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Why do people invest in personal pension plans?

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Abstract: The aim of this paper is to identify the variables affecting the decision to make contributions to personal pension plans and the amount of such contributions. For this purpose, we specify and estimate a Tobit model for a sample based on the 1995 Personal Income Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy and Finance) formed by 3,041 taxpayers, of whom 358 made contributions to pension plans. Our results suggest that individuals decide to invest in pension plans on complex grounds combining the wish to benefit from tax savings and to ensure they will receive supplementary income upon retirement.

Key words: Pension plans, retirement purposes, tax planning.

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1. Introduction

The tax treatment of pension plans is currently a matter of some debate in Spain. The government's position is that the favourable tax treatment accorded to such instruments provides an incentive for the better off to invest, while the lower and middle income groups hardly make any use of them. Thus, investment in pension plans is more a matter of tax planning than financial prudence in anticipation of retirement. This paper seeks to make a contribution to this debate, and to this end we shall use information provided in 1995 personal income tax returns to investigate the reasons underlying the two decisions made by the holders of pension plans, first to set up a plan and then to make contributions for a given amount.

The Spanish Pension Plans and Funds Regulation Act, 1987 (Law 8/June 8, 1987) regulated pension plans, defined as voluntary prudential institutions providing benefits supplementing those of the public social security system. The Act refers to three types of pension plan depending on the person who offers them. These are "occupational schemes" in which the sponsor of the pension plan is an organisation, corporation, company or firm (that is, an employer) and the members are employees; "associated schemes" sponsored by associations or trade unions for their members or affiliates; and "personal schemes" sponsored by one or more financial entities and having private individuals as their members. In this paper, we shall focus on personal pension plans.

Pension plans may also be classified on the basis of the obligations provided for in the contract. Thus, "defined benefits plans" fix the amount of the final pension the beneficiaries will receive; "defined contributions plans" establish the amount of the contributions the sponsors and, where applicable, participants must make; and "mixed

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plans" simultaneously stipulate eventual benefits and the amount of contributions. While occupational and associated pension plans may fall into any of these three categories, personal pension plans will always be defined contributions schemes.

Pension plans have received a highly favourable tax treatment since they were first regulated in 1987, and as a result they now represent a growing part of the financial assets held by individuals.

The rest of this paper is structured as follows. In Section 2, we outline the tax regime applicable to pension plans in Spain since 1987. The data presented are expressed in terms of the internal rate of return of pension plans in the three periods 1987-1991, 1992-1998 and from 1999 onwards.

The applied model is set out and discussed in Section 3. In order to discover the factors explaining the decisions associated with investment in personal pension plans, we specify and estimate a Tobit model for a sample drawn from the 1995 Personal Income Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy and Finance). Our conclusion from this exercise is that the holders of personal pension plans are motivated both by reasons of financial prudence and tax savings.

Section 4 ends the paper with some final considerations.

2. The tax treatment of pension plans

In this section, we shall describe the tax treatment of pension plans and quantify their internal rate of return (IRR) since 1987. This analysis distinguishes between the three moments at which the tax treatment affects investment in pension plans, namely when contributions are made, during the accumulation of returns, and when the benefit

contracted is received.[1] Table 1 shows the expressions for the IRR of the pension plans in the three periods considered. The tax treatment of the plans is summarised in Table 2.

[TABLES 1 and 2 ABOUT HERE]

2.1. Contributions

The contributions made to pension plans are tax allowable within certain limits. Initially, in the period 1987-1991, the contribution could be deducted from taxable income provided the amount of the deduction was less than 15 percent of the sum of net earnings from work and business activities (*earned income*) or 500,000 pesetas. The remaining contributions were eligible for a 15 percent tax credit up to a limit of 750,000 pesetas. In the early years, these limits were applied to each tax return, but this changed in 1989, when married people were allowed to file separate returns, and tax credits and allowances became applicable to each taxpayer included in the return.

There were two key changes to the tax treatment of contributions to pension plans in the ensuing years. Firstly, the 15 percent tax credit was removed (1992) and, secondly, the absolute and relative limits on the deduction from taxable income were raised.

Since 2003 the absolute deduction for people aged under 53 years has been € 8,000, with an additional € 1,250 for each additional year over the age of 52 to a maximum of € 24,250 for pension plan contributors aged over 65. Meanwhile, the relative limit on deductions was removed in 2002, and the maximum allowable contribution has since been 100 percent of taxable income excluding capital gains.

Based on this regulatory framework, let us initially assume an initial capital *IC* available for investment in a pension plan. The contribution made produces tax savings.

[1] See Scholes *et al.*(2002).

Given that the unit deduction will differ depending on whether it is applied to taxable income or tax liability, which shall denote each alternative by d_q, where q takes the value 1 or 2, respectively, for deductions from taxable income or tax liability. If the contribution is deductible from taxable income, $d_1 = t_{px}$, where t_{px} is the marginal rate subject to the age x at which the taxpayer made the contribution. If it is deductible from tax liability, then $d_2 = 0{,}15$.

Hence, the net initial capital, *NIC*, will be equal to:

$$NIC = IC \cdot (1 - d_q) \qquad [1]$$

2.2. Accumulation

The returns generated by pension plans are not taxable during the accumulation period. In the first place, the pension plan holder does not pay any income tax on the returns generated, which are not imputed to him. Meanwhile, the pension fund itself, though subject to Corporate Income Tax, benefits from a zero tax rate. Thus, the fund is required to file a corporate income tax return, but only to recover amounts withheld at source. Finally, Net Wealth Tax is not levied on the investment, because the vested rights in the plan were not initially subject to the tax, and they are currently exempt.

Hence, the net rate of interest on the pension plan investment is:

$$i_N = i \cdot (1 - t_s) = i \qquad [2]$$

where i is the nominal gross rate, and t_s the corporate tax rate.

If x is the age of the individual making contributions to the pension plan, and j is her age upon retirement, the final capital accumulated will thus be:

$$FC = IC \cdot (1 + i_N)^{j-x} = IC \cdot (1 + i)^{j-x} \quad [3]$$

2.3. Benefits

When benefits are paid, the total amount is included in taxable income by way of earnings from labour. The way in which the tax base is established and the applicable tax rate calculated has changed over time.

As shown in Table 2, the benefits received from the plan are eligible for an allowance. This was initially 2 percent of the returns obtained and is currently 40 percent.

Between 1991 and 1998, the annualised returns (i.e. the quotient of taxable returns and the number of years in which they were generated) were taxed at the marginal tax rate. The remainder returns were taxed at the average rate, because it would not be equitable to apply a progressive tax schedule to returns generated over a number of years. Since 1999, the taxable part of pension plan benefits have been taxed at the relevant marginal tax rate.

Let us call the equivalent tax rate applicable to benefits t_e, and the taxable part of the final capital obtained g. The tax liability will now be:

$$T_P = t_e \cdot g \cdot FC \quad [4]$$

And the net final capital will be:

$$NFC = FC - T_P = FC \cdot (1 - t_e \cdot g) = IC \cdot (1 + i)^{j-x} \cdot (1 - t_e \cdot g) \quad [5]$$

The formula for IRR is:

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$$IRR = \left(\frac{NFC}{NIC}\right)^{\frac{1}{j-x}} - 1 = (1+i)\cdot\left(\frac{1-g.t_e}{1-d_q}\right)^{\frac{1}{j-x}} - 1 \qquad [6]$$

The IRR of pension plans has grown continuously since 1987 thanks to the tax regime, which is more favourable than for any other savings instrument. As shown in Figure 1, these assets have gradually increased their share of the portfolios held by individuals to somewhat more than 6 percent at present.[2]

[FIGURE 1 ABOUT HERE]

2.4. Income, age and pension plan investment

Let us now focus on the variables influencing the decision to invest in a personal pension plan. Based on the expression of IRR, we can predict the relationship between pension plan investment and the investor's income. Since the year considered in the present empirical study is 1995, we shall work with the IRR expression for the period 1992-1998, which is:

$$IRR = (1+i)\cdot\left\{\frac{1-g.t_e}{1-t_{px}}\right\}^{\frac{1}{j-x}} - 1 \qquad [6']$$

In order to obtain the relationship between IRR and income levels, we first need to establish the relationship between the marginal tax rate at the time the contribution is made, t_{px}, and the equivalent tax rate levied on the benefits, t_e. As explained above, the latter is the weighted average of the average and marginal tax rates at the time the benefit is paid.

[2] Figure 1 was constructed on the basis of the *Financial Accounts of the Spanish Economy,* prepared by the Bank of Spain. Exhaustive information concerning pension plans in Spain is available in *Dirección General de Seguros y Fondos de Pensiones* (2004) and at the website of INVERCO, *Asociación de Instituciones de Inversión Colectiva y Fondos de Pensiones*: www.inverco.es.

We may therefore make the general assumption that it will be related to the initial marginal tax rate in the following manner:

$$t_e = k \cdot t_{px} \quad , \; 0 < k < 1 \qquad [7]$$

Thus, the pension plan participant's income at the time the benefit is received, and hence the applicable tax rate, will be a given proportion of the income she received and the applicable tax rate applied while she was active. We may now calculate how IRR will vary when t_{px} changes:

$$\frac{\partial IRR}{\partial t_{px}} = \frac{(1+i)}{(j-x)} \cdot \left(\frac{1-g \cdot t_e}{1-t_{px}} \right)^{\frac{1}{j-x}-1} \cdot \left(\frac{1-g \cdot k}{(1-t_{px})^2} \right) > 0 \qquad [8]$$

Accordingly, the IRR of pension plans rises in line with contributors' incomes and the applicable tax rates. We may therefore expect to find a positive relationship between income and pension plan contributions.

Let us look now at the incentive to invest in pension plans and age. The IRR of pension savings is of no use to us here, because investments of differing duration cannot be compared on this basis. Consequently, we shall calculate the net present value of the investment in the plan, assuming that the alternative investment is tax exempt.

Based on the net initial and final capital respectively given in [1] and [5], the net present value of a one euro investment in a pension plan would be:

$$\begin{aligned} NPV &= -(1-t_{px}) + \frac{NFC}{(1+i)^{j-x}} = \\ &= -(1-t_{px}) + (1-g \cdot t_e) = t_{px} - g \cdot t_e = t_{px}(1-g \cdot k) \end{aligned} \qquad [9]$$

Hence, anybody investing in a personal pension plan obtains a subsidy per unit invested, which is the same at any age. This subsidy represents compensation for the

absence of liquidity inherent in pension plans. However, if we take into account that the loss of liquidity diminish as people grow older and the recovery of the investment draws nearer, we may conclude that the incentive to invest in pension plans is greater for older people.

3. Empirical evidence for personal pension plan investment decisions

In this section, we seek to answer the two questions forming the objective of this paper. What variables influence the decision to invest in a personal pension plan? And, what variables affect the amount individuals decide to contribute to their pension plans? To answer these questions, we shall specify and estimate a Tobit model for a 1995 sample (the latest available) from the Institute of Fiscal Studies Personal Income Taxpayers Panel. The sample is formed by 3,041 tax returns, of which 358 include contributions to personal pension plans.

Following Cabrer, Sancho, and Serrano (2001), the specification of the model is as follow[3]. The regressand Y_i can take a value of zero or the value of the variable Y_i^* , known as the latent variable:

$$\begin{cases} \left(Y_i / X_i, Y_i^* \leq 0\right) = 0 \\ \left(Y_i / X_i, Y_i^* > 0\right) = X_i \beta + u_i \end{cases} \qquad [10]$$

In the first stage a Probit model is used to determine the probability that the variable Y_i^* will take a value of zero rather than a positive value. In the second stage, a real and positive value is assigned to the variable Y_i after a positive value has been

[3] See also, Wooldridge (2003).

probabilistically given to Y_i^* , and the following model is specified with the subset of observations having a regressand other than zero:

$$Y_i^* = X_i\beta + u_i \qquad [11]$$

where β are the coefficients, X_i the regressors, and u_i is the error term, which is a random variable distributed based on normal $N(0,\sigma^2)$.

In our model, the dependent variable is the amount of contributions made to pension plans. The explanatory variables are those usually considered in the literature[4], to which have added some others that are specific to the reality of Spain. The variables used and the expected sign for each are shown in Table 3. Table 4, meanwhile, reflects the percentage of personal pension plan contributors for each variable, as well as the average contributions made. As the first row of this table shows, 11.77 percent of 1995 tax returns declare contributions to personal pension plans, the average amount of which was 150,564 pesetas.[5]

The regressors considered were as follows:

Age. Based on the argument derived from expression [9], we may expect to find a positive relationship between age and the contributions made to pension plans. This variable has been included quadratically as well.

[4] See, for example, Guariglia and Markose (2000), Joulfaian and Richardson (2001), and Engelhardt and Madrian (2004) We have not been able to use the number of children, because this variable was not reliable in the sample.

[5] According to data from the *Dirección General de Seguros y Fondos de Pensiones*, 1,423,542 people contributed to personal pension plans in 1995, investing an average of 132,823 pesetas. In 2004, 7,224,792 people made contributions, investing an average of € 746,87 (124,000 pesetas).

Marital status. We have used a dummy variable with a value of zero for unmarried and one for married taxpayers. We opted to assign a positive sign to this variable, because we believe that prudential behaviour is more likely in the case of married people.

Income level. Based on expression [8], we may expect a positive relationship between individuals' income levels (i.e. taxable income prior to tax allowance for contributions) and the amount of the contributions made to pension plans. For the same reason, we may assign a positive value to the variable ***marginal tax rate***. In addition, higher earners will also have greater capacity for savings. The *income* variable has also been included quadratically.

Occupation. We have used dummy variables for the categories entrepreneurs, professionals and salaried employees. We consider that the first two categories are likely to make higher contributions than employees because their mandatory social security contributions are smaller. Also, we would expect professionals to make higher contributions because they are, in general, better educated and are likely to be more aware of the advantages of this saving instrument .

Year-end tax bill. The aim of this variable is to verify the hypothesis that people invests in pension plans with a view to reducing their year-end tax bill (i.e. the part of income tax not paid through withholdings at source), which is due upon the presentation of the income tax return. Thus, the higher the tax bill, the higher will be the pension plan contributions made.

Membership of occupational pension plans. Our hypothesis is that membership of occupational pension schemes will encourage the participation on personal plans. We have employed a dummy variable with a value of one for taxpayers who are members of

occupational schemes and zero for those who are not. In the case of the former, however, we expect the contributions made to fall as the ***employer's contribution*** rises. This variable has been assigned a negative sign.

Prior year's contribution. We believe that the behaviour of people contributing to pension plans may be to some extent routine, with the result that they will continue to contribute a roughly similar amount each year after setting up the plan. Consequently, we have assigned a positive sign to this variable.

Mortgage repayments. A person who is still repaying the mortgage on his home will have less spare cash to contribute to his pension plan. The higher these mortgage repayments are, the less the person will contribute to the plan.

Life insurance contributions. Like pension plans, life insurance policies are prudential savings instruments, although they do not have the same characteristics. While pension plans receive a more favourable tax treatment, life insurance are more liquid. If pension plans and life insurance are substitute assets, we may expect that higher life insurance contributions will be associated with smaller contributions to pension plans. On the other hand, if they act as complementary assets (as table 4 would seem to indicate), this relationship will be the reverse. In short, we are unable to assign a positive or negative sign to this variable.

