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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.

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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3 plans” simultaneously stipulate eventual benefits and the amount of contributions. While
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5 occupational and associated pension plans may fall into any of these three categories,
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7 personal pension plans will always be defined contributions schemes.
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11 Pension plans have received a highly favourable tax treatment since they were first
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13 regulated in 1987, and as a result they now represent a growing part of the financial assets
14
15 held by individuals.
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19 The rest of this paper is structured as follows. In Section 2, we outline the tax
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21 regime applicable to pension plans in Spain since 1987. The data presented are expressed in
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23 terms of the internal rate of return of pension plans in the three periods 1987-1991, 1992-
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25 1998 and from 1999 onwards.
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29 The applied model is set out and discussed in Section 3. In order to discover the
30
31 factors explaining the decisions associated with investment in personal pension plans, we
32
33 specify and estimate a Tobit model for a sample drawn from the 1995 Personal Income
34
35 Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy
36
37 and Finance). Our conclusion from this exercise is that the holders of personal pension
38
39 plans are motivated both by reasons of financial prudence and tax savings.
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42
43 Section 4 ends the paper with some final considerations.
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47

48 49 **2. The tax treatment of pension plans**

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51 In this section, we shall describe the tax treatment of pension plans and quantify
52
53 their internal rate of return (IRR) since 1987. This analysis distinguishes between the three
54
55 moments at which the tax treatment affects investment in pension plans, namely when
56
57 contributions are made, during the accumulation of returns, and when the benefit
58
59
60

1
2
3 contracted is received.¹ Table 1 shows the expressions for the IRR of the pension plans in
4
5 the three periods considered. The tax treatment of the plans is summarised in Table 2.
6
7

8 [TABLES 1 and 2 ABOUT HERE]
9

10 **2.1. Contributions**

11
12 The contributions made to pension plans are tax allowable within certain limits.
13
14 Initially, in the period 1987-1991, the contribution could be deducted from taxable income
15
16 provided the amount of the deduction was less than 15 percent of the sum of net earnings
17
18 from work and business activities (*earned income*) or 500,000 pesetas. The remaining
19
20 contributions were eligible for a 15 percent tax credit up to a limit of 750,000 pesetas. In
21
22 the early years, these limits were applied to each tax return, but this changed in 1989, when
23
24 married people were allowed to file separate returns, and tax credits and allowances
25
26 became applicable to each taxpayer included in the return.
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28
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30
31
32

33 There were two key changes to the tax treatment of contributions to pension plans
34
35 in the ensuing years. Firstly, the 15 percent tax credit was removed (1992) and, secondly,
36
37 the absolute and relative limits on the deduction from taxable income were raised.
38
39

40 Since 2003 the absolute deduction for people aged under 53 years has been € 8,000,
41
42 with an additional € 1,250 for each additional year over the age of 52 to a maximum of €
43
44 24,250 for pension plan contributors aged over 65. Meanwhile, the relative limit on
45
46 deductions was removed in 2002, and the maximum allowable contribution has since been
47
48 100 percent of taxable income excluding capital gains.
49
50
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52 Based on this regulatory framework, let us initially assume an initial capital IC
53
54 available for investment in a pension plan. The contribution made produces tax savings.
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56
57

58 ¹ See Scholes *et al.*(2002).
59
60

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:

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

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:

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

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:

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

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:

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

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:

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

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:

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

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:

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

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

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3 absence of liquidity inherent in pension plans. However, if we take into account that the
4
5 loss of liquidity diminish as people grow older and the recovery of the investment draws
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7 nearer, we may conclude that the incentive to invest in pension plans is greater for older
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9 people.
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12 13 14 15 16 **3. Empirical evidence for personal pension plan investment decisions**

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18 In this section, we seek to answer the two questions forming the objective of this
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20 paper. What variables influence the decision to invest in a personal pension plan? And,
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22 what variables affect the amount individuals decide to contribute to their pension plans?
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24 To answer these questions, we shall specify and estimate a Tobit model for a 1995 sample
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26 (the latest available) from the Institute of Fiscal Studies Personal Income Taxpayers Panel.
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28 The sample is formed by 3,041 tax returns, of which 358 include contributions to personal
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30 pension plans.
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35 Following Cabrer, Sancho, and Serrano (2001), the specification of the model is as
36
37 follow³. The regressand Y_i can take a value of zero or the value of the variable Y_i^* , known
38
39 as the latent variable:
40
41

$$42 \begin{cases} (Y_i / X_i, Y_i^* \leq 0) = 0 \\ (Y_i / X_i, Y_i^* > 0) = X_i \beta + u_i \end{cases} \quad [10]$$

43
44 In the first stage a Probit model is used to determine the probability that the
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46 variable Y_i^* will take a value of zero rather than a positive value. In the second stage, a real
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48 and positive value is assigned to the variable Y_i after a positive value has been
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59 ³ See also, Wooldridge (2003).
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3 probabilistically given to Y_i^* , and the following model is specified with the subset of
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6 observations having a regressand other than zero:
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$$8 \quad Y_i^* = X_i\beta + u_i \quad [11]$$

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11 where β are the coefficients, X_i the regressors, and u_i is the error term, which is a random
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14 variable distributed based on normal $N(0, \sigma^2)$.
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18 In our model, the dependent variable is the amount of contributions made to
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20 pension plans. The explanatory variables are those usually considered in the literature⁴, to
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22 which have added some others that are specific to the reality of Spain. The variables used
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24 and the expected sign for each are shown in Table 3. Table 4, meanwhile, reflects the
25
26 percentage of personal pension plan contributors for each variable, as well as the average
27
28 contributions made. As the first row of this table shows, 11.77 percent of 1995 tax returns
29
30 declare contributions to personal pension plans, the average amount of which was 150,564
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32 pesetas.⁵
33
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35
36
37 The regressors considered were as follows:
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39
40 **Age.** Based on the argument derived from expression [9], we may expect to find a
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42 positive relationship between age and the contributions made to pension plans. This
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44 variable has been included quadratically as well.
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54 ⁴ See, for example, Guariglia and Markose (2000), Joulfaian and Richardson (2001), and Engelhardt and
55
56 Madrian (2004) We have not been able to use the number of children, because this variable was not reliable
57
58 in the sample.

59
60 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).

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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.

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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.

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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 .

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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.

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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

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3 occupational schemes and zero for those who are not. In the case of the former, however,
4
5 we expect the contributions made to fall as the *employer's contribution* rises. This
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7 variable has been assigned a negative sign.
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10
11 ***Prior year's contribution.*** We believe that the behaviour of people contributing to
12
13 pension plans may be to some extent routine, with the result that they will continue to
14
15 contribute a roughly similar amount each year after setting up the plan. Consequently, we
16
17 have assigned a positive sign to this variable.
18
19

20
21 ***Mortgage repayments.*** A person who is still repaying the mortgage on his home
22
23 will have less spare cash to contribute to his pension plan. The higher these mortgage
24
25 repayments are, the less the person will contribute to the plan.
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27

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29 ***Life insurance contributions.*** Like pension plans, life insurance policies are
30
31 prudential savings instruments, although they do not have the same characteristics. While
32
33 pension plans receive a more favourable tax treatment, life insurance are more liquid. If
34
35 pension plans and life insurance are substitute assets, we may expect that higher life
36
37 insurance contributions will be associated with smaller contributions to pension plans. On
38
39 the other hand, if they act as complementary assets (as table 4 would seem to indicate), this
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41 relationship will be the reverse. In short, we are unable to assign a positive or negative sign
42
43 to this variable.
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[TABLES 3 and 4 ABOUT HERE]

50
51 The relationship between investment in the home, pension plans and life insurance
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53 is clearly apparent in figures 2 and 3, which are constructed on the basis of the sample of
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55 tax returns used for the applied study of 1995. It may be observed in figure 2, that buying a
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57 house is the most important investment made by people in their lifetimes. However,
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3 mortgage repayments begin to fall after the age of 50. Contributions to pension plans and
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5 life insurance are considerably smaller, but increase as individuals age. Average pension
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7 plan contributions rise fastest among people aged over 60, while life insurance
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9 contributions fall after the age of 65.
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13 Figure 3, which takes income levels into account, reflects sustained growth in
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15 average mortgage repayments along the income scale. This effect is particularly pronounced
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17 in the two upper deciles. There is also a slight rise in investment in pension plans and life
18
19 insurance until the last two deciles, where average contributions increase sharply, especially
20
21 in the case of pension plans.
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25 [FIGURES 2 and 3 ABOUT HERE]
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28 Based on the above variables, we have specified three models which provide
29
30 alternative explanations for the decision to invest in a personal pension plan. The first of
31
32 these, which we shall call the “prudential model”, is based on the hypothesis that
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34 individuals invest in pension plans basically to save against their retirement, perhaps as a
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36 supplement to other retirement funds obtained from sources such as the social security or
37
38 life insurance. The explanatory variables in this model are age, marital status, occupation,
39
40 membership of an occupational pension plan, employer’s contributions, prior
41
42 contributions, mortgage repayments and contributions to life insurance. The specification
43
44 of the model is as follows:
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48

$$49 \quad PLAN_1 = f(C, AGE, STATUS, ENTREPRENEUR, PROFESSIONAL, SALARIED, OCCUPATIONALP, \quad [12]$$

$$50 \quad \quad \quad EMPLOYERC, PRIORC, MORTGAGE, INSURANCE)$$

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52
53 The second “tax planning model” refers to the hypothesis that the individual’s main
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55 motivation is to obtain the tax benefits available to investors in pension plans. The
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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

