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Non-take-up of Tax-Favored Savings Plans: Evidence from Dutch Employees[**]

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Abstract

Since the early nineties, the Dutch tax system allows for a tax-favored form of risk free savings through employer-sponsored savings plans (ESSPs). Under some conditions and up to a certain amount, the contributions to this plan are tax-deductible, and the returns as well as the withdrawals are tax-free. This makes these plans extremely attractive, with real after-tax returns by far exceeding the returns to other financial assets such as risk free saving accounts or stocks and bonds. According to standard economic theory, those who have access to this type of savings should participate in them and hold the maximum tax favored amount, provided they have enough financial wealth that they can allocate to their own choice. In this paper, we analyze data on participation and amounts held in ESSPs for employees who have access to the asset, investigating the relationship with background characteristics and other forms of savings. We find that people who are likely to face binding liquidity constraints less often buy ESSPs and, if they buy them, more often use them as a substitute for other savings. The results also provide evidence of financial decision-making that is not driven by standard economic arguments, confirming theoretical and empirical findings in the recent behavioral and psychological literature on savings.

1. Introduction

Several countries try to stimulate household savings by introducing special tax-favored savings schemes. Scholz (2001), for example, discusses the plans of the US government to introduce new tax-favored savings schemes and to make the tax rules concerning Individual Retirement Accounts (IRAs) more generous, with the aim of stimulating savings for retirement. Knowing how participation in such plans relates to income, wealth and other household characteristics is crucial for understanding the implications for the distribution of savings, wealth, and future income and consumption. Analyzing the reasons for non-take-up is helpful to design the plans in such a way that they will be used by the households they are aimed at.

Since 1994, the Dutch tax system allows for a tax-favored form of risk free savings through employer-sponsored savings plans (ESSPs). Up to some maximum amount, contributions to these plans are tax-deductible, and the returns as well as the withdrawals are tax-free if the asset is held for at least four years. This makes these plans extremely attractive, with real after-tax returns of about 20 percent per year, at least ten times the real return on traditional saving accounts and much higher than the average returns on risky assets such as stocks or mutual funds. The tax-favored nature of the ESSPs is so large that for those who do not face current liquidity problems or expect liquidity problems in the near future, standard economic theory implies that not buying the asset or buying less than the maximum tax-favored amount is clearly sub-optimal. Employers provide their employees with full information on the opportunities and bear the costs of acquiring and holding the ESSPs. Taking up ESSPs does not involve the negative stigma that has been found to reduce take-up of welfare benefits (see Blundell, Fry and Walker, 1988). Not holding ESSPs thus points at serious concerns about liquidity, or at decision-making that is based upon non-economic arguments, such as mental accounting, etc. (see, e.g., Thaler, 1999). If reasons for non-take-up of ESSPs can be identified, these reasons will almost certainly also play a role in the take-up decisions of many other financial assets for which tax advantages are less clear, information is not as readily available, and transaction costs are higher.

In this paper we analyze household data on access to and participation in ESSPs. The raw data show that in the initial years, about 80% of all employees had access to ESSPs, but only 67% of those with access actually bought them. About 23% of those who acquired ESSPs spent less than the full tax-favored amount. Less than 15% of the participants reported that participating in ESSPs induced them to reduce their other financial savings.

We focus on employees with access to ESSPs. We analyze their participation decision and the decision how much to invest. Using a rich data set allowing to include conditioning variables that describe attitudes towards savings and time preference, we aim at identifying the reasons for non-participation or holding less than the maximum amount. We also analyze how self-reported reasons for non-take-up relate to household characteristics.

We find that liquidity constraints that are currently binding or are expected to become binding in the near future are an important reason for non-take-up. This is in line with the economic theory on borrowing constraints and with empirical evidence that borrowing constraints are detrimental to portfolio diversification and risk taking (see e.g. Guiso, Jappelli and Terlizzese, 1996). Liquidity constraints alone, however, are not the only explanation for non-take-up or partial take-up. Since employers provide detailed information on ESSPs and take over most of the administrative burden, real take-up costs for employees are quite small. Arguments based on costs of acquiring information or transaction or participation costs will validly explain non-participation if

perceived costs exceed real costs. ESSPs are available to the large majority of employees, are widely advertised and offered in a transparent and user-friendly way, and can be chosen such that they have risk-free returns. Thus our results strongly suggest that many households hold assets that are inferior from a mean-variance point of view, confirming recent evidence in the literature on the psychology of savings.