[TABLES 3 and 4 ABOUT HERE]

The relationship between investment in the home, pension plans and life insurance is clearly apparent in figures 2 and 3, which are constructed on the basis of the sample of tax returns used for the applied study of 1995. It may be observed in figure 2, that buying a house is the most important investment made by people in their lifetimes. However,

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mortgage repayments begin to fall after the age of 50. Contributions to pension plans and life insurance are considerably smaller, but increase as individuals age. Average pension plan contributions rise fastest among people aged over 60, while life insurance contributions fall after the age of 65.

Figure 3, which takes income levels into account, reflects sustained growth in average mortgage repayments along the income scale. This effect is particularly pronounced in the two upper deciles. There is also a slight rise in investment in pension plans and life insurance until the last two deciles, where average contributions increase sharply, especially in the case of pension plans.

[FIGURES 2 and 3 ABOUT HERE]

Based on the above variables, we have specified three models which provide alternative explanations for the decision to invest in a personal pension plan. The first of these, which we shall call the "prudential model", is based on the hypothesis that individuals invest in pension plans basically to save against their retirement, perhaps as a supplement to other retirement funds obtained from sources such as the social security or life insurance. The explanatory variables in this model are age, marital status, occupation, membership of an occupational pension plan, employer's contributions, prior contributions, mortgage repayments and contributions to life insurance. The specification of the model is as follows:

$$PLAN_1 = f(C, AGE, STATUS, ENTREPRENEUR, PROFESSIONAL, SALARIED, OCCUPATIONALP, EMPLOYERC, PRIORC, MORTGAGE, INSURANCE) \quad [12]$$

The second "tax planning model" refers to the hypothesis that the individual's main motivation is to obtain the tax benefits available to investors in pension plans. The

exogenous variables included in the model are income level, marginal tax rate, year-end tax bill, mortgage repayments and life insurance contributions. The specification is:

$$PLAN_2 = f(C, INCOME, MARGINALT, TAXBILL, MORTGAGE, INSURANCE) \quad [13]$$

Finally, the "general model" includes all of the exogenous variables and is based on the hypothesis that investment in pension plans can be explained both by prudential and tax planning concerns. The specification of the model is as follows:

$$PLAN_3 = f(C, AGE, STATUS, INCOME, ENTREPRENEUR, PROFESSIONAL, SALARIED, MARGINALT, TAXBILL, OCCUPATIONALP, EMPLOYERC, PRIORC, IMORTGAGE, INSURANCE) \quad [14]$$

The heteroskedastically robust estimation of the models was performed using the *Econometric Views (Eviews)* application, version 3.1. Using the logarithm of the verisimilitude function and the Aikake, Schwarz and Hannan-Quinn criteria as the selection criteria, we chose the general model as the most adequate. The results of the estimation are shown in Table 5.

The variables found to be significant took the expected signs. In the first place, the amount of contributions rises with age, although at a decreasing rate (AGE) until the age of 45, whereafter contributions begin to decline as individuals grow older. As shown in Table 4, the percentage of older people still making contributions falls sharply, although the average amount set aside rises. Secondly, salaried employees make smaller contributions than people in other occupations (SALARIED). Meanwhile, we have been able to confirm that membership of an occupational pension plan stimulates investment in personal plans (OCCUPATIONALP), and that people benefiting from higher sponsor's contributions to such plans invest less in their personal plans than they would were the sponsor's

contribution smaller (EMPLOYERC). Furthermore, savings in a given year are positively affected by the prior year's contributions (PRIORC).

While the above variables refer to prudential reasons for setting up a personal pension plan, there is another significant variable which is related with tax planning. In fact, contributions grow with income, although once again at a decreasing rate (INCOME) up to a threshold of 10.6 million pesetas (approximately € 64,000) covering the earnings of 99 percent of income taxpayers. Thereafter, the amount of contributions begins to decrease as income rises.

The last variable found to be significant in the estimation of the model expressed in [14] is the amount of mortgage repayments (MORTGAGE). This variable also took the expected sign and fits both with prudential and tax planning arguments for pension plan investment. Based on Table 5, we may affirm that taxpayers set aside less by way of private pension plan contributions as the amount of mortgage repayments made during the year rises.

In light of these results, we may conclude that individuals decide to invest in personal pension plans on complex grounds combining the wish to benefit from tax savings and to ensure they will receive supplementary income upon retirement. These results are in line with those obtained by literature in other countries.

[]TABLE 5 ABOUT HERE]

Tables A1 and A2 given in the Appendix respectively reflect the estimation of the prudential and tax planning models. In the former, age and the three variables related with investment in pension plans (membership of occupational pension plans, employer's contributions and prior contributions) are significant and take the expected signs. In the

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tax planning model, meanwhile, the significant variables are income, tax bill and mortgage repayments, which once again take the expected signs.

4. Concluding remarks

In this paper, we have examined the variables affecting the decisions to invest in a personal pension plan and the amount of contributions. We have found a combination of prudential and tax planning reasons for these decisions. Age and occupation affect individuals, as do membership of occupational pension plans, and previous contributions to their own personal plans, as well as the cost of mortgage repayments and income levels.

Our empirical study uses 1995 data, seven years after the first regulation of pension plans. In that year, these instruments had come to represent 4.4 percent of assets held by private individuals. Eight years on, this share has risen to 6.2 percent, confirming the consolidation of these prudential savings vehicles. Consequently, it will be necessary to repeat the estimations carried out in order to confirm whether, as we believe, the variables that explain investment in pension plans in 1995 remain significant in the present.*

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TABLE 1. Pension plan IRR, 1987-2004

Period	IRR	*g*
1987-1991	$\mathrm{IRR}_{\mathrm{P.87}} = (1+i)\cdot\left(\frac{(1-g.t_e)}{1-d_q}\right)^{\frac{1}{j-x}} - 1$	0.98
1992-1998	$\mathrm{IRR}_{\mathrm{P.92}} = (1+i)\cdot\left(\frac{(1-g.t_e)}{1-t_{px}}\right)^{\frac{1}{j-x}} - 1$	0.95 or 1
1999 and thereafter	$\mathrm{IRR}_{\mathrm{P.99}} = (1+i)\cdot\left(\frac{(1-g.t_{pj})}{1-t_{px}}\right)^{\frac{1}{j-x}} - 1$	0.6 (if j-x>2)

TABLE 2. Tax treatment of pension plans

		1987 – 1991	1992 - 1998	1999 - 2004	
CONTRIBUTIONS					
Tax saving		t_{px} or 15%	t_{px}	t_{px}	
				Up to 52 years	*> 52 years*
Limits on allowances and tax credits	-- Absolute	Ptas. 500,000 – 750,000	Ptas. 750,000 -1,100,000	In 1999: Ptas. 1,100,000 In 2000-01: Ptas. 1,200,000 In 2002: Ptas. 1,200,000 Since 2003: € 8,000	---- 2000-01:+ Ptas. 100,000 (age–52) In 2002:+ Ptas. 200,000 (age–52) Since 2003: + €1,250 (age-52)
	-- Relative	15% earned income	15%-20% earned income	100% general taxable income (In 1999-01: 20%, 25%)	100% general taxable income (In 1999-01: 20%, 25%, 40%)
ACCUMULATION					
Corporate income tax		Zero rate			
Net Wealth Tax		Not subject	Exempt	Exempt	
BENEFITS					
Tax base		Final capital	Final capital	Final capital	
Taxable returns		98%	95% – 100%	60%	
Applicable tax rate		t_e	t_e	t_{pj}	

Source: Own work.

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TABLE 3. Variables and expected sign

Variable	Symbol	Expected sign
Contributions to pension plans	PLAN	
Age	AGE	+
Marital status	STATUS	+
Income level	INCOME	+
Business activity	ENTREPRENEUR	¿?
Professional activity	PROFESSIONAL	+
Salaried employment	SALARIED	-
Marginal tax rate	MARGINALT	+
Year-end tax bill	TAXBILL	+
Membership of occupational scheme	OCCUPATIONALP	+
Employer´s contribution	EMPLOYERC	-
Prior year's contribution	PRIORC	+
Mortgage repayments	MORTGAGE	-
Life insurance contributions	LINSURANCE	¿?

TABLE 4. Personal pension plan membership and average contributions

VARIABLE		PERCENTAGE CONTRIBUTORS	AVERAGE CONTRIBUTION (pesetas)
TOTAL		**11.77**	**150,564**
AGE	20-25	3.33	76,100
	25-30	4.03	71,294
	30-35	9.52	107,387
	35-40	11.82	143,148
	40-45	15.99	157,821
	45-50	20.23	168,435
	50-55	16.03	162,782
	55-60	9.05	182,430
	60-65	6.60	213,851
MARITAL STATUS	Unmarried	10.30	123,855
	Married	13.12	169,825
INCOME LEVEL	Decile 1	2.63	50,323
	Decile 2	3.95	82,919
	Decile 3	5.59	81,680
	Decile 4	6.25	88,752
	Decile 5	7.57	94,569
	Decile 6	10.53	116,845
	Decile 7	11.18	92,666
	Decile 8	15.13	106,532
	Decile 9	21.38	152,520
	Decile 10	33.55	250,495
OCCUPATION	Entrepreneur	11.52	156,509
	Professional	21.30	212,584
	Salaried employee	11.74	147,810
MARGINAL TAX RATE	0.0%	3.65	72,952
	20.0%	4.51	101,716
	22.0%	6.24	86,341
	24.5%	8.73	98,111
	27.0%	12.23	103,398
	30.0%	17.54	134,515
	32.0%	19.77	147,252
	34.0%	23.30	165,826
	36.0%	30.00	118,837
	38.0%	22.22	286,168
	40.0%	35.48	184,481
	42.5%	46.15	195,188
	45.0%	27.78	167,069
	47.0%	41.67	395,785
	49.0%	37.50	515,049
	51.0%	9.09	151,029
	53.5%	52.38	390,886
TAX BILL	Negative	18.04	252,739
	Positive	11.05	131,215
PARTICIPATION IN OCCUPATIONAL PENSION PLAN	Yes	54.64	101,415
	No	10.36	159,105
MORTGAGE REPAYMENTS	Yes	15.12	122,641
	No	10.50	165,916
LIFE INSURANCE CONTRIBUTIONS	Yes	23.52	190,944
	No	9.04	126,118

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TABLE 5. Results of the Tobit estimation for the general model

	Coefficient	Marginal Effect	Std. Error	z-Statistic	Prob.
C	-772944.2	-64292.13	108576.3	-7.118904	0.0000
AGE	22964.83	1910.17	4915.381	4.672035	0.0000
AGE*AGE	-259.8054	-21.68	54.84662	-4.736945	0.0000
INCOME	0.042513	0.003514	0.005972	7.118444	0.0000
INCOME*INCOME	-1.98E-09	-1,64693E-10	4.19E-10	-4.732125	0.0000
SALARIED	-38574.77	-43470.35	16299.70	-2.366595	0.0180
OCCUPATIONALP	172098.7	43790.72	29915.47	5.752832	0.0000
EMPLOYERC	-0.483151	-0.040188	0.067742	-7.132190	0.0000
PRIORC	1.290833	0.107369	0.050385	25.61938	0.0000
MORTGAGE	-0.025753	-0.002142	0.011719	-2.197532	0.0280
		Error Distribution			
SCALE:C(11)	159924.4		4444.289	35.98424	0.0000

R-squared	0.534140	Mean dependent var	17725.07
Adjusted R-squared	0.532602	S.D. dependent var	73299.59
S.E. of regression	50112.37	Akaike info criterion	3.479154
Sum squared resid	7.61E+12	Schwarz criterion	3.500930
Log likelihood	-5279.054	Hannan-Quinn criter.	3.486981
Avg. log likelihood	-1.735960		
Left censored obs	2683	Right censored obs	0
Uncensored obs	358	Total obs	3041

APPENDIX

TABLE A1. Results of the Tobit estimation for the prudential model

	Coefficient	Std. Error	z-Statistic	Prob.
C	-918664.1	108308.6	-8.481915	0.0000
AGE	31463.59	4931.230	6.380475	0.0000
AGE*AGE	-350.2904	54.97829	-6.371431	0.0000
OCCUPATIONALP	190266.5	32070.75	5.932709	0.0000
EMPLOYERC	-0.475665	0.070643	-6.733330	0.0000
PRIORC	1.466353	0.044976	32.60324	0.0000
Error Distribution				
SCALE:C(7)	168214.5	3625.361	46.39937	0.0000
R-squared	0.502038	Mean dependent var		17725.07
Adjusted R-squared	0.501053	S.D. dependent var		73299.59
S.E. of regression	51776.03	Akaike info criterion		3.499670
Sum squared resid	8.13E+12	Schwarz criterion		3.513527
Log likelihood	-5314.248	Hannan-Quinn criter.		3.504651
Avg. log likelihood	-1.747533			
Left censored obs	2683	Right censored obs		0
Uncensored obs	358	Total obs		3041

TABLE A2. Results of the Tobit estimation for the tax planning model

	Coefficient	Std. Error	z-Statistic	Prob.
C	-574386.7	27999.27	-20.51434	0.0000
INCOME	0.111300	0.008877	12.53834	0.0000
INCOME*INCOME	-4.10E-09	6.32E-10	-6.490179	0.0000
TAXBILL	0.045730	0.019646	2.327738	0.0199
MORTGAGE	-0.071568	0.023655	-3.025521	0.0025
Error Distribution				
SCALE:C(6)	266798.1	11630.07	22.94038	0.0000
R-squared	0.208576	Mean dependent var		17725.07
Adjusted R-squared	0.207272	S.D. dependent var		73299.59
S.E. of regression	65262.49	Akaike info criterion		3.674403
Sum squared resid	1.29E+13	Schwarz criterion		3.686280
Log likelihood	-5580.930	Hannan-Quinn criter.		3.678672
Avg. log likelihood	-1.835228			
Left censored obs	2683	Right censored obs		0
Uncensored obs	358	Total obs		3041