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3 contribution smaller (EMPLOYERC). Furthermore, savings in a given year are positively
4
5 affected by the prior year's contributions (PRIORC).
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9 While the above variables refer to prudential reasons for setting up a personal
10 pension plan, there is another significant variable which is related with tax planning. In fact,
11 contributions grow with income, although once again at a decreasing rate (INCOME) up to
12 a threshold of 10.6 million pesetas (approximately € 64,000) covering the earnings of 99
13 percent of income taxpayers. Thereafter, the amount of contributions begins to decrease as
14 income rises.
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23 The last variable found to be significant in the estimation of the model expressed
24 in [14] is the amount of mortgage repayments (MORTGAGE). This variable also took the
25 expected sign and fits both with prudential and tax planning arguments for pension plan
26 investment. Based on Table 5, we may affirm that taxpayers set aside less by way of private
27 pension plan contributions as the amount of mortgage repayments made during the year
28 rises.
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37 In light of these results, we may conclude that individuals decide to invest in
38 personal pension plans on complex grounds combining the wish to benefit from tax
39 savings and to ensure they will receive supplementary income upon retirement. These
40 results are in line with those obtained by literature in other countries.
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47 [TABLE 5 ABOUT HERE]
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50 Tables A1 and A2 given in the Appendix respectively reflect the estimation of the
51 prudential and tax planning models. In the former, age and the three variables related with
52 investment in pension plans (membership of occupational pension plans, employer's
53 contributions and prior contributions) are significant and take the expected signs. In the
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3 tax planning model, meanwhile, the significant variables are income, tax bill and mortgage
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5 repayments, which once again take the expected signs.
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10 11 **4. Concluding remarks** 12

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14 In this paper, we have examined the variables affecting the decisions to invest in a
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16 personal pension plan and the amount of contributions. We have found a combination of
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18 prudential and tax planning reasons for these decisions. Age and occupation affect
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20 individuals, as do membership of occupational pension plans, and previous contributions
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22 to their own personal plans, as well as the cost of mortgage repayments and income levels.
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26 Our empirical study uses 1995 data, seven years after the first regulation of pension
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28 plans. In that year, these instruments had come to represent 4.4 percent of assets held by
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30 private individuals. Eight years on, this share has risen to 6.2 percent, confirming the
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32 consolidation of these prudential savings vehicles. Consequently, it will be necessary to
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34 repeat the estimations carried out in order to confirm whether, as we believe, the variables
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36 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 | $\text{IRR}_{p,87} = (1+i) \cdot \left(\frac{(1-gt_e)}{1-d_q} \right)^{\frac{1}{j-x}} - 1$ | 0.98 |
| 1992-1998 | $\text{IRR}_{p,92} = (1+i) \cdot \left(\frac{(1-gt_e)}{1-t_{px}} \right)^{\frac{1}{j-x}} - 1$ | 0.95 or 1 |
| 1999 and thereafter | $\text{IRR}_{p,99} = (1+i) \cdot \left(\frac{(1-gt_{pj})}{1-t_{px}} \right)^{\frac{1}{j-x}} - 1$ | 0.6 (if $j-x > 2$) |

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For Peer Review

TABLE 2. Tax treatment of pension plans

| | | 1987 – 1991 | 1992 - 1998 | 1999 - 2004 | |
|--------------------------------------|-------------|-------------------------|--------------------------|--|---|
| CONTRIBUTIONS | | | | | |
| Tax saving | | t_{px} or 15% | t_{px} | t_{px} | |
| | | | | <i>Up to 52 years</i> | <i>> 52 years</i> |
| 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.