The remainder of this paper is organized as follows. In Section 2 we discuss the related literature on the psychology of savings. Section 3 describes the tax-favored nature of the employer sponsored savings plans and the conditions on the withdrawals, which limit their liquidity. In Section 4, we present the data, drawn from the 1995 wave of the CentER Savings Survey (CSS), with about 1700 employees who have access to ESSPs. Section 5 presents Probit results for participation in ESSPs conditional on access, as well as the results of a Tobit regression explaining the amounts participants invest in ESSPs, correcting for selective participation. The amount is censored by the maximum tax-favored contribution. In Section 6, the answers to an open question on why non-participants have not taken part in the ESSP scheme are analyzed. Section 7 briefly addresses substitution of other savings (portfolio shuffling). Section 8 concludes.

2. The Economic Psychology of Saving

Economic models of savings traditionally rely on a life cycle framework in which households or individuals maximize the expected discounted value of lifetime utility under an intertemporal budget constraint. See, for example, Modigliani (1986), Deaton (1992) or Browning and Lusardi (1996). Economic models of portfolio choice are based upon the same expected-utility maximizing framework, cf., e.g., Markowitz (1952) or the overview of theoretical and empirical work in Guiso, Haliassos and Jappelli (2002). Central concepts in these models that determine the amounts of savings and how they are invested in different types of assets (risky or risk free; liquid or illiquid, etc.) are the time horizon and the rate of time preference, uncertainty and the degree of risk aversion, and liquidity constraints. More recent models also allow for transaction or holding costs or the cost of acquiring information (see, e.g., the explanation of the stockholding puzzle of Bertaut and Haliassos, 1995).

As discussed by Nyhus (2002), psychological concepts were already prominent in the ideas about saving behavior of economists in the 1930s like Fisher and Keynes, but not much of this was found in the formal theories of the life cycle model and the permanent income hypothesis in the 1950s. As explained in the extensive overview by Wärneryd (1999), the first influential psychological model of savings stems from Katona (1975). His theory is based upon two driving forces for saving: The ability to save and the willingness to save. One of his main contributions to behavioral economics is the concept of "discretionary" savings for a specific goal or for consumption goods that are not strict necessities.

Psychological arguments leading to behavioral rules were integrated with the life cycle theory in the behavioral life cycle model (BLCH) proposed by Shefrin and Thaler (1988). Important ingredients of this model are the dichotomy of a planner and a doer (originally developed in Thaler and Shefrin, 1981), the notion of self-control, and the idea of mental accounting. The planner part in each consumer accounts for the future but the doer part is only interested in short-term utility maximization. The planner imposes self-control on the doer, using behavioral rules. One such rule is mental accounting, the idea that some accounts are used for short-term consumption but others are not touched. This implies that different accounts are no longer perfect substitutes of each other (i.e., are no longer fully fungible), even if they have the same liquidity. In our context, this theory

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may explain why people are unwilling to transfer money from an existing account to something like an ESSP, in spite of the tax advantage. A related aspect of the BLCH is framing: consumers start from a given benchmark, e.g. an allocation of their wealth in a given set of (mental) accounts, and are unwilling to give up their benchmark holdings in return for non-benchmark assets. This is similar to Kahneman and Tversky's (1979) idea of loss aversion in prospect theory, which can explain why consumers are reluctant to invest in risky assets.

An example of an empirical study providing evidence of mental accounting is Bertaut and Haliassos (2002), who explain why so many US households hold credit card debt although they simultaneously have command over sufficient liquid assets to repay the debt, using a model in which the credit card debt limit is an instrument for self-control. A similar argument can explain why people do not replace long run investments such as life annuities by ESSPs which become liquid after four years. In general, empirical studies have confirmed the relevance of the BLCH and also in economics it is by now widely accepted that psychological aspects leading to deviations from utility maximization play a role (see, for example, Thaler, 1994). The recent behavioral finance literature studies the consequences for financial market macro-phenomena (e.g., Zeckhauser et al., 1991) and asset pricing (e.g., Barberis and Huang, 2001; Brav and Heaton, 2002; Hirshleifer, 2001). The type of behavior incorporated in these models often reflects non-rational expectations or the use of heuristics to avoid solving the difficult optimization problem of the optimal financial portfolio.