Figure 1. Distribution of family assets.1984-2003

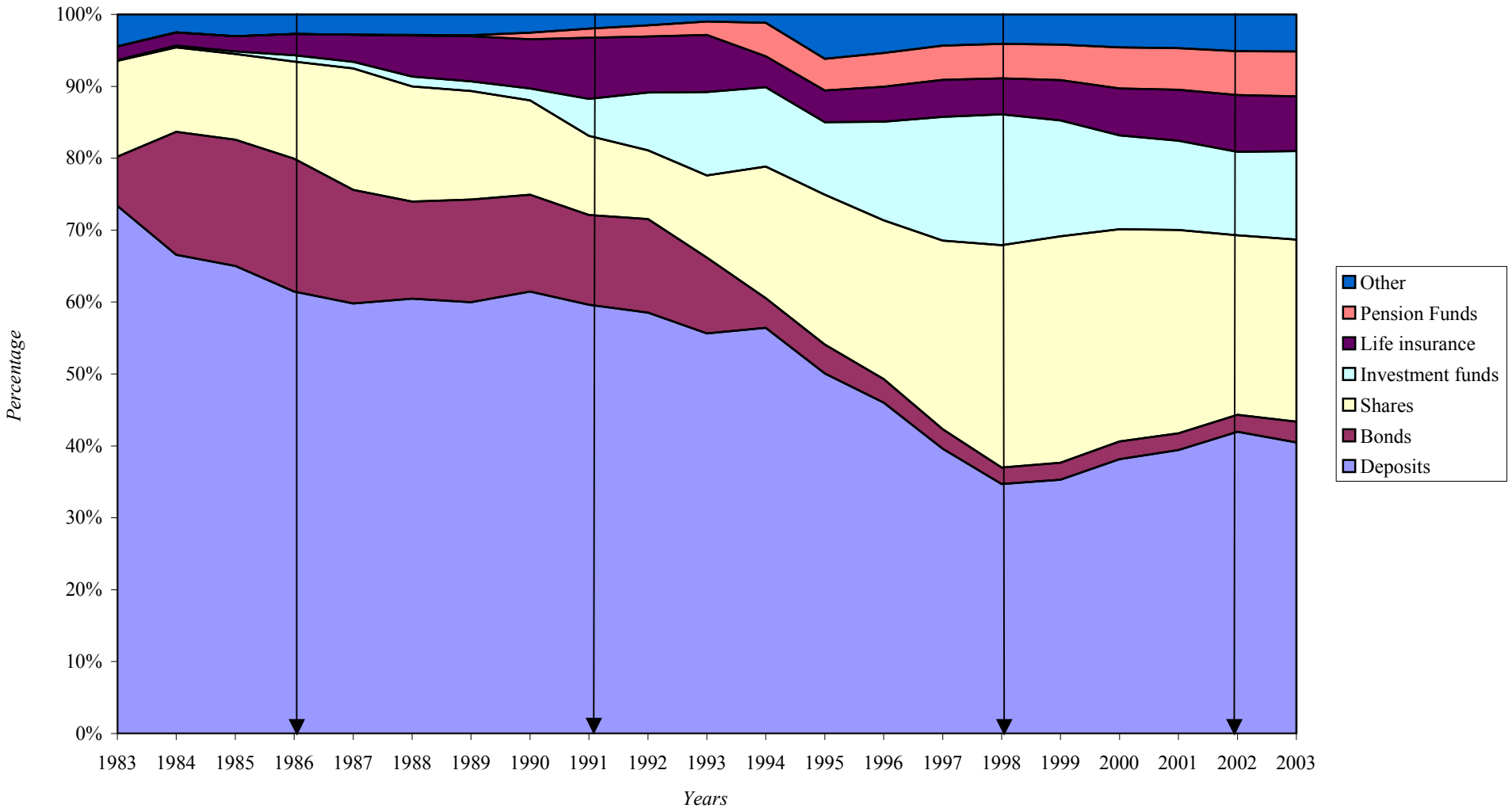


Figure 2. Age and average investment in different assets.

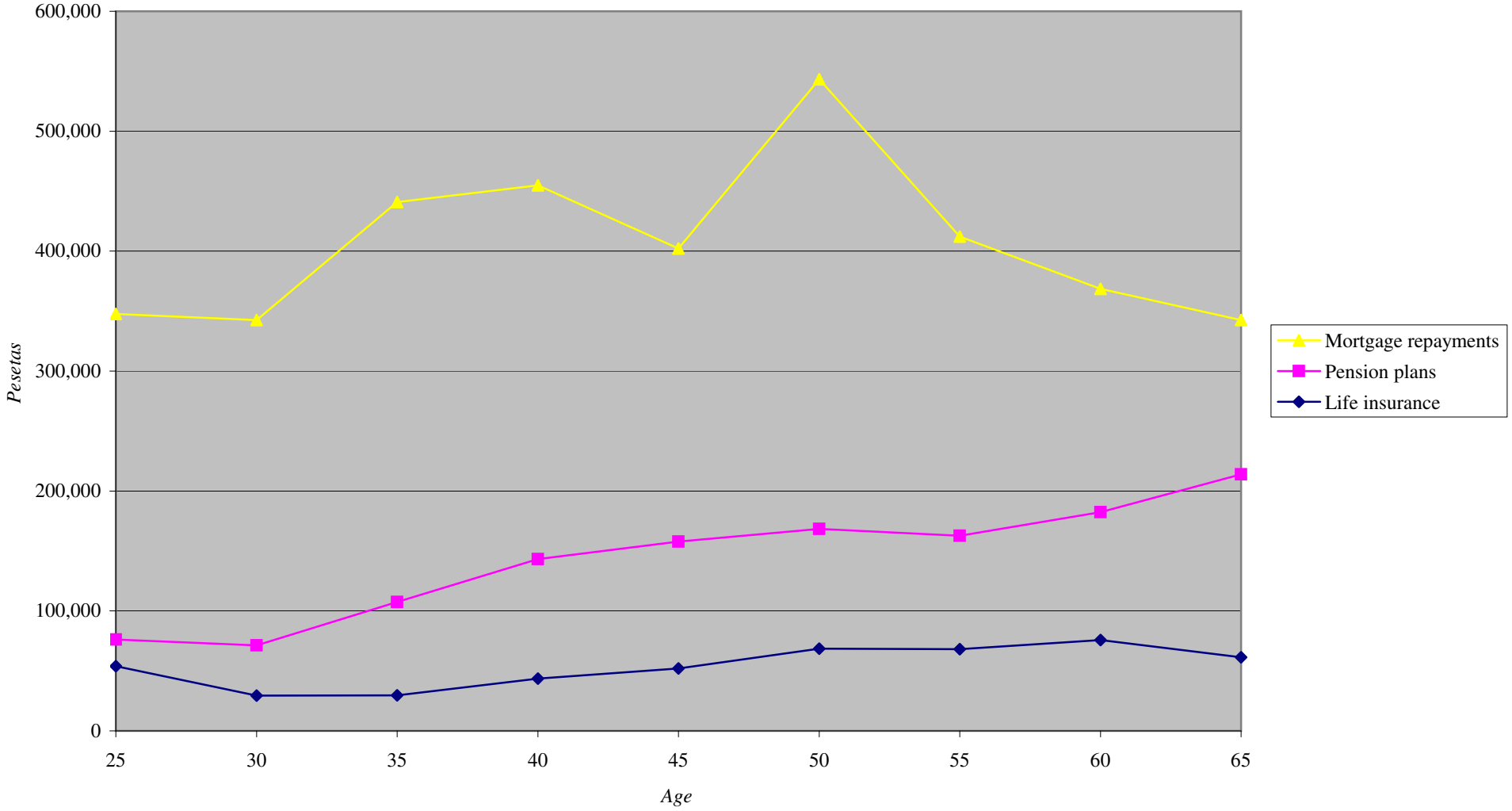
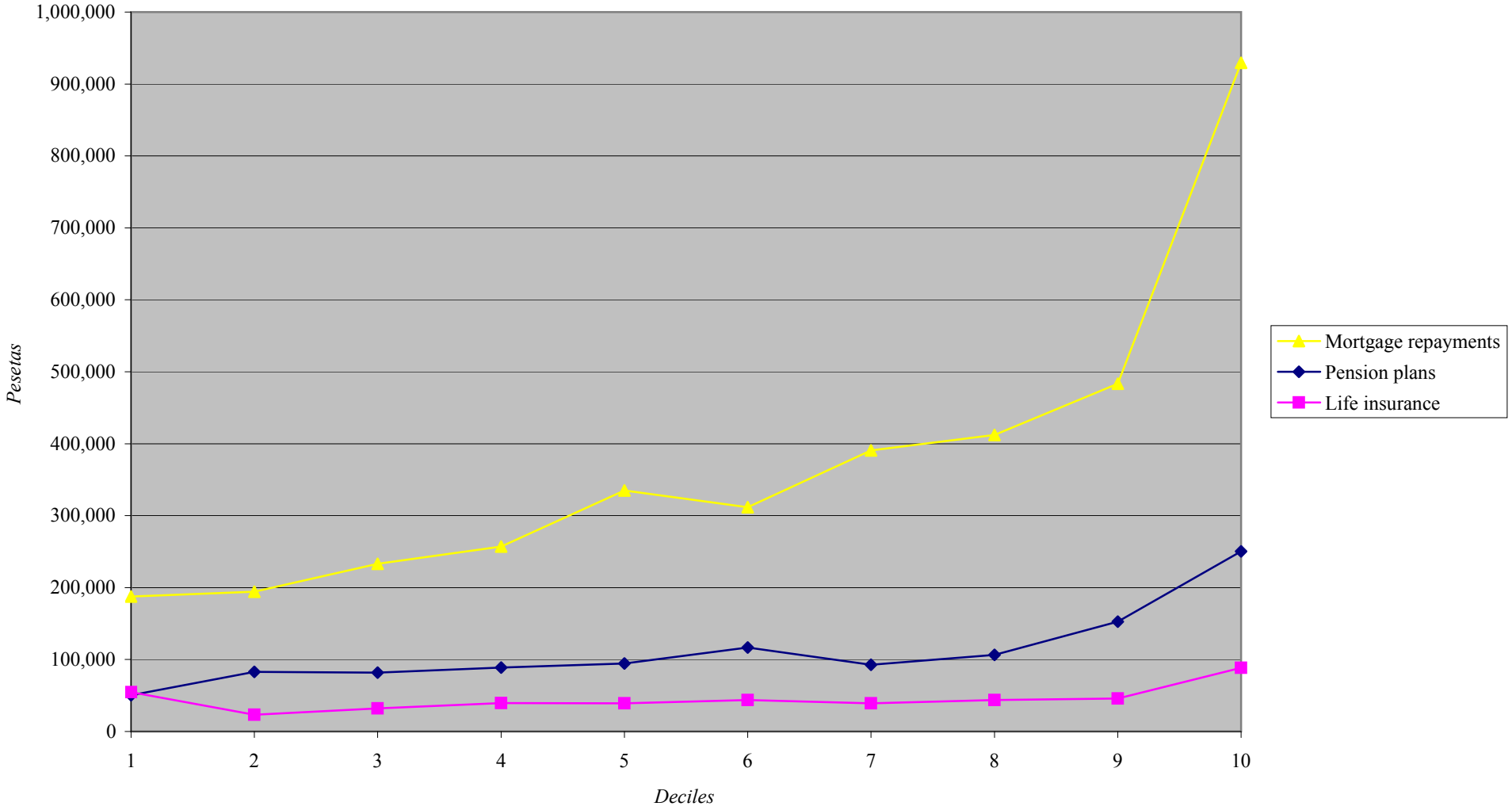


Figure 3. Income levels and average investment in assets.



Why do people invest in personal pension plans?

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Abstract: The aim of this paper is to identify the variables affecting the decision to make contributions to personal pension plans and the amount of such contributions. For this purpose, we specify and estimate a Tobit model for a sample based on the 1995 Personal Income Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy and Finance) formed by 3,041 taxpayers, of whom 358 made contributions to pension plans. Our results suggest that individuals decide to invest in pension plans on complex grounds combining the wish to benefit from tax savings and to ensure they will receive supplementary income upon retirement.

Key words: Pension plans, retirement purposes, tax planning.

J.E.L. classification: H31.

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1. Introduction

The tax treatment of pension plans is currently a matter of some debate in Spain. The government's position is that the favourable tax treatment accorded to such instruments provides an incentive for the better off to invest, while the lower and middle income groups hardly make any use of them. Thus, investment in pension plans is more a matter of tax planning than financial prudence in anticipation of retirement. This paper seeks to make a contribution to this debate, and to this end we shall use information provided in 1995 personal income tax returns to investigate the reasons underlying the two decisions made by the holders of pension plans, first to set up a plan and then to make contributions for a given amount.

The Spanish Pension Plans and Funds Regulation Act, 1987 (Law 8/June 8, 1987) regulated pension plans, defined as voluntary prudential institutions providing benefits supplementing those of the public social security system. The Act refers to three types of pension plan depending on the person who offers them. These are "occupational schemes" in which the sponsor of the pension plan is an organisation, corporation, company or firm (that is, an employer) and the members are employees; "associated schemes" sponsored by associations or trade unions for their members or affiliates; and "personal schemes" sponsored by one or more financial entities and having private individuals as their members. In this paper, we shall focus on personal pension plans.

Pension plans may also be classified on the basis of the obligations provided for in the contract. Thus, "defined benefits plans" fix the amount of the final pension the beneficiaries will receive; "defined contributions plans" establish the amount of the contributions the sponsors and, where applicable, participants must make; and "mixed

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plans" simultaneously stipulate eventual benefits and the amount of contributions. While occupational and associated pension plans may fall into any of these three categories, personal pension plans will always be defined contributions schemes.

Pension plans have received a highly favourable tax treatment since they were first regulated in 1987, and as a result they now represent a growing part of the financial assets held by individuals.

The rest of this paper is structured as follows. In Section 2, we outline the tax regime applicable to pension plans in Spain since 1987. The data presented are expressed in terms of the internal rate of return of pension plans in the three following periods: from 1987 to 1991, with the initial regulation for pension plans; from 1992 to 1998, after the 1991 Spanish Personal Income Tax reform; and from 1999 onwards, following the 1998 reform.

The applied model is set out and discussed in Section 3. In order to discover the factors explaining the decisions associated with investment in personal pension plans, we specify and estimate a Tobit model for a sample drawn from the 1995 Personal Income Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy and Finance). Our conclusion from this exercise is that the holders of personal pension plans are motivated both by reasons of financial prudence and tax savings.

Section 4 ends the paper with some final considerations.

2. The tax treatment of pension plans

In this section, we shall describe the tax treatment of pension plans and quantify their internal rate of return (IRR) since 1987. This analysis distinguishes between the three

moments at which the tax treatment affects investment in pension plans, namely when contributions are made, during the accumulation of returns, and when the benefit contracted is received.[1] Table 1 shows the expressions for the IRR of the pension plans in the three periods considered. The tax treatment of the plans is summarised in Table 2.

[TABLES 1 and 2 ABOUT HERE]

2.1. Contributions

The contributions made to pension plans are tax allowable in the contributor's Personal Income Tax within certain limits. Initially, in the period 1987-1991, the contribution could be deducted from taxable income provided the amount of the deduction was less than 15 percent of the sum of net earnings from work and business activities (*earned income*) or 500,000 pesetas. The remaining contributions were eligible for a 15 percent tax credit up to a limit of 750,000 pesetas. In the early years, these limits were applied to each tax return, but this changed in 1989, when married people were allowed to file separate returns, and tax credits and allowances became applicable to each taxpayer included in the return.

There were two key changes to the tax treatment of contributions to pension plans in the ensuing years. Firstly, the 15 percent tax credit was removed (1992) and, secondly, the absolute and relative limits on the deduction from taxable income were raised.