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

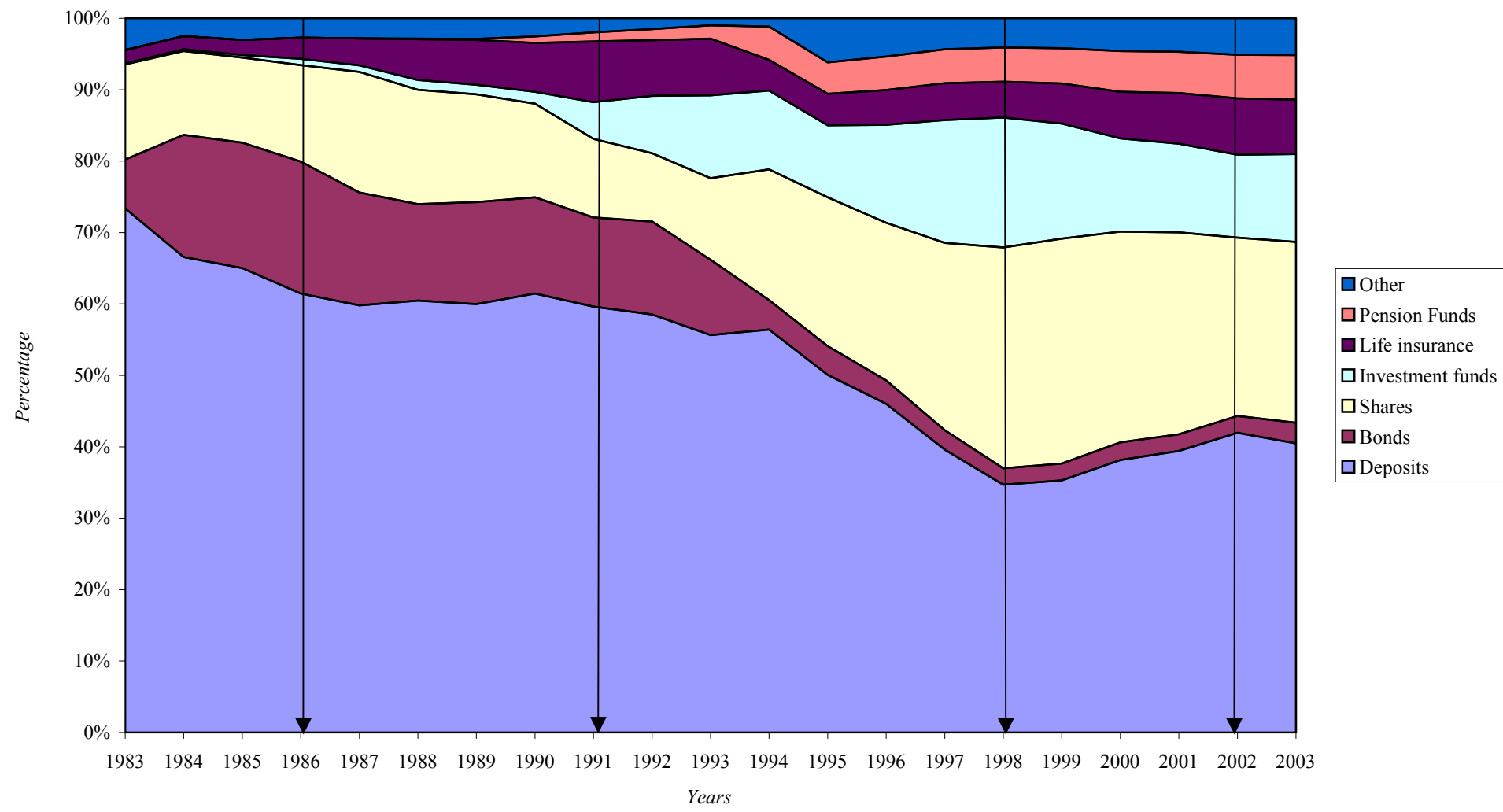


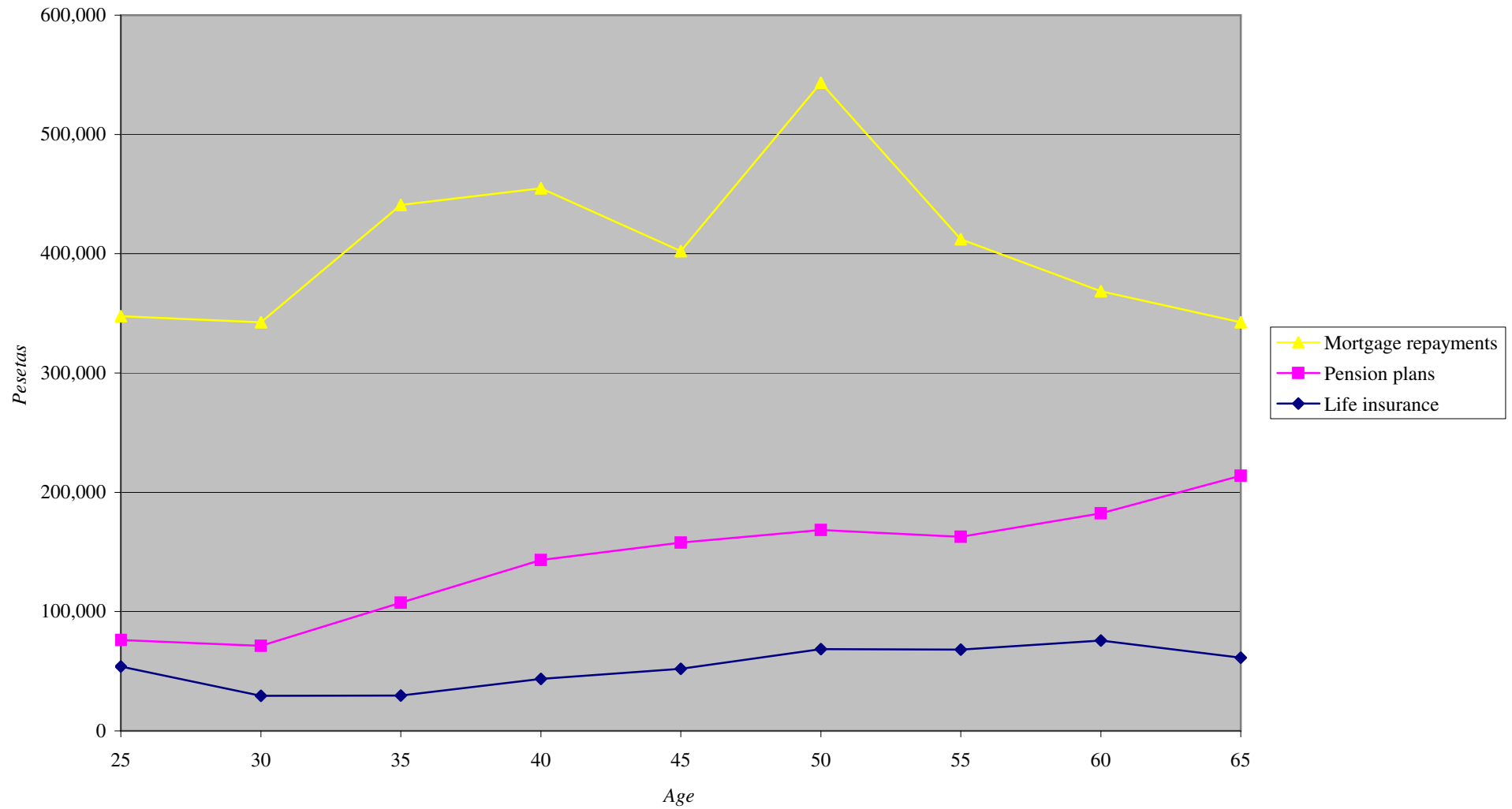
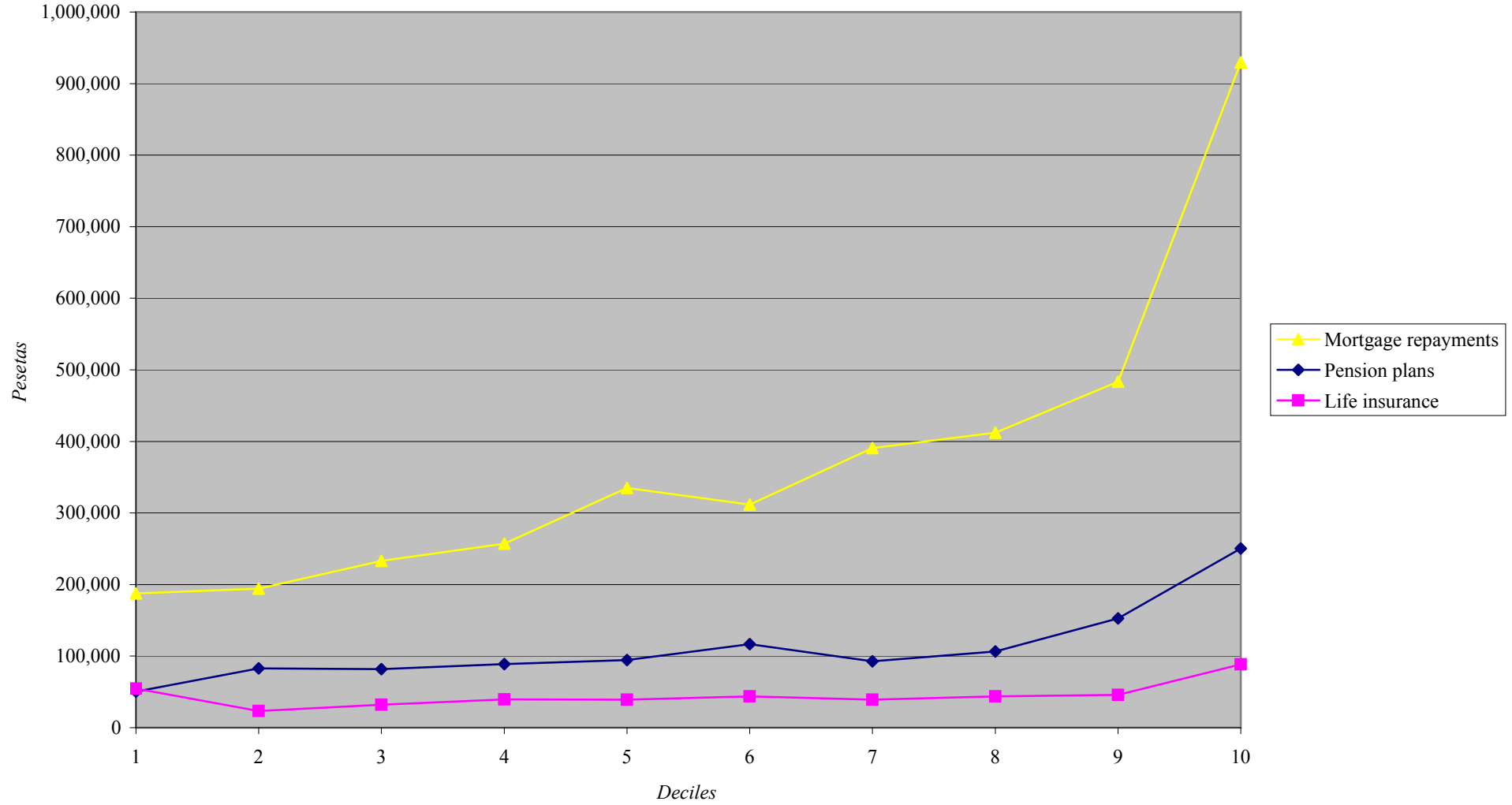
Figure 2. Age and average investment in different assets.

Figure 3. Income levels and average investment in assets.