3. The ESSP scheme

While employer sponsored saving plans (ESSPs) existed in the Netherlands already before 1994, they became much more prominent when in January 1994 new and more generous tax rules were introduced. The new rules were introduced in a political compromise between unions, employers and the government to stimulate labor force participation, wage moderation, and wealth accumulation (see Bikker, 1994). The Dutch ESSPs share some features with tax-favored retirement accounts in other countries, for instance with U.S. Individual Retirement Accounts (IRAs), Keogh Plans and 401(k)-Defined Contribution Plans. In comparison, the Dutch ESSPs are not primarily aimed at retirement; however, they enjoy a much more favorable tax treatment, and are much more liquid.. In particular, interest income from ESSPs is treated separately from other interest income and not liable to income tax up to a substantial threshold (Dfl 2,000 for couples, Dfl 1,000 for singles).[1] Up to Dfl 1,544 per year,[2] contributions are tax-deductible and not subject to social insurance premiums. If the money is not withdrawn for four years, the withdrawals are not taxed.[3] This makes these plans somewhat less liquid but much more tax-favored than ordinary savings accounts.

Bovenberg and ter Rele (1998) illustrate the differences between tax treatments of various forms of (risk free) savings, following the method of King and Fullerton (1984). They compute the after-tax return s from the pre-tax return r as

$$s = [(1-m_w)/(1-m_c)]^{1/dur} (1+r) - 1$$

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[1] The same thresholds apply to interest income from ordinary saving accounts. The fixed guilder/euro conversion rate per January 1, 1999, is 1€=2.20 Dfl.

[2] This was the threshold in 1994. It was raised gradually to Dfl. 1,580 in 1995 and Dfl. 1,736 in 2000.

[3] The money can be withdrawn earlier to buy a house or if the employee changes employer. It is also possible to invest the money in stocks or mutual funds or in an annuity insurance or whole insurance policy.

Here *dur* is the duration of the investment, m_w is the marginal tax rate at which withdrawals are taxed, and m_c is the marginal tax rate at which contributions can be deducted. Bovenberg and ter Rele (1998) use an inflation rate of 2% and a nominal pre-tax return of 6% for each asset they consider. For households with an average marginal tax rate (m_c=0.45), they find real after tax returns of 1.2% for traditional saving accounts, 1.5% for ('innovative') risk-free growth funds, and 20.8% for the tax-favored employer-sponsored savings plans.[4] On the maximum tax-favored ESSP amount, this implies an annual interest income differential of Dfl 275 between ESSPs and traditional savings, almost one fifth of the average interest income per household. For high-income (and high marginal tax rate) households, the ceiling may make ESSPs relatively less important. On the other hand, their after tax rate of return can be about 1.5 times as high, due to the higher marginal tax rate. Thus for all households ESSPs are an extremely attractive investment with non-negligible extra returns. There are no formal entry costs. Transaction costs may be faced by liquidity constrained consumers who need to restructure their portfolios in order to free funds for ESSP.

Only employees of participating employers have access to ESSPs. Employers do not pay social insurance contributions on the amounts invested in ESSPs, reducing their wage costs. In spite of this, some small employers do not offer ESSPs, due to the administration costs.