Since 2003 the absolute deduction for people aged under 53 years has been € 8,000, with an additional € 1,250 for each additional year over the age of 52 to a maximum of € 24,250 for pension plan contributors aged over 65. Meanwhile, the relative limit on

[1] See Scholes *et al.*(2002). Antolín, de Serrres, and de la Maisonneuve (2004) and Yoo and de Serres (2004) examine the tax treatment of private pensions in the OECD countries.

deductions was removed in 2002, and the maximum allowable contribution has since been 100 percent of taxable income excluding capital gains.

Based on this regulatory framework, let us initially assume an initial capital *IC* available for investment in a pension plan. The contribution made produces tax savings. Given that the unit deduction will differ depending on whether it is applied to taxable income or tax liability, which shall denote each alternative by d_q, where q takes the value 1 or 2, respectively, for deductions from taxable income or tax liability. If the contribution is deductible from taxable income, $d_1 = t_{px}$, where t_{px} is the marginal rate subject to the age x at which the taxpayer made the contribution. If it is deductible from tax liability, then $d_2 = 0{,}15$.

Hence, the net initial capital, *NIC*, will be equal to:

$$NIC = IC \cdot (1 - d_q) \qquad [1]$$

2.2. Accumulation

The returns generated by pension plans are not taxable during the accumulation period. In the first place, the pension plan holder does not pay any Income Tax on the returns generated, which are not imputed to him. Meanwhile, the pension fund itself, though subject to Corporate Income Tax, benefits from a zero tax rate. Thus, the fund is required to file a corporate income tax return, but only to recover amounts withheld at source. Finally, Net Wealth Tax is not levied on the investment, because the vested rights in the plan were not initially subject to the tax, and they are currently exempt.

Hence, the net rate of interest on the pension plan investment is:

$$i_N = i \cdot (1 - t_s) = i \qquad [2]$$

where i is the nominal gross rate, and t_s the corporate tax rate.

If x is the age of the individual making contributions to the pension plan, and j is her age upon retirement, the final capital accumulated will thus be:

$$FC = IC \cdot (1 + i_N)^{j-x} = IC \cdot (1 + i)^{j-x} \qquad [3]$$

2.3. Benefits

Pension benefits could be withdrawn in the form of lump-sums or in the form of annuities. We will refer here only to the first case. When benefits are paid, the total amount is included in taxable income by way of earnings from labour. The way in which the tax base is established and the applicable tax rate calculated has changed over time.

As shown in Table 2, the benefits received from the plan are eligible for an allowance. This was initially 2 percent of the returns obtained and is currently 40 percent.

Between 1987 and 1998, the annualised returns (i.e. the quotient of taxable returns and the number of years in which they were generated) were taxed at the marginal tax rate. The remainder returns were taxed at the average rate, because it would not be equitable to apply a progressive tax schedule to returns generated over a number of years. So, the tax rate applicable to benefits is the weighted average of the average and marginal tax rates at the time the funds are withdrawn. Since 1999, the taxable part of pension plan benefits have been taxed at the relevant marginal tax rate.

Let us call the tax rate applicable to benefits t_e, and the taxable part of the final capital obtained g. The tax liability will now be:

$$T_P = t_e \cdot g \cdot FC \qquad [4]$$

And the net final capital will be:

$$NFC = FC - T_P = FC \cdot (1 - t_e \cdot g) = IC \cdot (1+i)^{j-x} \cdot (1 - t_e \cdot g) \qquad [5]$$

The formula for IRR is:

$$IRR = \left(\frac{NFC}{NIC}\right)^{\frac{1}{j-x}} - 1 = (1+i) \cdot \left(\frac{1 - g \cdot t_e}{1 - d_q}\right)^{\frac{1}{j-x}} - 1 \qquad [6]$$

The IRR of pension plans has grown continuously since 1987 thanks to the tax regime, which is more favourable than for any other savings instrument. As shown in Figure 1, these assets have gradually increased their share of the portfolios held by individuals to somewhat more than 6 percent at present.[2]

[FIGURE 1 ABOUT HERE]

2.4. Income, age and pension plan investment

Let us now focus on the variables influencing the decision to invest in a personal pension plan. Based on the expression of IRR, we can predict the relationship between pension plan investment and the investor's income. Since the year considered in the present empirical study is 1995, we shall work with the IRR expression for the period 1992-1998, which is:

[2] Figure 1 was constructed on the basis of the *Financial Accounts of the Spanish Economy,* prepared by the Bank of Spain. Exhaustive information concerning pension plans in Spain is available in *Dirección General de Seguros y Fondos de Pensiones* (2004) and at the website of INVERCO, *Asociación de Instituciones de Inversión Colectiva y Fondos de Pensiones*: www.inverco.es.

$$IRR = (1+i)\cdot\left\{\frac{1-g\cdot t_e}{1-t_{px}}\right\}^{\frac{1}{j-x}} - 1 \qquad [6']$$

In order to obtain the relationship between IRR and income levels, we first need to establish the relationship between the marginal tax rate at the time the contribution is made, t_{px}, and the tax rate levied on the benefits, t_e. As explained above, the latter is the weighted average of the average and marginal tax rates at the time the benefit is paid. We may therefore make the general assumption that it will be related to the initial marginal tax rate in the following manner:

$$t_e = k\cdot t_{px} \quad , \; 0<k<1 \qquad [7]$$

Thus, the pension plan participant's income at the time the benefit is received, and hence the applicable tax rate, will be a given proportion of the income she received and the applicable tax rate applied while she was active. We may now calculate how IRR will vary when t_{px} changes:

$$\frac{\partial IRR}{\partial t_{px}} = \frac{(1+i)}{(j-x)}\cdot\left(\frac{1-g\cdot t_e}{1-t_{px}}\right)^{\frac{1}{j-x}-1}\cdot\left(\frac{1-g\cdot k}{(1-t_{px})^2}\right) > 0 \qquad [8]$$

Accordingly, the IRR of pension plans rises in line with contributors' incomes and the applicable tax rates. We may therefore expect to find a positive relationship between income and pension plan contributions.

Let us look now at the incentive to invest in pension plans and age. The IRR of pension savings is of no use to us here, because investments of differing duration cannot be compared on this basis. Consequently, we shall calculate the net present value of the investment in the plan, assuming that the alternative investment is tax exempt.

Based on the net initial and final capital respectively given in [1] and [5], the net present value of a one euro investment in a pension plan would be:

$$NPV = -(1-t_{px}) + \frac{NFC}{(1+i)^{j-x}} = \\ = -(1-t_{px}) + (1-g\cdot t_e) = t_{px} - g\cdot t_e = t_{px}\cdot(1-g\cdot k) \qquad [9]$$

Hence, anybody investing in a personal pension plan obtains a subsidy per unit invested, which is the same at any age. This subsidy represents compensation for the absence of liquidity inherent in pension plans. However, if we take into account that the loss of liquidity diminish as people grow older and the recovery of the investment draws nearer, we may conclude that the incentive to invest in pension plans is greater for older people.

3. Empirical evidence for personal pension plan investment decisions

In this section, we seek to answer the two questions forming the objective of this paper. What variables influence the decision to invest in a personal pension plan? And, what variables affect the amount individuals decide to contribute to their pension plans? To answer these questions, we shall specify and estimate a Tobit model for a 1995 sample (the latest available) from the Institute of Fiscal Studies Personal Income Taxpayers Panel. The sample is formed by 3,041 tax returns, of which 358 include contributions to personal pension plans.

Following Cabrer, Sancho, and Serrano (2001), the specification of the model is as follow[3]. The regressand Y_i can take a value of zero or the value of the variable Y_i^* , known as the latent variable:

$$\begin{cases} \left(Y_i / X_i, Y_i^* \le 0\right) = 0 \\ \left(Y_i / X_i, Y_i^* > 0\right) = X_i\beta + u_i \end{cases} \quad [10]$$

In the first stage a Probit model is used to determine the probability that the variable Y_i^* will take a value of zero rather than a positive value. In the second stage, a real and positive value is assigned to the variable Y_i after a positive value has been probabilistically given to Y_i^* , and the following model is specified with the subset of observations having a regressand other than zero:

$$Y_i^* = X_i\beta + u_i \quad [11]$$

where β are the coefficients, X_i the regressors, and u_i is the error term, which is a random variable distributed based on normal $N(0,\sigma^2)$.

In our model, the dependent variable is the amount of contributions made to pension plans. The explanatory variables are those usually considered in the literature[4], to which have added some others that are specific to the reality of Spain. The variables used and the expected sign for each are shown in Table 3. Table 4, meanwhile, reflects the percentage of personal pension plan contributors for each variable, as well as the average contributions made. As the first row of this table shows, 11.77 percent of 1995 tax returns

[3] See also, Wooldridge (2003).
[4] See, for example, Guariglia and Markose (2000), Joulfaian and Richardson (2001), and Engelhardt and Madrian (2004) We have not been able to use the number of children, because this variable was not reliable in the sample.

declare contributions to personal pension plans, the average amount of which was 150,564 pesetas.[5]

The regressors considered were as follows:

Age. Based on the argument derived from expression [9], we may expect to find a positive relationship between age and the contributions made to pension plans. This variable has been included quadratically as well.

Marital status. We have used a dummy variable with a value of zero for unmarried and one for married taxpayers. We opted to assign a positive sign to this variable, because we believe that prudential behaviour is more likely in the case of married people.

Income level. Based on expression [8], we may expect a positive relationship between individuals' income levels (i.e. taxable income prior to tax allowance for contributions) and the amount of the contributions made to pension plans. For the same reason, we may assign a positive value to the variable ***marginal tax rate***. In addition, higher earners will also have greater capacity for savings. The *income* variable has also been included quadratically.

Occupation. We have used dummy variables for the categories entrepreneurs, professionals and salaried employees. We consider that the first two categories are likely to make higher contributions than employees because their mandatory social security contributions are smaller. Also, we would expect professionals to make higher contributions because they are, in general, better educated and are likely to be more aware of the advantages of this saving instrument .

[5] Following the Spanish Tax Agency -*Agencia Estatal de Administración Tributaria*- 9 percent of 1995 tax returns declared contributions to some kind of pension plan, the average amount of which was 184,150 pesetas. According to data from the *Dirección General de Seguros y Fondos de Pensiones*, 1,423,542 people contributed to

Year-end tax bill. The aim of this variable is to verify the hypothesis that people invests in pension plans with a view to reducing their year-end tax bill (i.e. the part of income tax not paid through withholdings at source), which is due upon the presentation of the income tax return. Thus, the higher the tax bill, the higher will be the pension plan contributions made.

Membership of occupational pension plans. Our hypothesis is that membership of occupational pension schemes will encourage the participation on personal plans. We have employed a dummy variable with a value of one for taxpayers who are members of occupational schemes and zero for those who are not. In the case of the former, however, we expect the contributions made to fall as the ***employer's contribution*** rises. This variable has been assigned a negative sign.

Prior year's contribution. We believe that the behaviour of people contributing to pension plans may be to some extent routine, with the result that they will continue to contribute a roughly similar amount each year after setting up the plan. Consequently, we have assigned a positive sign to this variable.

Mortgage repayments. A person who is still repaying the mortgage on his home will have less spare cash to contribute to his pension plan. The higher these mortgage repayments are, the less the person will contribute to the plan.

Life insurance contributions. Like pension plans, life insurance policies are prudential savings instruments, although they do not have the same characteristics. While pension plans receive a more favourable tax treatment, life insurance are more liquid. If pension plans and life insurance are substitute assets, we may expect that higher life

personal pension plans in 1995, investing an average of 132,823 pesetas. In 2004, 7,224,792 people made contributions, investing an average of € 746,87 (124,000 pesetas).

insurance contributions will be associated with smaller contributions to pension plans. On the other hand, if they act as complementary assets (as table 4 would seem to indicate), this relationship will be the reverse. In short, we are unable to assign a positive or negative sign to this variable.

[TABLES 3 and 4 ABOUT HERE]

The relationship between investment in the home, pension plans and life insurance is clearly apparent in figures 2 and 3, which are constructed on the basis of the sample of tax returns used for the applied study of 1995. It may be observed in figure 2, that buying a house is the most important investment made by people in their lifetimes. However, mortgage repayments begin to fall after the age of 50. Contributions to pension plans and life insurance are considerably smaller, but increase as individuals age. Average pension plan contributions rise fastest among people aged over 60, while life insurance contributions fall after the age of 65.

Figure 3, which takes income levels into account, reflects sustained growth in average mortgage repayments along the income scale. This effect is particularly pronounced in the two upper deciles. There is also a slight rise in investment in pension plans and life insurance until the last two deciles, where average contributions increase sharply, especially in the case of pension plans.

[FIGURES 2 and 3 ABOUT HERE]

Based on the above variables, we have specified three models which provide alternative explanations for the decision to invest in a personal pension plan. The first of these, which we shall call the "prudential model", is based on the hypothesis that individuals invest in pension plans basically to save against their retirement, perhaps as a

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supplement to other retirement funds obtained from sources such as the social security or life insurance. The explanatory variables in this model are age, marital status, occupation, membership of an occupational pension plan, employer's contributions, prior contributions, mortgage repayments and contributions to life insurance. The specification of the model is as follows:

$$PLAN_1 = f(C, AGE, STATUS, ENTREPRENEUR, PROFESSIONAL, SALARIED, OCCUPATIONALP, EMPLOYERC, PRIORC, MORTGAGE, INSURANCE) \quad [12]$$

The second "tax planning model" refers to the hypothesis that the individual's main motivation is to obtain the tax benefits available to investors in pension plans. The exogenous variables included in the model are income level, marginal tax rate, year-end tax bill, mortgage repayments and life insurance contributions. The specification is:

$$PLAN_2 = f(C, INCOME, MARGINALT, TAXBILL, MORTGAGE, INSURANCE) \quad [13]$$

Finally, the "general model" includes all of the exogenous variables and is based on the hypothesis that investment in pension plans can be explained both by prudential and tax planning concerns. The specification of the model is as follows:

$$PLAN_3 = f(C, AGE, STATUS, INCOME, ENTREPRENEUR, PROFESSIONAL, SALARIED, MARGINALT, TAXBILL, OCCUPATIONALP, EMPLOYERC, PRIORC, IMORTGAGE, INSURANCE) \quad [14]$$

The heteroskedastically robust estimation of the models was performed using the *Econometric Views (Eviews)* application, version 3.1. Using the logarithm of the verisimilitude function and the Aikake, Schwarz and Hannan-Quinn criteria as the selection criteria, we chose the general model as the most adequate. The results of the estimation are shown in Table 5.

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The variables found to be significant took the expected signs. In the first place, the amount of contributions rises with age, although at a decreasing rate (AGE) until the age of 45, whereafter contributions begin to decline as individuals grow older. As shown in Table 4, the percentage of older people still making contributions falls sharply, although the average amount set aside rises. Secondly, salaried employees make smaller contributions than people in other occupations (SALARIED). Meanwhile, we have been able to confirm that membership of an occupational pension plan stimulates investment in personal plans (OCCUPATIONALP), and that people benefiting from higher sponsor's contributions to such plans invest less in their personal plans than they would were the sponsor's contribution smaller (EMPLOYERC). Furthermore, savings in a given year are positively affected by the prior year's contributions (PRIORC).