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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3 plans” simultaneously stipulate eventual benefits and the amount of contributions. While
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5 occupational and associated pension plans may fall into any of these three categories,
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7 personal pension plans will always be defined contributions schemes.
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11 Pension plans have received a highly favourable tax treatment since they were first
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13 regulated in 1987, and as a result they now represent a growing part of the financial assets
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15 held by individuals.
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19 The rest of this paper is structured as follows. In Section 2, we outline the tax
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21 regime applicable to pension plans in Spain since 1987. The data presented are expressed in
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23 terms of the internal rate of return of pension plans in the three following periods: from
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25 1987 to 1991, with the initial regulation for pension plans; from 1992 to 1998, after the
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27 1991 Spanish Personal Income Tax reform; and from 1999 onwards, following the 1998
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29 reform.
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33 The applied model is set out and discussed in Section 3. In order to discover the
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35 factors explaining the decisions associated with investment in personal pension plans, we
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37 specify and estimate a Tobit model for a sample drawn from the 1995 Personal Income
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39 Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy
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41 and Finance). Our conclusion from this exercise is that the holders of personal pension
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43 plans are motivated both by reasons of financial prudence and tax savings.
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48 Section 4 ends the paper with some final considerations.
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52 53 **2. The tax treatment of pension plans** 54

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56 In this section, we shall describe the tax treatment of pension plans and quantify
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58 their internal rate of return (IRR) since 1987. This analysis distinguishes between the three
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3 moments at which the tax treatment affects investment in pension plans, namely when
4 contributions are made, during the accumulation of returns, and when the benefit
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6 contracted is received.¹ Table 1 shows the expressions for the IRR of the pension plans in
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8 the three periods considered. The tax treatment of the plans is summarised in Table 2.
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12 [TABLES 1 and 2 ABOUT HERE]
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15 16 **2.1. Contributions** 17

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19 The contributions made to pension plans are tax allowable in the contributor's
20 Personal Income Tax within certain limits. Initially, in the period 1987-1991, the
21 contribution could be deducted from taxable income provided the amount of the
22 deduction was less than 15 percent of the sum of net earnings from work and business
23 activities (*earned income*) or 500,000 pesetas. The remaining contributions were eligible for a
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25 15 percent tax credit up to a limit of 750,000 pesetas. In the early years, these limits were
26 applied to each tax return, but this changed in 1989, when married people were allowed to
27 file separate returns, and tax credits and allowances became applicable to each taxpayer
28 included in the return.
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40 There were two key changes to the tax treatment of contributions to pension plans
41 in the ensuing years. Firstly, the 15 percent tax credit was removed (1992) and, secondly,
42 the absolute and relative limits on the deduction from taxable income were raised.
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47 Since 2003 the absolute deduction for people aged under 53 years has been € 8,000,
48 with an additional € 1,250 for each additional year over the age of 52 to a maximum of €
49 24,250 for pension plan contributors aged over 65. Meanwhile, the relative limit on
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58 ¹ See Scholes *et al.*(2002). Antolín, de Serrres, and de la Maisonneuve (2004) and Yoo and de Serres (2004)
59 examine the tax treatment of private pensions in the OECD countries.
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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:

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

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:

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

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

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_b , 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.

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

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:

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

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:

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

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:

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

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 follow³. The regressand Y_i can take a value of zero or the value of the variable Y_i^* , known as the latent variable:

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

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 literature⁴, 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.

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3 declare contributions to personal pension plans, the average amount of which was 150,564
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5 pesetas.⁵
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8 The regressors considered were as follows:
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11 **Age.** Based on the argument derived from expression [9], we may expect to find a
12 positive relationship between age and the contributions made to pension plans. This
13 variable has been included quadratically as well.
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18 **Marital status.** We have used a dummy variable with a value of zero for unmarried
19 and one for married taxpayers. We opted to assign a positive sign to this variable, because
20 we believe that prudential behaviour is more likely in the case of married people.
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25 **Income level.** Based on expression [8], we may expect a positive relationship
26 between individuals' income levels (i.e. taxable income prior to tax allowance for
27 contributions) and the amount of the contributions made to pension plans. For the same
28 reason, we may assign a positive value to the variable *marginal tax rate*. In addition,
29 higher earners will also have greater capacity for savings. The *income* variable has also been
30 included quadratically.
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40 **Occupation.** We have used dummy variables for the categories entrepreneurs,
41 professionals and salaried employees. We consider that the first two categories are likely to
42 make higher contributions than employees because their mandatory social security
43 contributions are smaller. Also, we would expect professionals to make higher
44 contributions because they are, in general, better educated and are likely to be more aware
45 of the advantages of this saving instrument .
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55 ⁵ Following the Spanish Tax Agency -*Agencia Estatal de Administración Tributaria*- 9 percent of 1995 tax returns
56 declared contributions to some kind of pension plan, the average amount of which was 184,150 pesetas.
57 According to data from the *Dirección General de Seguros y Fondos de Pensiones*, 1,423,542 people contributed to
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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.

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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.

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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.

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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.

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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

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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).

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3 insurance contributions will be associated with smaller contributions to pension plans. On
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5 the other hand, if they act as complementary assets (as table 4 would seem to indicate), this
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7 relationship will be the reverse. In short, we are unable to assign a positive or negative sign
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9 to this variable.
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12 [TABLES 3 and 4 ABOUT HERE]
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16 The relationship between investment in the home, pension plans and life insurance
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18 is clearly apparent in figures 2 and 3, which are constructed on the basis of the sample of
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20 tax returns used for the applied study of 1995. It may be observed in figure 2, that buying a
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22 house is the most important investment made by people in their lifetimes. However,
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24 mortgage repayments begin to fall after the age of 50. Contributions to pension plans and
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26 life insurance are considerably smaller, but increase as individuals age. Average pension
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28 plan contributions rise fastest among people aged over 60, while life insurance
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30 contributions fall after the age of 65.
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34 Figure 3, which takes income levels into account, reflects sustained growth in
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36 average mortgage repayments along the income scale. This effect is particularly pronounced
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38 in the two upper deciles. There is also a slight rise in investment in pension plans and life
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40 insurance until the last two deciles, where average contributions increase sharply, especially
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42 in the case of pension plans.
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46 [FIGURES 2 and 3 ABOUT HERE]
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50 Based on the above variables, we have specified three models which provide
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52 alternative explanations for the decision to invest in a personal pension plan. The first of
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54 these, which we shall call the “prudential model”, is based on the hypothesis that
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56 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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3 The variables found to be significant took the expected signs. In the first place,
4 the amount of contributions rises with age, although at a decreasing rate (AGE) until the
5 age of 45, whereafter contributions begin to decline as individuals grow older. As shown in
6 Table 4, the percentage of older people still making contributions falls sharply, although
7 the average amount set aside rises. Secondly, salaried employees make smaller contributions
8 than people in other occupations (SALARIED). Meanwhile, we have been able to confirm
9 that membership of an occupational pension plan stimulates investment in personal plans
10 (OCCUPATIONALP), and that people benefiting from higher sponsor's contributions to
11 such plans invest less in their personal plans than they would were the sponsor's
12 contribution smaller (EMPLOYERC). Furthermore, savings in a given year are positively
13 affected by the prior year's contributions (PRIORC).
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29 While the above variables refer to prudential reasons for setting up a personal
30 pension plan, there is another significant variable which is related with tax planning. In fact,
31 contributions grow with income, although once again at a decreasing rate (INCOME) up to
32 a threshold of 10.6 million pesetas (approximately € 64,000) covering the earnings of 99
33 percent of income taxpayers. Thereafter, the amount of contributions begins to decrease as
34 income rises.
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43 The last variable found to be significant in the estimation of the model expressed
44 in [14] is the amount of mortgage repayments (MORTGAGE). This variable also took the
45 expected sign and fits both with prudential and tax planning arguments for pension plan
46 investment. Based on Table 5, we may affirm that taxpayers set aside less by way of private
47 pension plan contributions as the amount of mortgage repayments made during the year
48 rises.
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3 In light of these results, we may conclude that individuals decide to invest in
4 personal pension plans on complex grounds combining the wish to benefit from tax
5 savings and to ensure they will receive supplementary income upon retirement. These
6 results are in line with those obtained by literature in other countries.
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12 [TABLE 5 ABOUT HERE]
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16 Tables A1 and A2 given in the Appendix respectively reflect the estimation of the
17 prudential and tax planning models. In the former, age and the three variables related with
18 investment in pension plans (membership of occupational pension plans, employer's
19 contributions and prior contributions) are significant and take the expected signs. In the
20 tax planning model, meanwhile, the significant variables are income, tax bill and mortgage
21 repayments, which once again take the expected signs.
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33 **4. Concluding remarks**

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36 In this paper, we have examined the variables affecting the decisions to invest in a
37 personal pension plan and the amount of contributions. We have found a combination of
38 prudential and tax planning reasons for these decisions. Age and occupation affect
39 individuals, as do membership of occupational pension plans, and previous contributions
40 to their own personal plans, as well as the cost of mortgage repayments and income levels.
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48 Our empirical study uses 1995 data, seven years after the first regulation of pension
49 plans. In that year, these instruments had come to represent 4.4 percent of assets held by
50 private individuals. Eight years on, this share has risen to 6.2 percent, confirming the
51 consolidation of these prudential savings vehicles. Consequently, it will be necessary to
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3 repeat the estimations carried out in order to confirm whether, as we believe, the variables
4 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 | $\text{IRR}_{p,87} = (1+i) \cdot \left(\frac{(1-g \cdot t_e)}{1-d_q} \right)^{\frac{1}{j-x}} - 1$ | 0.98 |
| 1992-1998 | $\text{IRR}_{p,92} = (1+i) \cdot \left(\frac{(1-g \cdot t_e)}{1-t_{px}} \right)^{\frac{1}{j-x}} - 1$ | 0.95 or 1 |
| 1999 and thereafter | $\text{IRR}_{p,99} = (1+i) \cdot \left(\frac{(1-g \cdot t_{pj})}{1-t_{px}} \right)^{\frac{1}{j-x}} - 1$ | 0.6 (if $j-x > 2$) |

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For Peer Review

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} | |
| | | | | <i>Up to 52 years</i> | <i>> 52 years</i> |
| 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_c | t_e | t_{pj} | |

Source: Own work.

