saving.

This analysis puts the reforms proposed in the Green Paper, *A New Contract for Welfare: Partnership in Pensions* (DSS, 1998), in a favourable light. The Green Paper proposes the introduction of stakeholder pensions — simple pension schemes, organised collectively, which will be more cost-effective and flexible than the existing PPPs. As with PPPs, workers will be encouraged to opt out of the state second pension scheme, which will replace SERPS, and will have their NICs paid directly into the pension fund by the DSS. Moreover, there will be a strong incentive, in the form of an extra rebate, for people earning between £9,000 and £18,500 to join these new schemes. As with PPPs, it will be possible to make additional voluntary tax-free contributions to stakeholder pension plans, up to a certain limit. However, people contributing irregularly will not be penalised as much. The new schemes will also be made much easier to understand: in particular, workers will receive an annual statement saying clearly how much they have paid in, what the charges are and what they can expect to receive on retirement. This will allow even less-educated people to take advantage of these schemes and will encourage them to make contributions in excess of the statutory ones. Although the majority of full-time employees earning between £9,000 and £18,500 already have a personal pension (Disney, Emmerson and Tanner, 1999), thanks to their low costs, greater flexibility and improved clarity, stakeholder pensions are likely to become more popular than existing PPPs, giving more incentives to make extra contributions. The concerns of the government that people do not save enough for retirement will be reduced, and the shift towards privatisation of the UK pension system will move one step further.

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