While the above variables refer to prudential reasons for setting up a personal pension plan, there is another significant variable which is related with tax planning. In fact, contributions grow with income, although once again at a decreasing rate (INCOME) up to a threshold of 10.6 million pesetas (approximately € 64,000) covering the earnings of 99 percent of income taxpayers. Thereafter, the amount of contributions begins to decrease as income rises.

The last variable found to be significant in the estimation of the model expressed in [14] is the amount of mortgage repayments (MORTGAGE). This variable also took the expected sign and fits both with prudential and tax planning arguments for pension plan investment. Based on Table 5, we may affirm that taxpayers set aside less by way of private pension plan contributions as the amount of mortgage repayments made during the year rises.

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In light of these results, we may conclude that individuals decide to invest in personal pension plans on complex grounds combining the wish to benefit from tax savings and to ensure they will receive supplementary income upon retirement. These results are in line with those obtained by literature in other countries.

[TABLE 5 ABOUT HERE]

Tables A1 and A2 given in the Appendix respectively reflect the estimation of the prudential and tax planning models. In the former, age and the three variables related with investment in pension plans (membership of occupational pension plans, employer's contributions and prior contributions) are significant and take the expected signs. In the tax planning model, meanwhile, the significant variables are income, tax bill and mortgage repayments, which once again take the expected signs.

4. Concluding remarks

In this paper, we have examined the variables affecting the decisions to invest in a personal pension plan and the amount of contributions. We have found a combination of prudential and tax planning reasons for these decisions. Age and occupation affect individuals, as do membership of occupational pension plans, and previous contributions to their own personal plans, as well as the cost of mortgage repayments and income levels.

Our empirical study uses 1995 data, seven years after the first regulation of pension plans. In that year, these instruments had come to represent 4.4 percent of assets held by private individuals. Eight years on, this share has risen to 6.2 percent, confirming the consolidation of these prudential savings vehicles. Consequently, it will be necessary to

repeat the estimations carried out in order to confirm whether, as we believe, the variables that explain investment in pension plans in 1995 remain significant in the present.*

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TABLE 1. Pension plan IRR, 1987-2004

Period	IRR	*g*
1987-1991	$\mathrm{IRR}_{\mathrm{P.87}} = (1+i)\cdot\left(\frac{(1-g\cdot t_e)}{1-d_q}\right)^{\frac{1}{j-x}} - 1$	0.98
1992-1998	$\mathrm{IRR}_{\mathrm{P.92}} = (1+i)\cdot\left(\frac{(1-g\cdot t_e)}{1-t_{px}}\right)^{\frac{1}{j-x}} - 1$	0.95 or 1
1999 and thereafter	$\mathrm{IRR}_{\mathrm{P.99}} = (1+i)\cdot\left(\frac{(1-g\cdot t_{pj})}{1-t_{px}}\right)^{\frac{1}{j-x}} - 1$	0.6 (if j-x>2)

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TABLE 2. Tax treatment of pension plans

		1987 – 1991	1992 - 1998	1999 - 2004	
CONTRIBUTIONS					
Personal Income Tax saving		t_{px} or 15%	t_{px}	t_{px}	
				Up to 52 years	*> 52 years*
Limits on allowances and tax credits	-- Absolute	Ptas. 500,000 – 750,000	Ptas. 750,000 -1,100,000	In 1999: Ptas. 1,100,000 In 2000-01: Ptas. 1,200,000 In 2002: Ptas. 1,200,000 Since 2003: € 8,000	---- 2000-01:+ Ptas. 100,000 (age–52) In 2002:+ Ptas. 200,000 (age–52) Since 2003: + €1,250 (age-52)
	-- Relative	15% earned income	15%-20% earned income	100% general taxable income (In 1999-01: 20%, 25%)	100% general taxable income (In 1999-01: 20%, 25%, 40%)
ACCUMULATION					
Corporate Income Tax		Zero rate			
Net Wealth Tax		Not subject	Exempt	Exempt	
BENEFITS					
Personal Income Tax base		Final capital	Final capital	Final capital	
Taxable returns		98%	95% – 100%	60%	
Applicable tax rate		t_e	t_e	t_{pj}	

Source: Own work.

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TABLE 3. Variables and expected sign

Variable	Symbol	Expected sign
Contributions to pension plans	PLAN	
Age	AGE	+
Marital status	STATUS	+
Income level	INCOME	+
Business activity	ENTREPRENEUR	¿?
Professional activity	PROFESSIONAL	+
Salaried employment	SALARIED	-
Marginal tax rate	MARGINALT	+
Year-end tax bill	TAXBILL	+
Membership of occupational scheme	OCCUPATIONALP	+
Employer´s contribution	EMPLOYERC	-
Prior year's contribution	PRIORC	+
Mortgage repayments	MORTGAGE	-
Life insurance contributions	LINSURANCE	¿?

TABLE 4. Personal pension plan membership and average contributions

VARIABLE		PERCENTAGE CONTRIBUTORS	AVERAGE CONTRIBUTION (pesetas)
TOTAL		**11.77**	**150,564**
AGE	20-25	3.33	76,100
	25-30	4.03	71,294
	30-35	9.52	107,387
	35-40	11.82	143,148
	40-45	15.99	157,821
	45-50	20.23	168,435
	50-55	16.03	162,782
	55-60	9.05	182,430
	60-65	6.60	213,851
MARITAL STATUS	Unmarried	10.30	123,855
	Married	13.12	169,825
INCOME LEVEL	Decile 1	2.63	50,323
	Decile 2	3.95	82,919
	Decile 3	5.59	81,680
	Decile 4	6.25	88,752
	Decile 5	7.57	94,569
	Decile 6	10.53	116,845
	Decile 7	11.18	92,666
	Decile 8	15.13	106,532
	Decile 9	21.38	152,520
	Decile 10	33.55	250,495
OCCUPATION	Entrepreneur	11.52	156,509
	Professional	21.30	212,584
	Salaried employee	11.74	147,810
MARGINAL TAX RATE	0.0%	3.65	72,952
	20.0%	4.51	101,716
	22.0%	6.24	86,341
	24.5%	8.73	98,111
	27.0%	12.23	103,398
	30.0%	17.54	134,515
	32.0%	19.77	147,252
	34.0%	23.30	165,826
	36.0%	30.00	118,837
	38.0%	22.22	286,168
	40.0%	35.48	184,481
	42.5%	46.15	195,188
	45.0%	27.78	167,069
	47.0%	41.67	395,785
	49.0%	37.50	515,049
	51.0%	9.09	151,029
	53.5%	52.38	390,886
TAX BILL	Negative	18.04	252,739
	Positive	11.05	131,215
PARTICIPATION IN OCCUPATIONAL PENSION PLAN	Yes	54.64	101,415
	No	10.36	159,105
MORTGAGE REPAYMENTS	Yes	15.12	122,641
	No	10.50	165,916
LIFE INSURANCE CONTRIBUTIONS	Yes	23.52	190,944
	No	9.04	126,118

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TABLE 5. Results of the Tobit estimation for the general model

	Coefficient	Marginal Effect	Std. Error	z-Statistic	Prob.
C	-772944.2	-64292.13	108576.3	-7.118904	0.0000
AGE	22964.83	1910.17	4915.381	4.672035	0.0000
AGE*AGE	-259.8054	-21.68	54.84662	-4.736945	0.0000
INCOME	0.042513	0.003514	0.005972	7.118444	0.0000
INCOME*INCOME	-1.98E-09	-1,64693E-10	4.19E-10	-4.732125	0.0000
SALARIED	-38574.77	-43470.35	16299.70	-2.366595	0.0180
OCCUPATIONALP	172098.7	43790.72	29915.47	5.752832	0.0000
EMPLOYERC	-0.483151	-0.040188	0.067742	-7.132190	0.0000
PRIORC	1.290833	0.107369	0.050385	25.61938	0.0000
MORTGAGE	-0.025753	-0.002142	0.011719	-2.197532	0.0280
		Error Distribution			
SCALE:C(11)	159924.4		4444.289	35.98424	0.0000

R-squared	0.534140	Mean dependent var	17725.07
Adjusted R-squared	0.532602	S.D. dependent var	73299.59
S.E. of regression	50112.37	Akaike info criterion	3.479154
Sum squared resid	7.61E+12	Schwarz criterion	3.500930
Log likelihood	-5279.054	Hannan-Quinn criter.	3.486981
Avg. log likelihood	-1.735960		
Left censored obs	2683	Right censored obs	0
Uncensored obs	358	Total obs	3041

APPENDIX

TABLE A1. Results of the Tobit estimation for the prudential model

	Coefficient	Std. Error	z-Statistic	Prob.
C	-918664.1	108308.6	-8.481915	0.0000
AGE	31463.59	4931.230	6.380475	0.0000
AGE*AGE	-350.2904	54.97829	-6.371431	0.0000
OCCUPATIONALP	190266.5	32070.75	5.932709	0.0000
EMPLOYERC	-0.475665	0.070643	-6.733330	0.0000
PRIORC	1.466353	0.044976	32.60324	0.0000
Error Distribution				
SCALE:C(7)	168214.5	3625.361	46.39937	0.0000
R-squared	0.502038	Mean dependent var		17725.07
Adjusted R-squared	0.501053	S.D. dependent var		73299.59
S.E. of regression	51776.03	Akaike info criterion		3.499670
Sum squared resid	8.13E+12	Schwarz criterion		3.513527
Log likelihood	-5314.248	Hannan-Quinn criter.		3.504651
Avg. log likelihood	-1.747533			
Left censored obs	2683	Right censored obs		0
Uncensored obs	358	Total obs		3041

TABLE A2. Results of the Tobit estimation for the tax planning model

	Coefficient	Std. Error	z-Statistic	Prob.
C	-574386.7	27999.27	-20.51434	0.0000
INCOME	0.111300	0.008877	12.53834	0.0000
INCOME*INCOME	-4.10E-09	6.32E-10	-6.490179	0.0000
TAXBILL	0.045730	0.019646	2.327738	0.0199
MORTGAGE	-0.071568	0.023655	-3.025521	0.0025
Error Distribution				
SCALE:C(6)	266798.1	11630.07	22.94038	0.0000
R-squared	0.208576	Mean dependent var		17725.07
Adjusted R-squared	0.207272	S.D. dependent var		73299.59
S.E. of regression	65262.49	Akaike info criterion		3.674403
Sum squared resid	1.29E+13	Schwarz criterion		3.686280
Log likelihood	-5580.930	Hannan-Quinn criter.		3.678672
Avg. log likelihood	-1.835228			
Left censored obs	2683	Right censored obs		0
Uncensored obs	358	Total obs		3041

Figure 1. Distribution of family assets.1984-2003

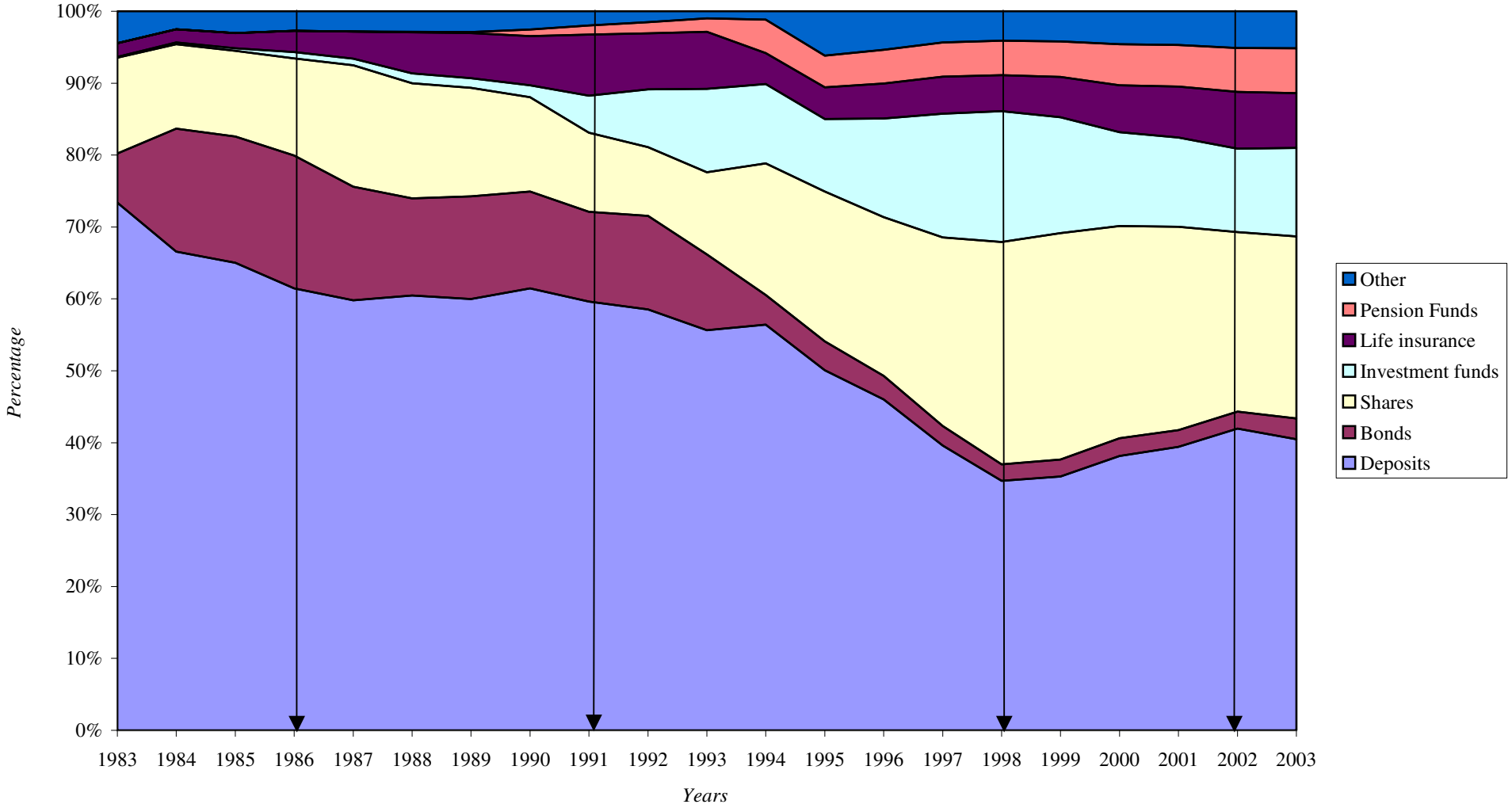


Figure 2. Age and average investment in different assets.