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

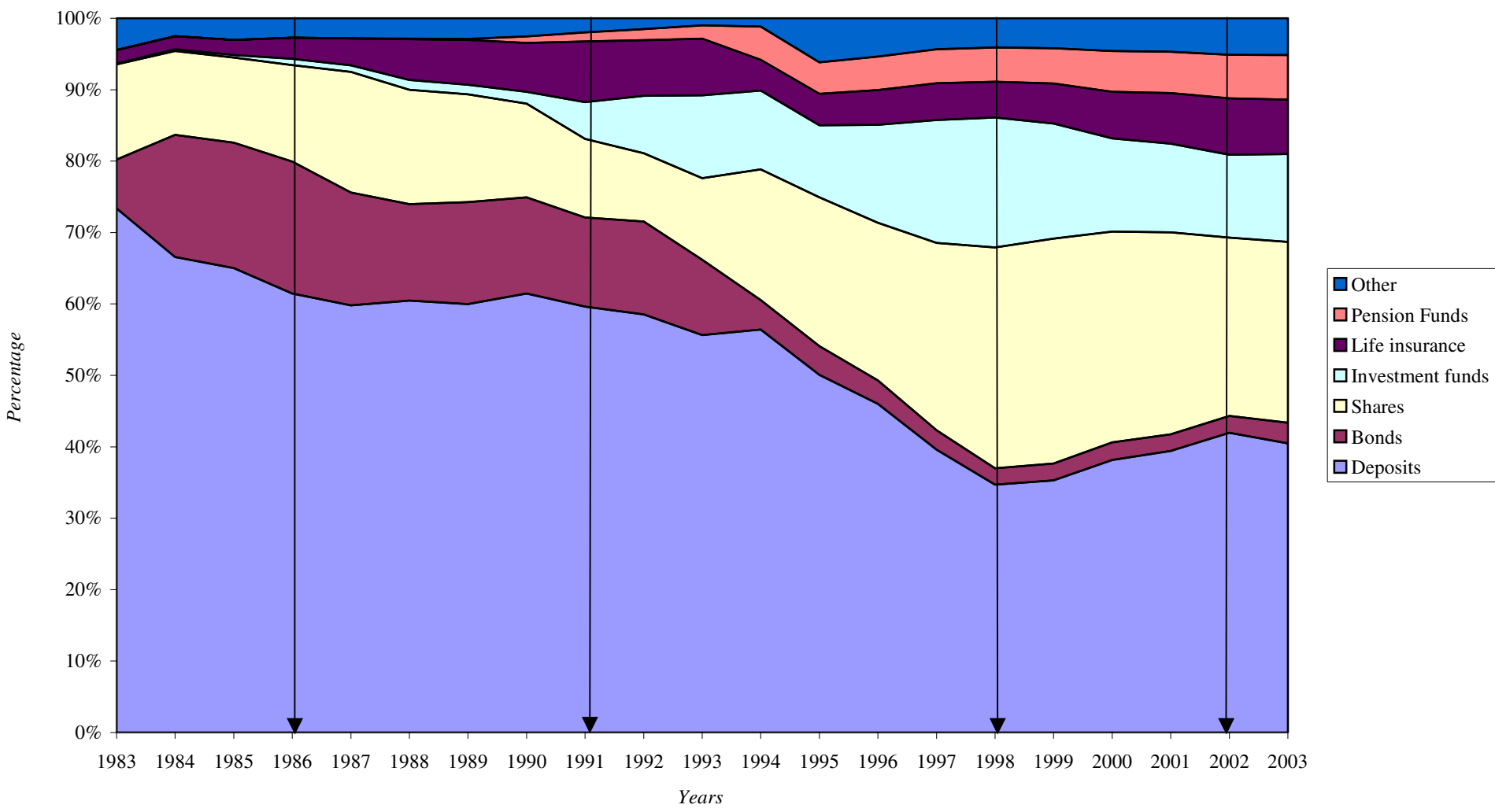


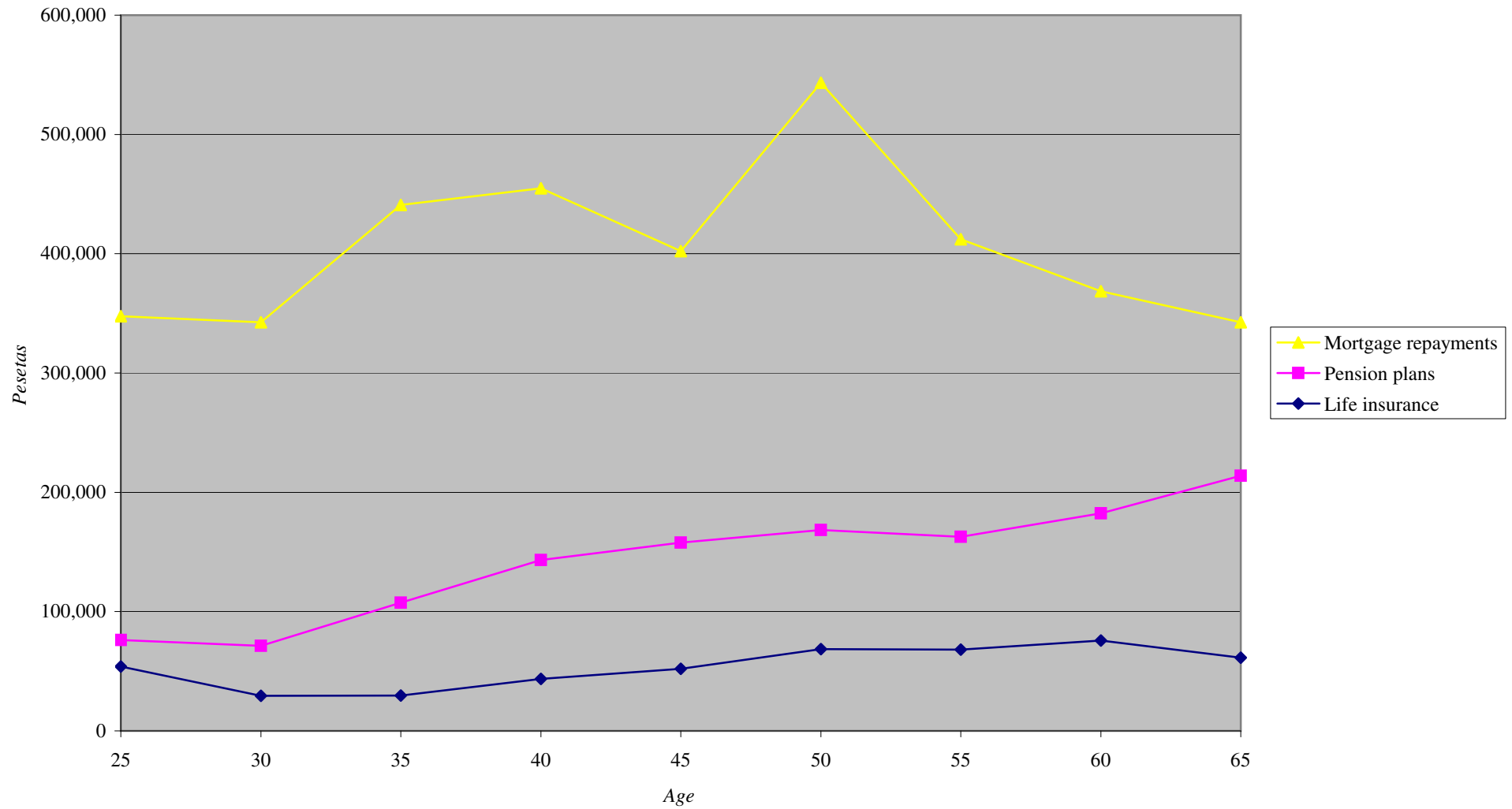
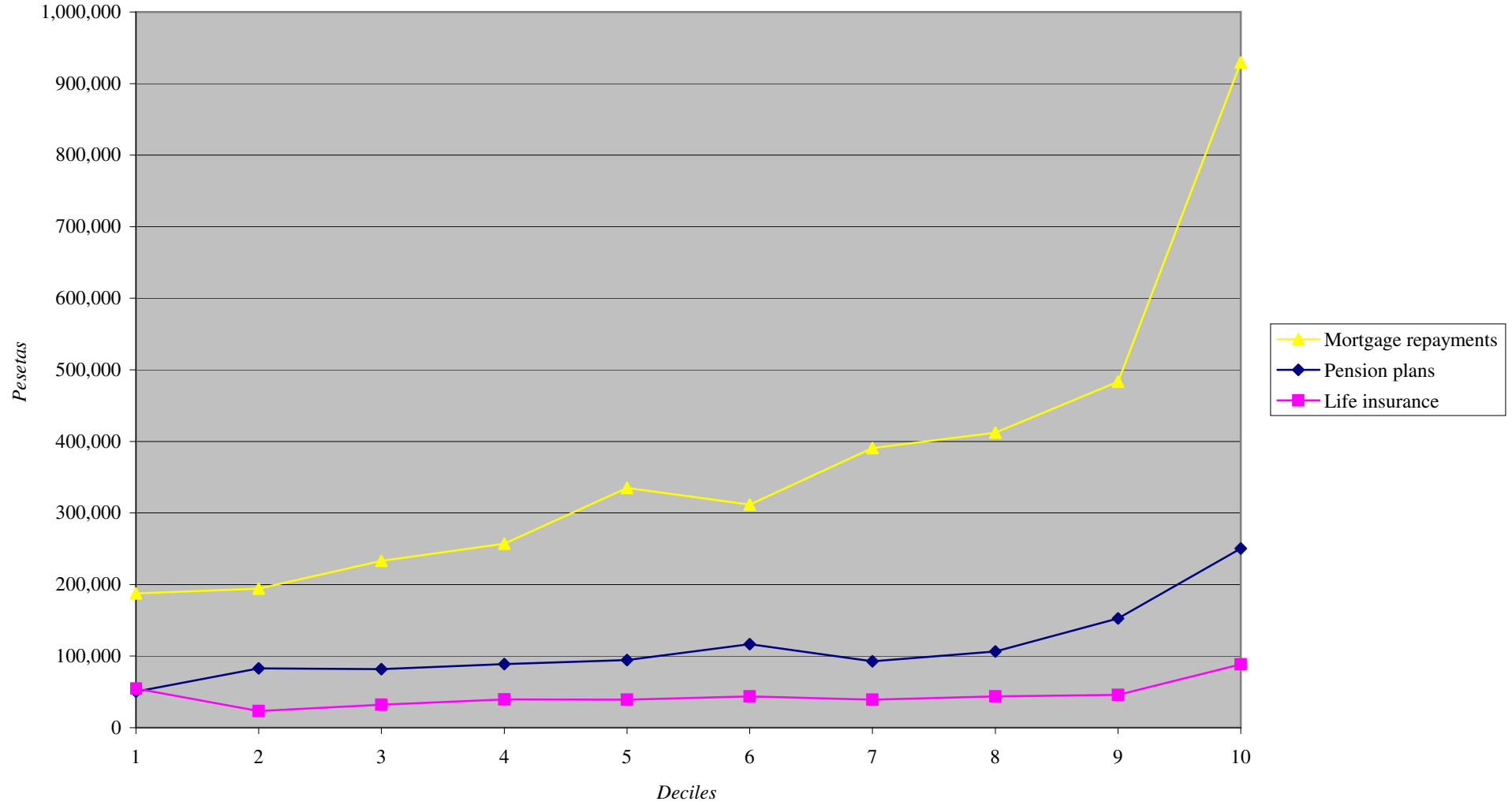
Figure 2. Age and average investment in different assets.