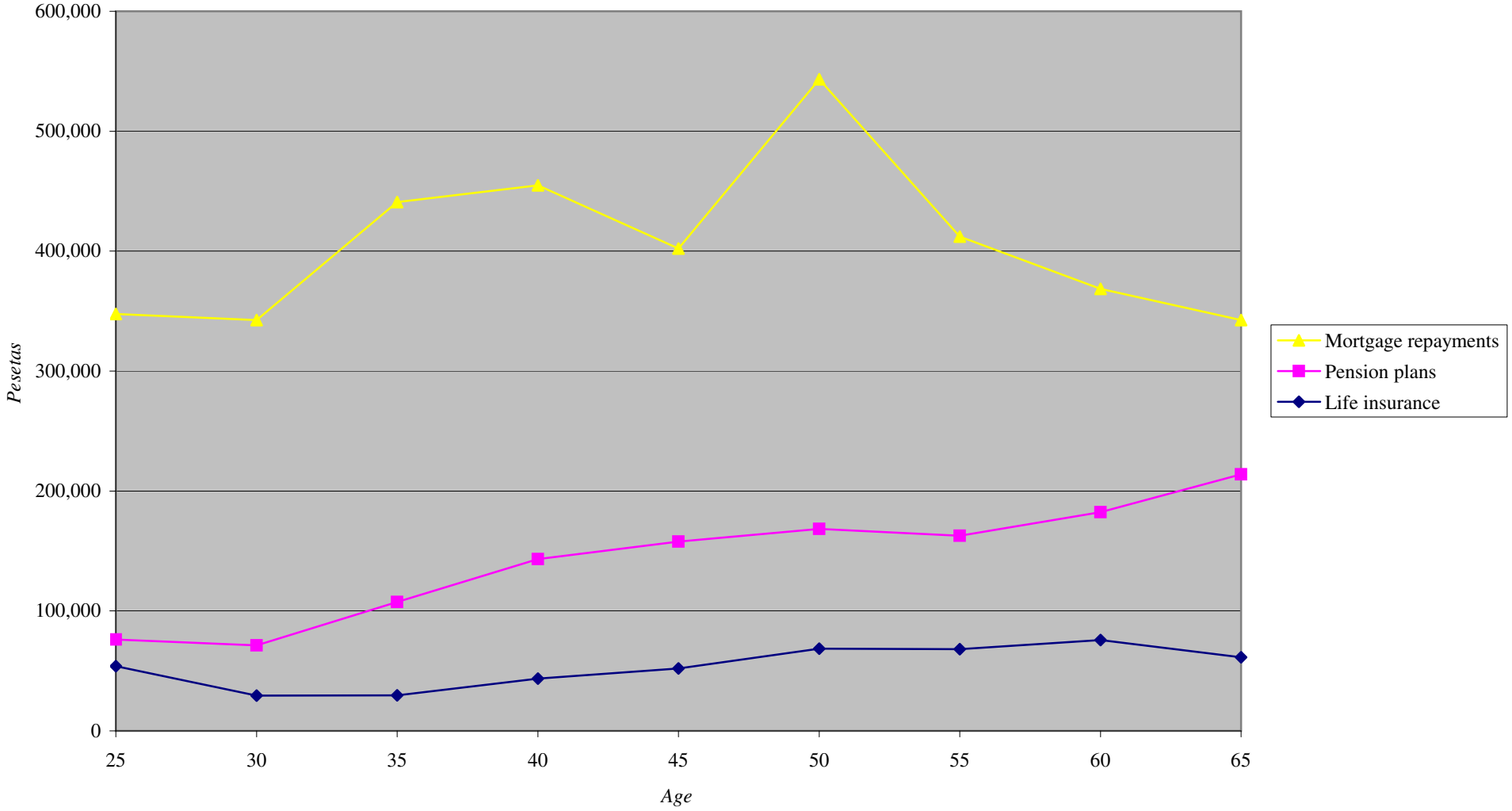
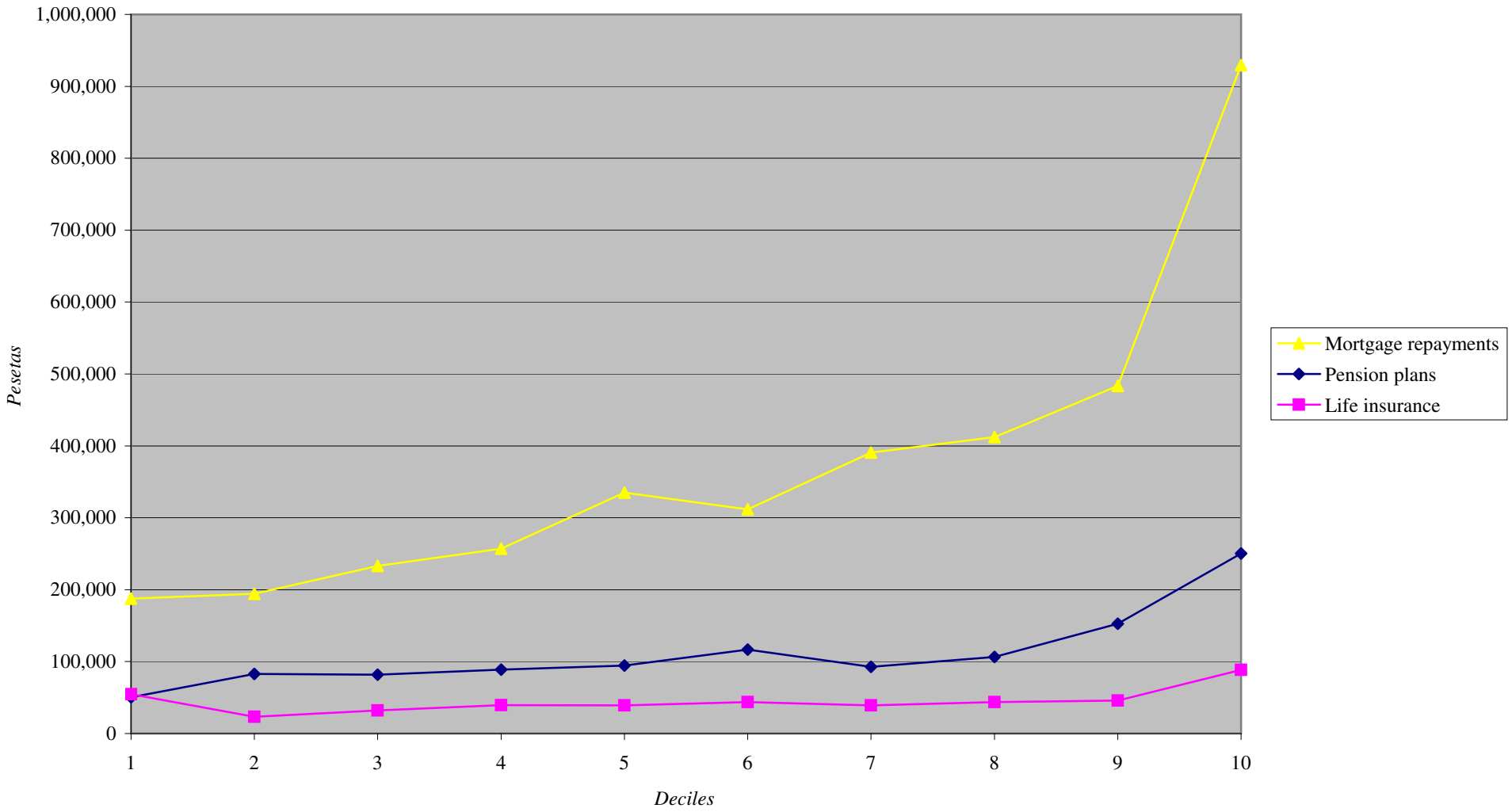


Figure 3. Income levels and average investment in assets.



Why do people invest in personal pension plans?

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Abstract: The aim of this paper is to identify the variables affecting the decision to make contributions to personal pension plans and the amount of such contributions. For this purpose, we specify and estimate a Tobit model for a sample based on the 1995 Personal Income Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy and Finance) formed by 3,041 taxpayers, of whom 358 made contributions to pension plans. Our results suggest that individuals decide to invest in pension plans on complex grounds combining the wish to benefit from tax savings and to ensure they will receive supplementary income upon retirement.

Key words: Pension plans, retirement purposes, tax planning.

J.E.L. classification: H31.

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1. Introduction

The tax treatment of pension plans is currently a matter of some debate in Spain. The government's position is that the favourable tax treatment accorded to such instruments provides an incentive for the better off to invest, while the lower and middle income groups hardly make any use of them. Thus, investment in pension plans is more a matter of tax planning than financial prudence in anticipation of retirement. This paper seeks to make a contribution to this debate, and to this end we shall use information provided in 1995 personal income tax returns to investigate the reasons underlying the two decisions made by the holders of pension plans, first to set up a plan and then to make contributions for a given amount.

The Spanish Pension Plans and Funds Regulation Act, 1987 (Law 8/June 8, 1987) regulated pension plans, defined as voluntary prudential institutions providing benefits supplementing those of the public social security system. The Act refers to three types of pension plan depending on the person who offers them. These are "occupational schemes" in which the sponsor of the pension plan is an organisation, corporation, company or firm (that is, an employer) and the members are employees; "associated schemes" sponsored by associations or trade unions for their members or affiliates; and "personal schemes" sponsored by one or more financial entities and having private individuals as their members. In this paper, we shall focus on personal pension plans.

Pension plans may also be classified on the basis of the obligations provided for in the contract. Thus, "defined benefits plans" fix the amount of the final pension the beneficiaries will receive; "defined contributions plans" establish the amount of the contributions the sponsors and, where applicable, participants must make; and "mixed

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plans" simultaneously stipulate eventual benefits and the amount of contributions. While occupational and associated pension plans may fall into any of these three categories, personal pension plans will always be defined contributions schemes.

Pension plans have received a highly favourable tax treatment since they were first regulated in 1987, and as a result they now represent a growing part of the financial assets held by individuals.

The rest of this paper is structured as follows. In Section 2, we outline the tax regime applicable to pension plans in Spain since 1987. The data presented are expressed in terms of the internal rate of return of pension plans in the three following periods: from 1987 to 1991, with the initial regulation for pension plans; from 1992 to 1998, after the 1991 Spanish Personal Income Tax reform; and from 1999 onwards, following the 1998 reform.

The applied model is set out and discussed in Section 3. In order to discover the factors explaining the decisions associated with investment in personal pension plans, we specify and estimate a Tobit model for a sample drawn from the 1995 Personal Income Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy and Finance). Our conclusion from this exercise is that the holders of personal pension plans are motivated both by reasons of financial prudence and tax savings.

Section 4 ends the paper with some final considerations.

2. The tax treatment of pension plans

In this section, we shall describe the tax treatment of pension plans and quantify their internal rate of return (IRR) since 1987. This analysis distinguishes between the three

moments at which the tax treatment affects investment in pension plans, namely when contributions are made, during the accumulation of returns, and when the benefit contracted is received.[1] Table 1 shows the expressions for the IRR of the pension plans in the three periods considered. The tax treatment of the plans is summarised in Table 2.

[TABLES 1 and 2 ABOUT HERE]

2.1. Contributions

The contributions made to pension plans are tax allowable in the contributor's Personal Income Tax within certain limits. Initially, in the period 1987-1991, the contribution could be deducted from taxable income provided the amount of the deduction was less than 15 percent of the sum of net earnings from work and business activities (*earned income*) or 500,000 pesetas. The remaining contributions were eligible for a 15 percent tax credit up to a limit of 750,000 pesetas. In the early years, these limits were applied to each tax return, but this changed in 1989, when married people were allowed to file separate returns, and tax credits and allowances became applicable to each taxpayer included in the return.

There were two key changes to the tax treatment of contributions to pension plans in the ensuing years. Firstly, the 15 percent tax credit was removed (1992) and, secondly, the absolute and relative limits on the deduction from taxable income were raised.

Since 2003 the absolute deduction for people aged under 53 years has been € 8,000, with an additional € 1,250 for each additional year over the age of 52 to a maximum of € 24,250 for pension plan contributors aged over 65. Meanwhile, the relative limit on

[1] See Scholes *et al.*(2002). Antolín, de Serrres, and de la Maisonneuve (2004) and Yoo and de Serres (2004) examine the tax treatment of private pensions in the OECD countries.

deductions was removed in 2002, and the maximum allowable contribution has since been 100 percent of taxable income excluding capital gains.

Based on this regulatory framework, let us initially assume an initial capital *IC* available for investment in a pension plan. The contribution made produces tax savings. Given that the unit deduction will differ depending on whether it is applied to taxable income or tax liability, which shall denote each alternative by d_q, where q takes the value 1 or 2, respectively, for deductions from taxable income or tax liability. If the contribution is deductible from taxable income, $d_1 = t_{px}$, where t_{px} is the marginal rate subject to the age x at which the taxpayer made the contribution. If it is deductible from tax liability, then $d_2 = 0{,}15$.

Hence, the net initial capital, *NIC*, will be equal to:

$$NIC = IC \cdot (1 - d_q) \qquad [1]$$

2.2. Accumulation

The returns generated by pension plans are not taxable during the accumulation period. In the first place, the pension plan holder does not pay any Income Tax on the returns generated, which are not imputed to him. Meanwhile, the pension fund itself, though subject to Corporate Income Tax, benefits from a zero tax rate. Thus, the fund is required to file a corporate income tax return, but only to recover amounts withheld at source. Finally, Net Wealth Tax is not levied on the investment, because the vested rights in the plan were not initially subject to the tax, and they are currently exempt.

Hence, the net rate of interest on the pension plan investment is:

$$i_N = i \cdot (1 - t_s) = i \qquad [2]$$

where i is the nominal gross rate, and t_s the corporate tax rate.

If x is the age of the individual making contributions to the pension plan, and j is her age upon retirement, the final capital accumulated will thus be:

$$FC = IC \cdot (1 + i_N)^{j-x} = IC \cdot (1 + i)^{j-x} \qquad [3]$$

2.3. Benefits

Pension benefits could be withdrawn in the form of lump-sums or in the form of annuities. We will refer here only to the first case. When benefits are paid, the total amount is included in taxable income by way of earnings from labour. The way in which the tax base is established and the applicable tax rate calculated has changed over time.

As shown in Table 2, the benefits received from the plan are eligible for an allowance. This was initially 2 percent of the returns obtained and is currently 40 percent.

Between 1987 and 1998, the annualised returns (i.e. the quotient of taxable returns and the number of years in which they were generated) were taxed at the marginal tax rate. The remainder returns were taxed at the average rate, because it would not be equitable to apply a progressive tax schedule to returns generated over a number of years. So, the tax rate applicable to benefits is the weighted average of the average and marginal tax rates at the time the funds are withdrawn. Since 1999, the taxable part of pension plan benefits have been taxed at the relevant marginal tax rate.

Let us call the tax rate applicable to benefits t_e, and the taxable part of the final capital obtained g. The tax liability will now be:

$$T_P = t_e \cdot g \cdot FC \quad [4]$$

And the net final capital will be:

$$NFC = FC - T_P = FC \cdot (1 - t_e \cdot g) = IC \cdot (1+i)^{j-x} \cdot (1 - t_e \cdot g) \quad [5]$$

The formula for IRR is:

$$IRR = \left(\frac{NFC}{NIC}\right)^{\frac{1}{j-x}} - 1 = (1+i) \cdot \left(\frac{1 - g \cdot t_e}{1 - d_q}\right)^{\frac{1}{j-x}} - 1 \quad [6]$$

The IRR of pension plans has grown continuously since 1987 thanks to the tax regime, which is more favourable than for any other savings instrument. As shown in Figure 1, these assets have gradually increased their share of the portfolios held by individuals to somewhat more than 6 percent at present.[2]

[FIGURE 1 ABOUT HERE]

2.4. Income, age and pension plan investment

Let us now focus on the variables influencing the decision to invest in a personal pension plan. Based on the expression of IRR, we can predict the relationship between pension plan investment and the investor's income. Since the year considered in the present empirical study is 1995, we shall work with the IRR expression for the period 1992-1998, which is:

[2] Figure 1 was constructed on the basis of the *Financial Accounts of the Spanish Economy,* prepared by the Bank of Spain. Exhaustive information concerning pension plans in Spain is available in *Dirección General de Seguros y Fondos de Pensiones* (2004) and at the website of INVERCO, *Asociación de Instituciones de Inversión Colectiva y Fondos de Pensiones*: www.inverco.es. Blake (2004) investigates the allocation of UK personal sector wealth across five asset categories (net financial wealth, housing wealth, state pension wealth, private pension wealth, and human capital) using the financial AIDS model. He finds that, apart from total wealth and returns, other variables relating to capital market imperfections, and demographic, labour market and cross-sector spillover effects turn out to be significant.

$$IRR = (1+i)\cdot\left\{\frac{1-g\cdot t_e}{1-t_{px}}\right\}^{\frac{1}{j-x}} - 1 \qquad [6']$$

In order to obtain the relationship between IRR and income levels, we first need to establish the relationship between the marginal tax rate at the time the contribution is made, t_{px}, and the tax rate levied on the benefits, t_e. As explained above, the latter is the weighted average of the average and marginal tax rates at the time the benefit is paid. We may therefore make the general assumption that it will be related to the initial marginal tax rate in the following manner:

$$t_e = k\cdot t_{px} \quad , \; 0<k<1 \qquad [7]$$

Thus, the pension plan participant's income at the time the benefit is received, and hence the applicable tax rate, will be a given proportion of the income she received and the applicable tax rate applied while she was active. We may now calculate how IRR will vary when t_{px} changes:

$$\frac{\partial IRR}{\partial t_{px}} = \frac{(1+i)}{(j-x)}\cdot\left(\frac{1-g\cdot t_e}{1-t_{px}}\right)^{\frac{1}{j-x}-1}\cdot\left(\frac{1-g\cdot k}{(1-t_{px})^2}\right) > 0 \qquad [8]$$

Accordingly, the IRR of pension plans rises in line with contributors' incomes and the applicable tax rates. We may therefore expect to find a positive relationship between income and pension plan contributions.

Let us look now at the incentive to invest in pension plans and age. The IRR of pension savings is of no use to us here, because investments of differing duration cannot be compared on this basis. Consequently, we shall calculate the net present value of the investment in the plan, assuming that the alternative investment is tax exempt.

Based on the net initial and final capital respectively given in [1] and [5], the net present value of a one euro investment in a pension plan would be:

$$NPV = -(1-t_{px}) + \frac{NFC}{(1+i)^{j-x}} = \\ = -(1-t_{px}) + (1-g\cdot t_e) = t_{px} - g\cdot t_e = t_{px}\cdot(1-g\cdot k) \qquad [9]$$

Hence, anybody investing in a personal pension plan obtains a subsidy per unit invested, which is the same at any age. This subsidy represents compensation for the absence of liquidity inherent in pension plans. However, if we take into account that the loss of liquidity diminish as people grow older and the recovery of the investment draws nearer, we may conclude that the incentive to invest in pension plans is greater for older people.

3. Empirical evidence for personal pension plan investment decisions

In this section, we seek to answer the two questions forming the objective of this paper. What variables influence the decision to invest in a personal pension plan? And, what variables affect the amount individuals decide to contribute to their pension plans? To answer these questions, we shall specify and estimate a Tobit model for a 1995 sample (the latest available) from the Institute of Fiscal Studies Personal Income Taxpayers Panel. The sample is formed by 3,041 tax returns, of which 358 include contributions to personal pension plans.

Following Cabrer, Sancho, and Serrano (2001), the specification of the model is as follow[3]. The regressand Y_i can take a value of zero or the value of the variable Y_i^* , known as the latent variable:

$$\begin{cases} \left(Y_i / X_i, Y_i^* \le 0\right) = 0 \\ \left(Y_i / X_i, Y_i^* > 0\right) = X_i\beta + u_i \end{cases} \quad [10]$$

In the first stage a Probit model is used to determine the probability that the variable Y_i^* will take a value of zero rather than a positive value. In the second stage, a real and positive value is assigned to the variable Y_i after a positive value has been probabilistically given to Y_i^* , and the following model is specified with the subset of observations having a regressand other than zero:

$$Y_i^* = X_i\beta + u_i \quad [11]$$

where β are the coefficients, X_i the regressors, and u_i is the error term, which is a random variable distributed based on normal $N(0,\sigma^2)$.

In our model, the dependent variable is the amount of contributions made to pension plans. The explanatory variables are those usually considered in the literature[4], to which have added some others that are specific to the reality of Spain. The variables used and the expected sign for each are shown in Table 3. Table 4, meanwhile, reflects the percentage of personal pension plan contributors for each variable, as well as the average contributions made. As the first row of this table shows, 11.77 percent of 1995 tax returns

[3] See also, Wooldridge (2003).

[4] See, for example, Guariglia and Markose (2000), Joulfaian and Richardson (2001), and Engelhardt and Madrian (2004) We have not been able to use the number of children, because this variable was not reliable in the sample.

declare contributions to personal pension plans, the average amount of which was 150,564 pesetas.[5]

The regressors considered were as follows:

Age. Based on the argument derived from expression [9], we may expect to find a positive relationship between age and the contributions made to pension plans. This variable has been included quadratically as well.

Marital status. We have used a dummy variable with a value of zero for unmarried and one for married taxpayers. We opted to assign a positive sign to this variable, because we believe that prudential behaviour is more likely in the case of married people.

Income level. Based on expression [8], we may expect a positive relationship between individuals' income levels (i.e. taxable income prior to tax allowance for contributions) and the amount of the contributions made to pension plans. For the same reason, we may assign a positive value to the variable ***marginal tax rate***. In addition, higher earners will also have greater capacity for savings. The *income* variable has also been included quadratically.

Occupation. We have used dummy variables for the categories entrepreneurs, professionals and salaried employees. We consider that the first two categories are likely to make higher contributions than employees because their mandatory social security contributions are smaller. Also, we would expect professionals to make higher contributions because they are, in general, better educated and are likely to be more aware of the advantages of this saving instrument .

[5] Following the Spanish Tax Agency -*Agencia Estatal de Administración Tributaria*- 9 percent of 1995 tax returns declared contributions to some kind of pension plan, the average amount of which was 184,150 pesetas. According to data from the *Dirección General de Seguros y Fondos de Pensiones*, 1,423,542 people contributed to

Year-end tax bill. The aim of this variable is to verify the hypothesis that people invests in pension plans with a view to reducing their year-end tax bill (i.e. the part of income tax not paid through withholdings at source), which is due upon the presentation of the income tax return. Thus, the higher the tax bill, the higher will be the pension plan contributions made.

Membership of occupational pension plans. Our hypothesis is that membership of occupational pension schemes will encourage the participation on personal plans. We have employed a dummy variable with a value of one for taxpayers who are members of occupational schemes and zero for those who are not. In the case of the former, however, we expect the contributions made to fall as the ***employer's contribution*** rises[6]. This variable has been assigned a negative sign.

Prior year's contribution. We believe that the behaviour of people contributing to pension plans may be to some extent routine, with the result that they will continue to contribute a roughly similar amount each year after setting up the plan. Consequently, we have assigned a positive sign to this variable.

Mortgage repayments. A person who is still repaying the mortgage on his home will have less spare cash to contribute to his pension plan. The higher these mortgage repayments are, the less the person will contribute to the plan.

Life insurance contributions. Like pension plans, life insurance policies are prudential savings instruments, although they do not have the same characteristics. While pension plans receive a more favourable tax treatment, life insurance are more liquid. If

personal pension plans in 1995, investing an average of 132,823 pesetas. In 2004, 7,224,792 people made contributions, investing an average of € 746,87 (124,000 pesetas).

[6] Quite a lot of papers examine the factors affecting the employer contributions to pension plans. For the UK, see Casey (1994); for the USA, see Kiker and Rhine (1990), and Bernstein (2002).

pension plans and life insurance are substitute assets, we may expect that higher life insurance contributions will be associated with smaller contributions to pension plans. On the other hand, if they act as complementary assets (as table 4 would seem to indicate), this relationship will be the reverse. In short, we are unable to assign a positive or negative sign to this variable.

[TABLES 3 and 4 ABOUT HERE]

The relationship between investment in the home, pension plans and life insurance is clearly apparent in figures 2 and 3, which are constructed on the basis of the sample of tax returns used for the applied study of 1995. It may be observed in figure 2, that buying a house is the most important investment made by people in their lifetimes. However, mortgage repayments begin to fall after the age of 50. Contributions to pension plans and life insurance are considerably smaller, but increase as individuals age. Average pension plan contributions rise fastest among people aged over 60, while life insurance contributions fall after the age of 65.

Figure 3, which takes income levels into account, reflects sustained growth in average mortgage repayments along the income scale. This effect is particularly pronounced in the two upper deciles. There is also a slight rise in investment in pension plans and life insurance until the last two deciles, where average contributions increase sharply, especially in the case of pension plans.

[FIGURES 2 and 3 ABOUT HERE]

Based on the above variables, we have specified three models which provide alternative explanations for the decision to invest in a personal pension plan. The first of these, which we shall call the "prudential model", is based on the hypothesis that

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individuals invest in pension plans basically to save against their retirement, perhaps as a supplement to other retirement funds obtained from sources such as the social security or life insurance. The explanatory variables in this model are age, marital status, occupation, membership of an occupational pension plan, employer's contributions, prior contributions, mortgage repayments and contributions to life insurance. The specification of the model is as follows:

$$PLAN_1 = f(C, AGE, STATUS, ENTREPRENEUR, PROFESSIONAL, SALARIED, OCCUPATIONALP, EMPLOYERC, PRIORC, MORTGAGE, INSURANCE) \quad [12]$$

The second "tax planning model" refers to the hypothesis that the individual's main motivation is to obtain the tax benefits available to investors in pension plans. The exogenous variables included in the model are income level, marginal tax rate, year-end tax bill, mortgage repayments and life insurance contributions. The specification is:

$$PLAN_2 = f(C, INCOME, MARGINALT, TAXBILL, MORTGAGE, INSURANCE) \quad [13]$$

Finally, the "general model" includes all of the exogenous variables and is based on the hypothesis that investment in pension plans can be explained both by prudential and tax planning concerns. The specification of the model is as follows:

$$PLAN_3 = f(C, AGE, STATUS, INCOME, ENTREPRENEUR, PROFESSIONAL, SALARIED, MARGINALT, TAXBILL, OCCUPATIONALP, EMPLOYERC, PRIORC, IMORTGAGE, INSURANCE) \quad [14]$$

The heteroskedastically robust estimation of the models was performed using the *Econometric Views (Eviews)* application, version 3.1. Using the logarithm of the verisimilitude function and the Akaike, Schwarz and Hannan-Quinn criteria as the selection criteria, we chose the general model as the most adequate. The results of the estimation are shown in Table 5.

The variables found to be significant took the expected signs. In the first place, the amount of contributions rises with age, although at a decreasing rate (AGE) until the age of 45, whereafter contributions begin to decline as individuals grow older. As shown in Table 4, the percentage of older people still making contributions falls sharply, although the average amount set aside rises. Secondly, salaried employees make smaller contributions than people in other occupations (SALARIED). Meanwhile, we have been able to confirm that membership of an occupational pension plan stimulates investment in personal plans (OCCUPATIONALP), and that people benefiting from higher sponsor's contributions to such plans invest less in their personal plans than they would were the sponsor's contribution smaller (EMPLOYERC). Furthermore, savings in a given year are positively affected by the prior year's contributions (PRIORC).

While the above variables refer to prudential reasons for setting up a personal pension plan, there is another significant variable which is related with tax planning. In fact, contributions grow with income, although once again at a decreasing rate (INCOME) up to a threshold of 10.6 million pesetas (approximately € 64,000) covering the earnings of 99 percent of income taxpayers. Thereafter, the amount of contributions begins to decrease as income rises.

The last variable found to be significant in the estimation of the model expressed in [14] is the amount of mortgage repayments (MORTGAGE). This variable also took the expected sign and fits both with prudential and tax planning arguments for pension plan investment. Based on Table 5, we may affirm that taxpayers set aside less by way of private pension plan contributions as the amount of mortgage repayments made during the year rises.

In light of these results, we may conclude that individuals decide to invest in personal pension plans on complex grounds combining the wish to benefit from tax savings and to ensure they will receive supplementary income upon retirement. These results are in line with those obtained by literature in other countries.

[TABLE 5 ABOUT HERE]

Tables A1 and A2 given in the Appendix respectively reflect the estimation of the prudential and tax planning models. In the former, age and the three variables related with investment in pension plans (membership of occupational pension plans, employer's contributions and prior contributions) are significant and take the expected signs. In the tax planning model, meanwhile, the significant variables are income, tax bill and mortgage repayments, which once again take the expected signs.

4. Concluding remarks

In this paper, we have examined the variables affecting the decisions to invest in a personal pension plan and the amount of contributions. We have found a combination of prudential and tax planning reasons for these decisions. Age and occupation affect individuals, as do membership of occupational pension plans, and previous contributions to their own personal plans, as well as the cost of mortgage repayments and income levels.

Our empirical study uses 1995 data, seven years after the first regulation of pension plans. In that year, these instruments had come to represent 4.4 percent of assets held by private individuals. Eight years on, this share has risen to 6.2 percent, confirming the consolidation of these prudential savings vehicles. Consequently, it will be necessary to

repeat the estimations carried out in order to confirm whether, as we believe, the variables that explain investment in pension plans in 1995 remain significant in the present.*

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TABLE 1. Pension plan IRR, 1987-2004

Period	IRR	*g*
1987-1991	$\mathrm{IRR}_{\mathrm{P.87}} = (1+i)\cdot\left(\frac{(1-g\cdot t_e)}{1-d_q}\right)^{\frac{1}{j-x}} - 1$	0.98
1992-1998	$\mathrm{IRR}_{\mathrm{P.92}} = (1+i)\cdot\left(\frac{(1-g\cdot t_e)}{1-t_{px}}\right)^{\frac{1}{j-x}} - 1$	0.95 or 1
1999 and thereafter	$\mathrm{IRR}_{\mathrm{P.99}} = (1+i)\cdot\left(\frac{(1-g\cdot t_{pj})}{1-t_{px}}\right)^{\frac{1}{j-x}} - 1$	0.6 (if j-x>2)

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TABLE 2. Tax treatment of pension plans

		1987 – 1991	1992 - 1998	1999 - 2004	
CONTRIBUTIONS					
Personal Income Tax saving		t_{px} or 15%	t_{px}	t_{px}	
				Up to 52 years	*> 52 years*
Limits on allowances and tax credits	-- Absolute	Ptas. 500,000 – 750,000	Ptas. 750,000 -1,100,000	In 1999: Ptas. 1,100,000 In 2000-01: Ptas. 1,200,000 In 2002: Ptas. 1,200,000 Since 2003: € 8,000	---- 2000-01:+ Ptas. 100,000 (age–52) In 2002:+ Ptas. 200,000 (age–52) Since 2003: + €1,250 (age-52)
	-- Relative	15% earned income	15%-20% earned income	100% general taxable income (In 1999-01: 20%, 25%)	100% general taxable income (In 1999-01: 20%, 25%, 40%)
ACCUMULATION					
Corporate Income Tax		Zero rate			
Net Wealth Tax		Not subject	Exempt	Exempt	
BENEFITS					
Personal Income Tax base		Final capital	Final capital	Final capital	
Taxable returns		98%	95% – 100%	60%	
Applicable tax rate		t_e	t_e	t_{pj}	

Source: Own work.