Figure 3. Income levels and average investment in assets.



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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3 plans” simultaneously stipulate eventual benefits and the amount of contributions. While
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5 occupational and associated pension plans may fall into any of these three categories,
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7 personal pension plans will always be defined contributions schemes.
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11 Pension plans have received a highly favourable tax treatment since they were first
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13 regulated in 1987, and as a result they now represent a growing part of the financial assets
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15 held by individuals.
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19 The rest of this paper is structured as follows. In Section 2, we outline the tax
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21 regime applicable to pension plans in Spain since 1987. The data presented are expressed in
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23 terms of the internal rate of return of pension plans in the three following periods: from
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25 1987 to 1991, with the initial regulation for pension plans; from 1992 to 1998, after the
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27 1991 Spanish Personal Income Tax reform; and from 1999 onwards, following the 1998
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29 reform.
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33 The applied model is set out and discussed in Section 3. In order to discover the
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35 factors explaining the decisions associated with investment in personal pension plans, we
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37 specify and estimate a Tobit model for a sample drawn from the 1995 Personal Income
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39 Taxpayers Panel prepared by the Institute of Fiscal Studies (Spanish Ministry of Economy
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41 and Finance). Our conclusion from this exercise is that the holders of personal pension
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43 plans are motivated both by reasons of financial prudence and tax savings.
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48 Section 4 ends the paper with some final considerations.
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51 52 53 **2. The tax treatment of pension plans** 54

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56 In this section, we shall describe the tax treatment of pension plans and quantify
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58 their internal rate of return (IRR) since 1987. This analysis distinguishes between the three
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3 moments at which the tax treatment affects investment in pension plans, namely when
4 contributions are made, during the accumulation of returns, and when the benefit
5
6 contracted is received.¹ Table 1 shows the expressions for the IRR of the pension plans in
7
8 the three periods considered. The tax treatment of the plans is summarised in Table 2.
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12 [TABLES 1 and 2 ABOUT HERE]
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15 **2.1. Contributions**

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17 The contributions made to pension plans are tax allowable in the contributor's
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19 Personal Income Tax within certain limits. Initially, in the period 1987-1991, the
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21 contribution could be deducted from taxable income provided the amount of the
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23 deduction was less than 15 percent of the sum of net earnings from work and business
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25 activities (*earned income*) or 500,000 pesetas. The remaining contributions were eligible for a
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27 15 percent tax credit up to a limit of 750,000 pesetas. In the early years, these limits were
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29 applied to each tax return, but this changed in 1989, when married people were allowed to
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31 file separate returns, and tax credits and allowances became applicable to each taxpayer
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33 included in the return.
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40 There were two key changes to the tax treatment of contributions to pension plans
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42 in the ensuing years. Firstly, the 15 percent tax credit was removed (1992) and, secondly,
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44 the absolute and relative limits on the deduction from taxable income were raised.
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47 Since 2003 the absolute deduction for people aged under 53 years has been € 8,000,
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49 with an additional € 1,250 for each additional year over the age of 52 to a maximum of €
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51 24,250 for pension plan contributors aged over 65. Meanwhile, the relative limit on
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58 ¹ See Scholes *et al.*(2002). Antolín, de Serrres, and de la Maisonneuve (2004) and Yoo and de Serres (2004)
59 examine the tax treatment of private pensions in the OECD countries.
60

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:

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

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:

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

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

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_b , 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.

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

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:

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

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:

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

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:

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

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 diminishes 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 follow³. The regressand Y_i can take a value of zero or the value of the variable Y_i^* , known as the latent variable:

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

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 literature⁴, 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.

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3 declare contributions to personal pension plans, the average amount of which was 150,564
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5 pesetas.⁵
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8 The regressors considered were as follows:
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11 **Age.** Based on the argument derived from expression [9], we may expect to find a
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13 positive relationship between age and the contributions made to pension plans. This
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15 variable has been included quadratically as well.
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19 **Marital status.** We have used a dummy variable with a value of zero for unmarried
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21 and one for married taxpayers. We opted to assign a positive sign to this variable, because
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23 we believe that prudential behaviour is more likely in the case of married people.
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27 **Income level.** Based on expression [8], we may expect a positive relationship
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29 between individuals' income levels (i.e. taxable income prior to tax allowance for
30
31 contributions) and the amount of the contributions made to pension plans. For the same
32
33 reason, we may assign a positive value to the variable *marginal tax rate*. In addition,
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35 higher earners will also have greater capacity for savings. The *income* variable has also been
36
37 included quadratically.
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41 **Occupation.** We have used dummy variables for the categories entrepreneurs,
42
43 professionals and salaried employees. We consider that the first two categories are likely to
44
45 make higher contributions than employees because their mandatory social security
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47 contributions are smaller. Also, we would expect professionals to make higher
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49 contributions because they are, in general, better educated and are likely to be more aware
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51 of the advantages of this saving instrument .
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55 ⁵ Following the Spanish Tax Agency -*Agencia Estatal de Administración Tributaria*- 9 percent of 1995 tax returns
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57 declared contributions to some kind of pension plan, the average amount of which was 184,150 pesetas.
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59 According to data from the *Dirección General de Seguros y Fondos de Pensiones*, 1,423,542 people contributed to
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3 **Year-end tax bill.** The aim of this variable is to verify the hypothesis that people
4 invests in pension plans with a view to reducing their year-end tax bill (i.e. the part of
5 income tax not paid through withholdings at source), which is due upon the presentation
6 of the income tax return. Thus, the higher the tax bill, the higher will be the pension plan
7 contributions made.
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12 **Membership of occupational pension plans.** Our hypothesis is that membership
13 of occupational pension schemes will encourage the participation on personal plans. We
14 have employed a dummy variable with a value of one for taxpayers who are members of
15 occupational schemes and zero for those who are not. In the case of the former, however,
16 we expect the contributions made to fall as the *employer's contribution* rises⁶. This
17 variable has been assigned a negative sign.
18
19

20
21 **Prior year's contribution.** We believe that the behaviour of people contributing to
22 pension plans may be to some extent routine, with the result that they will continue to
23 contribute a roughly similar amount each year after setting up the plan. Consequently, we
24 have assigned a positive sign to this variable.
25
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27
28 **Mortgage repayments.** A person who is still repaying the mortgage on his home
29 will have less spare cash to contribute to his pension plan. The higher these mortgage
30 repayments are, the less the person will contribute to the plan.
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34 **Life insurance contributions.** Like pension plans, life insurance policies are
35 prudential savings instruments, although they do not have the same characteristics. While
36 pension plans receive a more favourable tax treatment, life insurance are more liquid. If
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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).

1
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3 pension plans and life insurance are substitute assets, we may expect that higher life
4 insurance contributions will be associated with smaller contributions to pension plans. On
5
6 the other hand, if they act as complementary assets (as table 4 would seem to indicate), this
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8 relationship will be the reverse. In short, we are unable to assign a positive or negative sign
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10 to this variable.
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15 [TABLES 3 and 4 ABOUT HERE]
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18 The relationship between investment in the home, pension plans and life insurance
19 is clearly apparent in figures 2 and 3, which are constructed on the basis of the sample of
20 tax returns used for the applied study of 1995. It may be observed in figure 2, that buying a
21 house is the most important investment made by people in their lifetimes. However,
22 mortgage repayments begin to fall after the age of 50. Contributions to pension plans and
23 life insurance are considerably smaller, but increase as individuals age. Average pension
24 plan contributions rise fastest among people aged over 60, while life insurance
25 contributions fall after the age of 65.
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36 Figure 3, which takes income levels into account, reflects sustained growth in
37 average mortgage repayments along the income scale. This effect is particularly pronounced
38 in the two upper deciles. There is also a slight rise in investment in pension plans and life
39 insurance until the last two deciles, where average contributions increase sharply, especially
40 in the case of pension plans.
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49 [FIGURES 2 and 3 ABOUT HERE]
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52 Based on the above variables, we have specified three models which provide
53 alternative explanations for the decision to invest in a personal pension plan. The first of
54 these, which we shall call the “prudential model”, is based on the hypothesis that
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3 individuals invest in pension plans basically to save against their retirement, perhaps as a
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5 supplement to other retirement funds obtained from sources such as the social security or
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7 life insurance. The explanatory variables in this model are age, marital status, occupation,
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9 membership of an occupational pension plan, employer's contributions, prior
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11 contributions, mortgage repayments and contributions to life insurance. The specification
12
13 of the model is as follows:
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15

$$16 \quad \text{PLAN}_1 = f(C, \text{AGE}, \text{STATUS}, \text{ENTREPRENEUR}, \text{PROFESSIONAL}, \text{SALARIED}, \text{OCCUPATIONALP},$$
$$17 \quad \text{EMPLOYERC}, \text{PRIORC}, \text{MORTGAGE}, \text{INSURANCE}) \quad [12]$$

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19 The second "tax planning model" refers to the hypothesis that the individual's main
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21 motivation is to obtain the tax benefits available to investors in pension plans. The
22
23 exogenous variables included in the model are income level, marginal tax rate, year-end tax
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25 bill, mortgage repayments and life insurance contributions. The specification is:
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$$28 \quad \text{PLAN}_2 = f(C, \text{INCOME}, \text{MARGINALT}, \text{TAXBILL}, \text{MORTGAGE}, \text{INSURANCE}) \quad [13]$$

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30 Finally, the "general model" includes all of the exogenous variables and is based on
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32 the hypothesis that investment in pension plans can be explained both by prudential and
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34 tax planning concerns. The specification of the model is as follows:
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$$37 \quad \text{PLAN}_3 = f(C, \text{AGE}, \text{STATUS}, \text{INCOME}, \text{ENTREPRENEUR}, \text{PROFESSIONAL}, \text{SALARIED},$$
$$38 \quad \text{MARGINALT}, \text{TAXBILL}, \text{OCCUPATIONALP}, \text{EMPLOYERC}, \text{PRIORC},$$
$$39 \quad \text{IMORTGAGE}, \text{INSURANCE}) \quad [14]$$

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41 The heteroskedastically robust estimation of the models was performed using the
42
43 *Econometric Views (Eviews)* application, version 3.1. Using the logarithm of the verisimilitude
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45 function and the Akaike, Schwarz and Hannan-Quinn criteria as the selection criteria, we
46
47 chose the general model as the most adequate. The results of the estimation are shown in
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49 Table 5.
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3 The variables found to be significant took the expected signs. In the first place,
4 the amount of contributions rises with age, although at a decreasing rate (AGE) until the
5 age of 45, whereafter contributions begin to decline as individuals grow older. As shown in
6 Table 4, the percentage of older people still making contributions falls sharply, although
7 the average amount set aside rises. Secondly, salaried employees make smaller contributions
8 than people in other occupations (SALARIED). Meanwhile, we have been able to confirm
9 that membership of an occupational pension plan stimulates investment in personal plans
10 (OCCUPATIONALP), and that people benefiting from higher sponsor's contributions to
11 such plans invest less in their personal plans than they would were the sponsor's
12 contribution smaller (EMPLOYERC). Furthermore, savings in a given year are positively
13 affected by the prior year's contributions (PRIORC).
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29 While the above variables refer to prudential reasons for setting up a personal
30 pension plan, there is another significant variable which is related with tax planning. In fact,
31 contributions grow with income, although once again at a decreasing rate (INCOME) up to
32 a threshold of 10.6 million pesetas (approximately € 64,000) covering the earnings of 99
33 percent of income taxpayers. Thereafter, the amount of contributions begins to decrease as
34 income rises.
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43 The last variable found to be significant in the estimation of the model expressed
44 in [14] is the amount of mortgage repayments (MORTGAGE). This variable also took the
45 expected sign and fits both with prudential and tax planning arguments for pension plan
46 investment. Based on Table 5, we may affirm that taxpayers set aside less by way of private
47 pension plan contributions as the amount of mortgage repayments made during the year
48 rises.
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3 In light of these results, we may conclude that individuals decide to invest in
4 personal pension plans on complex grounds combining the wish to benefit from tax
5 savings and to ensure they will receive supplementary income upon retirement. These
6 results are in line with those obtained by literature in other countries.
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12 [TABLE 5 ABOUT HERE]
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16 Tables A1 and A2 given in the Appendix respectively reflect the estimation of the
17 prudential and tax planning models. In the former, age and the three variables related with
18 investment in pension plans (membership of occupational pension plans, employer's
19 contributions and prior contributions) are significant and take the expected signs. In the
20 tax planning model, meanwhile, the significant variables are income, tax bill and mortgage
21 repayments, which once again take the expected signs.
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33 **4. Concluding remarks**

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36 In this paper, we have examined the variables affecting the decisions to invest in a
37 personal pension plan and the amount of contributions. We have found a combination of
38 prudential and tax planning reasons for these decisions. Age and occupation affect
39 individuals, as do membership of occupational pension plans, and previous contributions
40 to their own personal plans, as well as the cost of mortgage repayments and income levels.
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48 Our empirical study uses 1995 data, seven years after the first regulation of pension
49 plans. In that year, these instruments had come to represent 4.4 percent of assets held by
50 private individuals. Eight years on, this share has risen to 6.2 percent, confirming the
51 consolidation of these prudential savings vehicles. Consequently, it will be necessary to
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3 repeat the estimations carried out in order to confirm whether, as we believe, the variables
4 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 | $\text{IRR}_{p,87} = (1+i) \cdot \left(\frac{(1-g \cdot t_e)}{1-d_q} \right)^{\frac{1}{j-x}} - 1$ | 0.98 |
| 1992-1998 | $\text{IRR}_{p,92} = (1+i) \cdot \left(\frac{(1-g \cdot t_e)}{1-t_{px}} \right)^{\frac{1}{j-x}} - 1$ | 0.95 or 1 |
| 1999 and thereafter | $\text{IRR}_{p,99} = (1+i) \cdot \left(\frac{(1-g \cdot t_{pj})}{1-t_{px}} \right)^{\frac{1}{j-x}} - 1$ | 0.6 (if $j-x > 2$) |

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For Peer Review

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} | |
| | | | | <i>Up to 52 years</i> | <i>> 52 years</i> |
| 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_c | t_e | t_{pj} | |

Source: Own work.