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TABLE 3. Variables and expected sign

Variable	Symbol	Expected sign
Contributions to pension plans	PLAN	
Age	AGE	+
Marital status	STATUS	+
Income level	INCOME	+
Business activity	ENTREPRENEUR	¿?
Professional activity	PROFESSIONAL	+
Salaried employment	SALARIED	-
Marginal tax rate	MARGINALT	+
Year-end tax bill	TAXBILL	+
Membership of occupational scheme	OCCUPATIONALP	+
Employer´s contribution	EMPLOYERC	-
Prior year's contribution	PRIORC	+
Mortgage repayments	MORTGAGE	-
Life insurance contributions	LINSURANCE	¿?

TABLE 4. Personal pension plan membership and average contributions

VARIABLE		PERCENTAGE CONTRIBUTORS	AVERAGE CONTRIBUTION (pesetas)
TOTAL		**11.77**	**150,564**
AGE	20-25	3.33	76,100
	25-30	4.03	71,294
	30-35	9.52	107,387
	35-40	11.82	143,148
	40-45	15.99	157,821
	45-50	20.23	168,435
	50-55	16.03	162,782
	55-60	9.05	182,430
	60-65	6.60	213,851
MARITAL STATUS	Unmarried	10.30	123,855
	Married	13.12	169,825
INCOME LEVEL	Decile 1	2.63	50,323
	Decile 2	3.95	82,919
	Decile 3	5.59	81,680
	Decile 4	6.25	88,752
	Decile 5	7.57	94,569
	Decile 6	10.53	116,845
	Decile 7	11.18	92,666
	Decile 8	15.13	106,532
	Decile 9	21.38	152,520
	Decile 10	33.55	250,495
OCCUPATION	Entrepreneur	11.52	156,509
	Professional	21.30	212,584
	Salaried employee	11.74	147,810
MARGINAL TAX RATE	0.0%	3.65	72,952
	20.0%	4.51	101,716
	22.0%	6.24	86,341
	24.5%	8.73	98,111
	27.0%	12.23	103,398
	30.0%	17.54	134,515
	32.0%	19.77	147,252
	34.0%	23.30	165,826
	36.0%	30.00	118,837
	38.0%	22.22	286,168
	40.0%	35.48	184,481
	42.5%	46.15	195,188
	45.0%	27.78	167,069
	47.0%	41.67	395,785
	49.0%	37.50	515,049
	51.0%	9.09	151,029
	53.5%	52.38	390,886
TAX BILL	Negative	18.04	252,739
	Positive	11.05	131,215
PARTICIPATION IN OCCUPATIONAL PENSION PLAN	Yes	54.64	101,415
	No	10.36	159,105
MORTGAGE REPAYMENTS	Yes	15.12	122,641
	No	10.50	165,916
LIFE INSURANCE CONTRIBUTIONS	Yes	23.52	190,944
	No	9.04	126,118

TABLE 5. Results of the Tobit estimation for the general model

	Coefficient	Marginal Effect	Std. Error	z-Statistic	Prob.
C	-772944.2	-64292.13	108576.3	-7.118904	0.0000
AGE	22964.83	1910.17	4915.381	4.672035	0.0000
AGE*AGE	-259.8054	-21.68	54.84662	-4.736945	0.0000
INCOME	0.042513	0.003514	0.005972	7.118444	0.0000
INCOME*INCOME	-1.98E-09	-1,64693E-10	4.19E-10	-4.732125	0.0000
SALARIED	-38574.77	-43470.35	16299.70	-2.366595	0.0180
OCCUPATIONALP	172098.7	43790.72	29915.47	5.752832	0.0000
EMPLOYERC	-0.483151	-0.040188	0.067742	-7.132190	0.0000
PRIORC	1.290833	0.107369	0.050385	25.61938	0.0000
MORTGAGE	-0.025753	-0.002142	0.011719	-2.197532	0.0280
		Error Distribution			
SCALE:C(11)	159924.4		4444.289	35.98424	0.0000

R-squared	0.534140	Mean dependent var	17725.07
Adjusted R-squared	0.532602	S.D. dependent var	73299.59
S.E. of regression	50112.37	Akaike info criterion	3.479154
Sum squared resid	7.61E+12	Schwarz criterion	3.500930
Log likelihood	-5279.054	Hannan-Quinn criter.	3.486981
Avg. log likelihood	-1.735960		
Left censored obs	2683	Right censored obs	0
Uncensored obs	358	Total obs	3041

APPENDIX

TABLE A1. Results of the Tobit estimation for the prudential model

	Coefficient	Std. Error	z-Statistic	Prob.
C	-918664.1	108308.6	-8.481915	0.0000
AGE	31463.59	4931.230	6.380475	0.0000
AGE*AGE	-350.2904	54.97829	-6.371431	0.0000
OCCUPATIONALP	190266.5	32070.75	5.932709	0.0000
EMPLOYERC	-0.475665	0.070643	-6.733330	0.0000
PRIORC	1.466353	0.044976	32.60324	0.0000
Error Distribution				
SCALE:C(7)	168214.5	3625.361	46.39937	0.0000
R-squared	0.502038	Mean dependent var		17725.07
Adjusted R-squared	0.501053	S.D. dependent var		73299.59
S.E. of regression	51776.03	Akaike info criterion		3.499670
Sum squared resid	8.13E+12	Schwarz criterion		3.513527
Log likelihood	-5314.248	Hannan-Quinn criter.		3.504651
Avg. log likelihood	-1.747533			
Left censored obs	2683	Right censored obs		0
Uncensored obs	358	Total obs		3041

TABLE A2. Results of the Tobit estimation for the tax planning model

	Coefficient	Std. Error	z-Statistic	Prob.
C	-574386.7	27999.27	-20.51434	0.0000
INCOME	0.111300	0.008877	12.53834	0.0000
INCOME*INCOME	-4.10E-09	6.32E-10	-6.490179	0.0000
TAXBILL	0.045730	0.019646	2.327738	0.0199
MORTGAGE	-0.071568	0.023655	-3.025521	0.0025
Error Distribution				
SCALE:C(6)	266798.1	11630.07	22.94038	0.0000
R-squared	0.208576	Mean dependent var		17725.07
Adjusted R-squared	0.207272	S.D. dependent var		73299.59
S.E. of regression	65262.49	Akaike info criterion		3.674403
Sum squared resid	1.29E+13	Schwarz criterion		3.686280
Log likelihood	-5580.930	Hannan-Quinn criter.		3.678672
Avg. log likelihood	-1.835228			
Left censored obs	2683	Right censored obs		0
Uncensored obs	358	Total obs		3041

Figure 1. Distribution of family assets.1984-2003

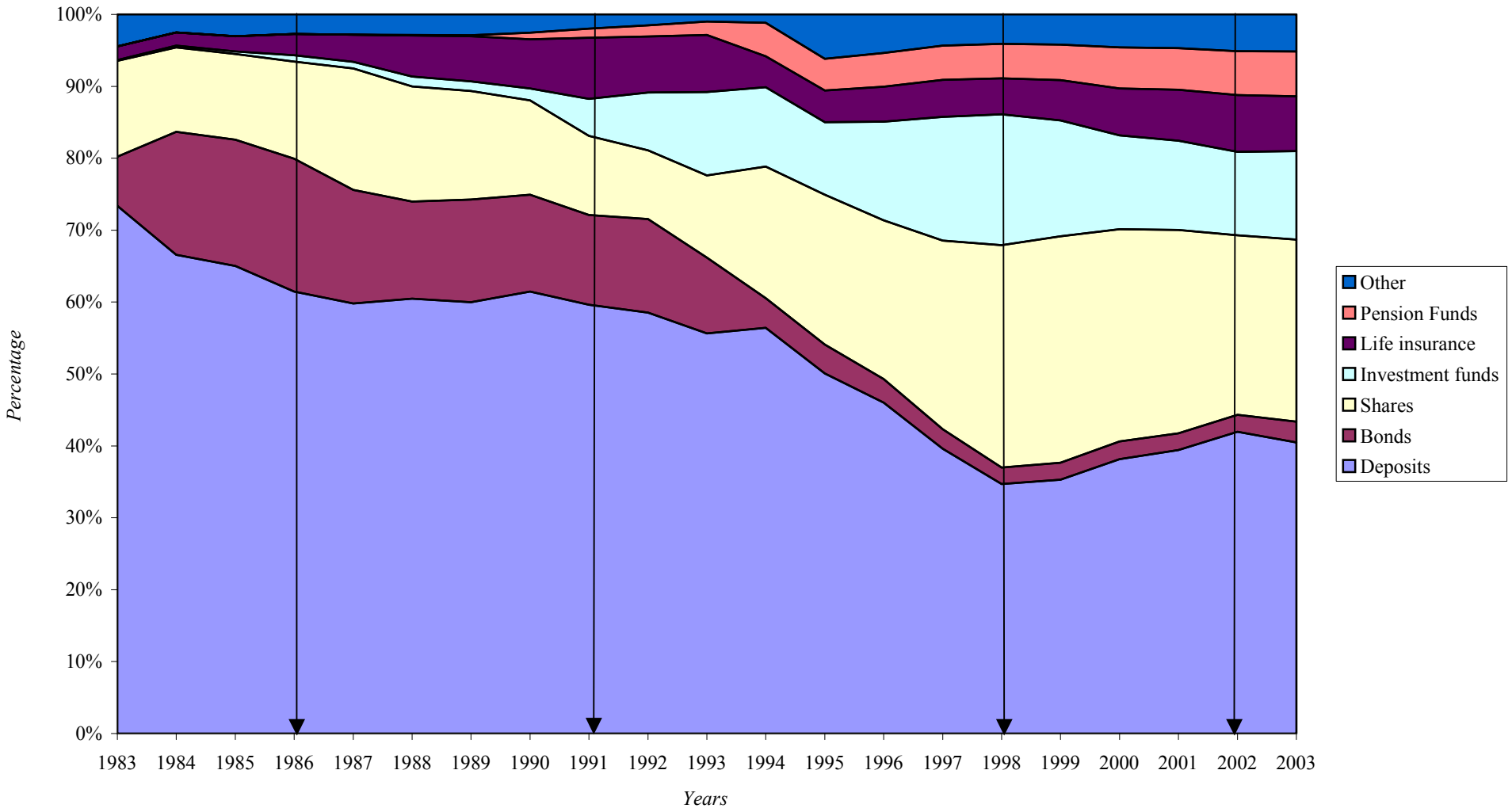

Figure 2. Age and average investment in different assets.

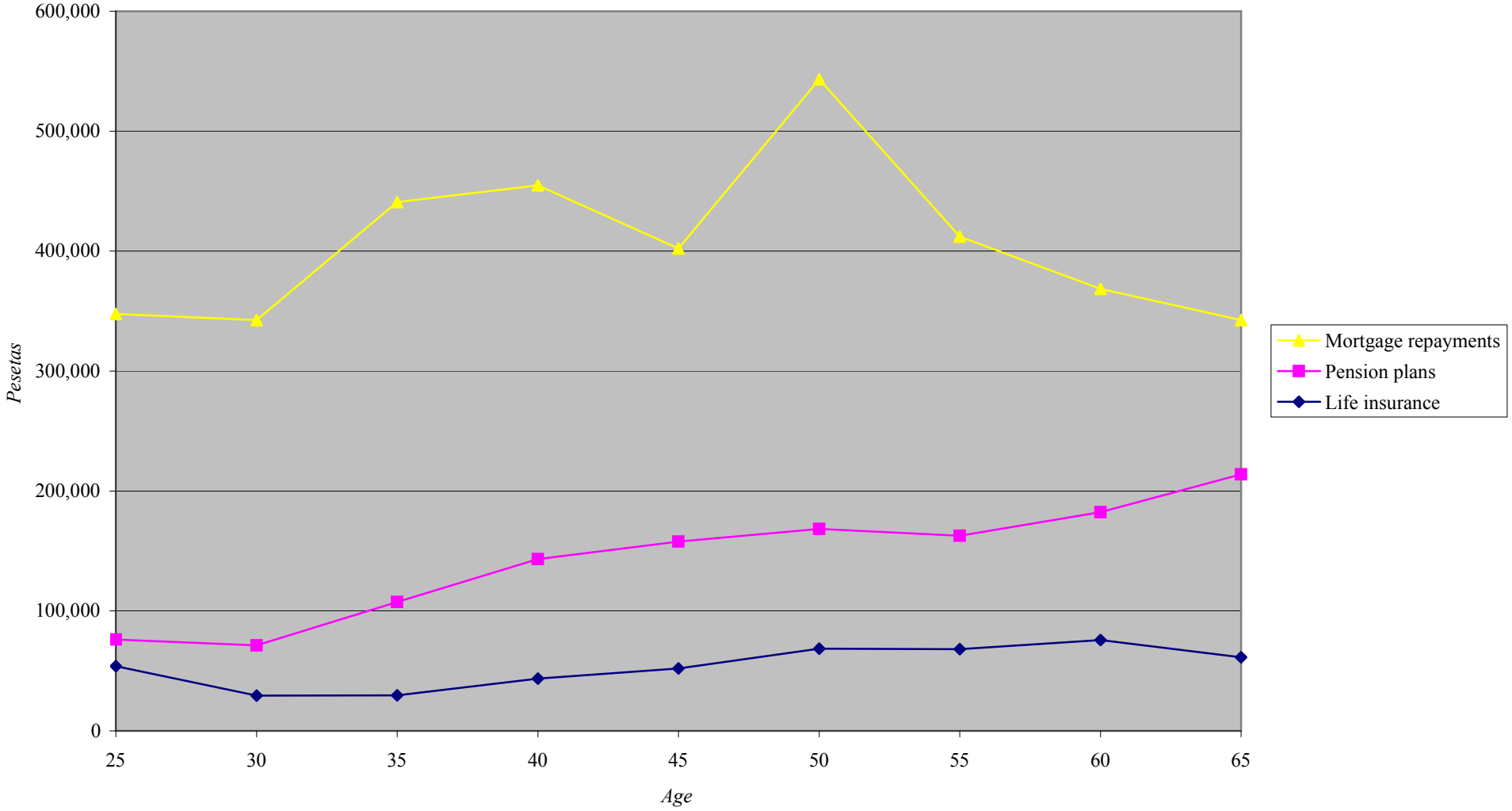

Figure 3. Income levels and average investment in assets.