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

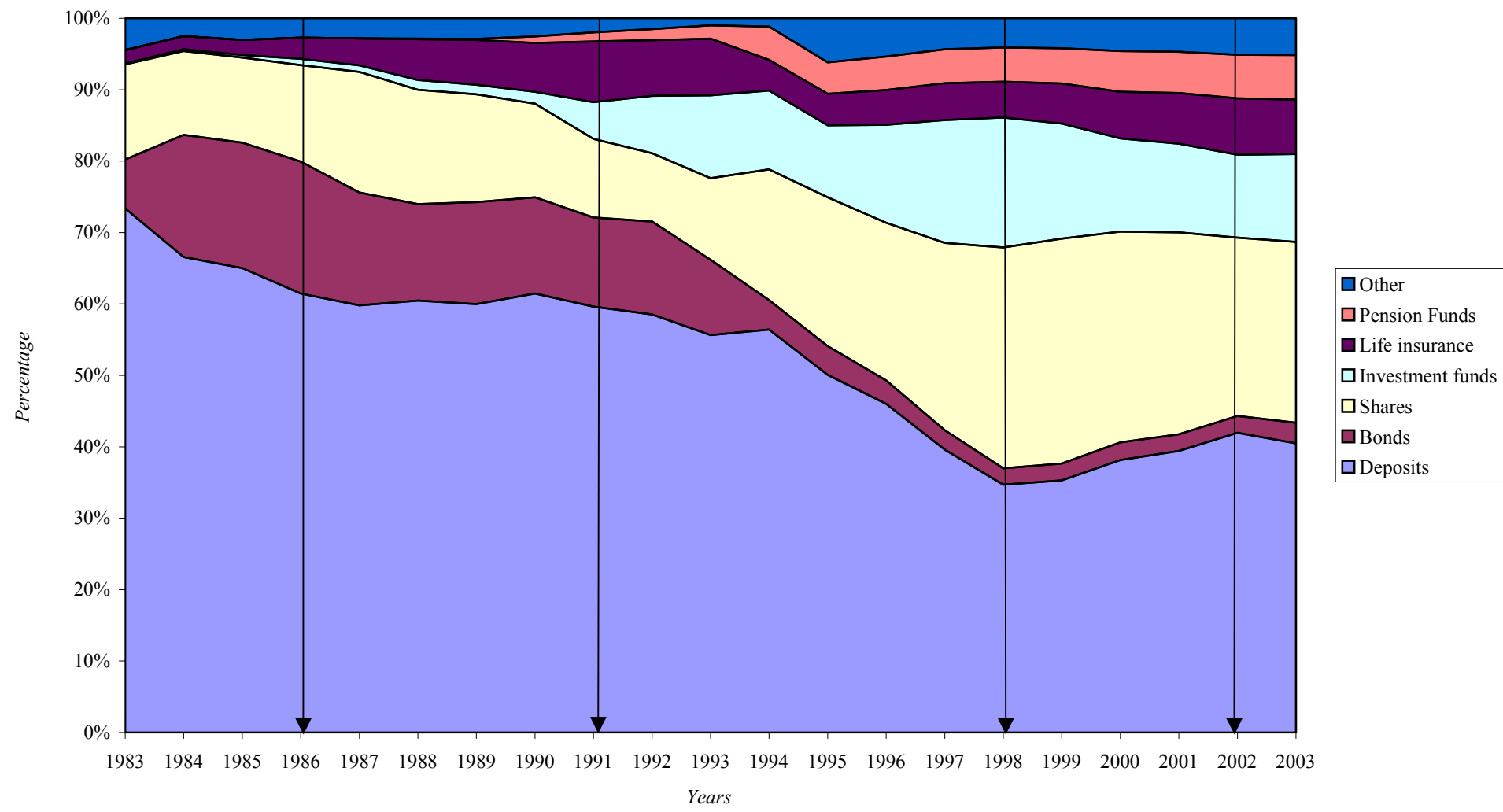


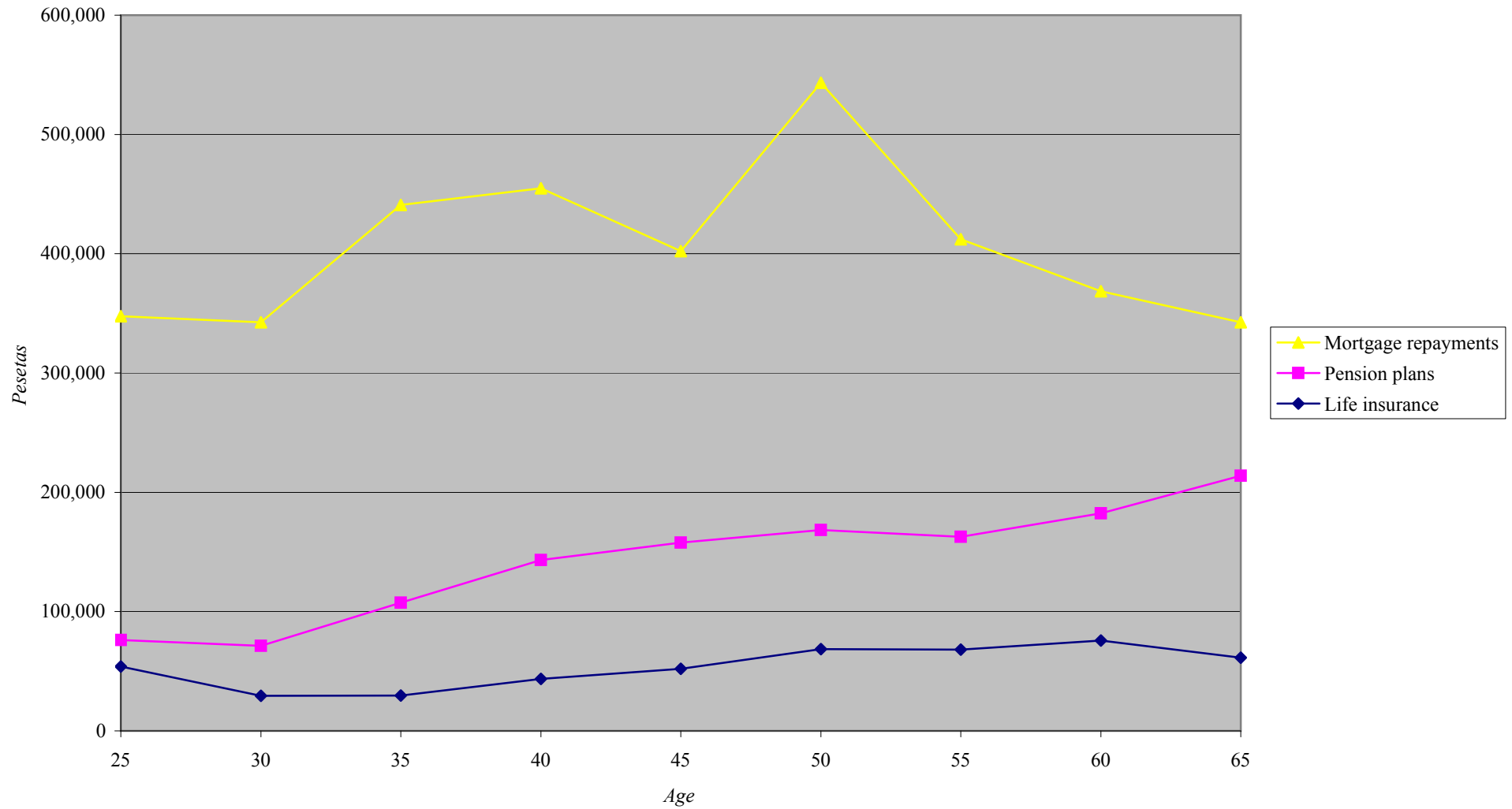
Figure 2. Age and average investment in different assets.

Figure 3. Income levels and average investment in assets.