4. Data

The data we use for the analysis are drawn from the 1995 wave of the CentER Savings Survey, collected by CentER*data*. Nyhus (1996) describes this data set and its general quality. The panel consists of two samples. The first sample (REP) is intended to be representative of the Dutch population. It contains about 2000 households in each wave. The second sample (HIP) was drawn from high-income areas and should represent the top income decile. Initially, it consisted of about 900 families.[5]

The CentER Savings Survey (CSS) data were collected via on-line terminal sessions, where each family was provided with a PC and modem. The answers to the survey questions provide general information on the household and its members, the work history and labor market status of adult household members, health status, and detailed information on many sources of income. The survey includes an economic psychology module eliciting, for example, risk attitudes, time preference, expectations, and interest in financial matters. It also has information on ownership and amounts for about forty assets and liability categories, used to obtain an aggregate measure of household wealth.[6]

Ownership of ESSPs grew rapidly in 1994 and 1995 and has remained approximately constant after that. Figure 1, taken from Alessie et al. (2002), presents the household ownership rates of ESSPs for each cohort in each of the six available waves (1993-1998).[7] Whether household members are employees or have access to ESSPs or not, is not taken into account here. Cohorts are defined using the five year- of- birth bands of the head

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[4] They assume that employees withdraw their money from the ESSP account after exactly four years (*dur*=4).

[5] The panel data set has been renamed into DNB Household Survey, as per survey wave 2003.
[6] Missing values on the amounts have been imputed. See Alessie et al. (2002) for details.

[7] Ownership rates are weighted with sample weights to make them representative for the Dutch population. By definition, a household owns the asset if at least one of its members owns it.

of household. The six points for each cohort represent the average age level at the times of the interviews, and form a "cohort curve." The jumps between the cohort curves show that, apart from age effects, there are cohort or time effects. The fact that cohort curves are not horizontal shows that there are time and/or age effects; the fact that not all cohort curves are the same shows that there is more than just time effects. As usual, however, the three effects (time, age and cohort) cannot be disentangled without further assumptions. Figure 1 also shows that the ownership rates of ESSPs have a hump-shaped age pattern. For the cohorts of working age, there is a steep increase between 1994 and 1996, reflecting the boom in take-up. Thus the jumps between the curves are better interpreted as time effects than as cohort effects.

The main CSS survey does not provide information on who has access to ESSPs. In the autumn of 1995, however, CentER*data* has fielded a small additional questionnaire about employer-sponsored savings plans, including the following questions:

1.   Did your employer, in 1994 or 1995, offer you the opportunity to participate in an employer-sponsored savings plan? *(yes/no)*

If question 1 is answered with *yes*:

2.   Are you participating in the employer-sponsored savings plan in 1995? *(yes/no)*

If question 2 is answered with *yes*:

3.   How much do you intend to save through this plan in 1995? For 1995 a maximum of Dfl. 1580 can be saved tax-free. *(Amount in Dfl.)*

If question 2 is answered with *yes*:

4.   Have you, due to your participation in the employer-sponsored savings plan, put less money on other savings accounts or invested less in other ways? *(yes/no)*

If question 2 is answered with *no*:

5.   Why did you not use the opportunity to save through employer-sponsored savings plans?
        The rest of the screen is available for your answer. *(Open-ended question)*

Only employees were asked to fill in the questionnaire. The sample consists of 2134 respondents of whom 1742 (80%[8]) had access to the ESSP scheme in 1995. The employers of the other respondents did not offer the scheme. In 1995, 67% of those with access decided to take-up an ESSP and 77% of the participants made the maximum tax-free contribution of Dfl. 1580. The 67% take-up rate can be compared to several take-up rates of tax-preferred savings plans in the U.S. reported in the literature: Kusko et al. (1994) report take-up rates ranging

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[8] Percentages are weighted with household sample weights making the survey representative.

from 78% to 84%; Madrian and Shea (2001) report participation rates between 49% and 83%, depending on tenure, for workers who were not automatically enrolled; both studies use data from a single, non-representative firm. Copeland and VanDerhei (2000), using family-level data from various years of the Survey of Consumer Finances, report relevant take-up rates of 401(k) defined contribution plans ranging from 73.8% to 77.3% and note that of nonparticipating families, 40.3% were already enrolled in a defined benefit plan. Poterba, Venti, and Wise (1995) report take-up rates for 401(k) plans of 70.8% from the 1991 Survey of Income and Program Participation, up from 58.1% in 1984. Thaler and Benartzi (2004) report effects on the pension-plan contribution rate, Madrian and Shea (2001) compare participation rates between an eligible opt-in (control) group: 57%, and an eligible opt-out (treatment) group: 86%.

Thus, although the characteristics of the plan we analyze are different and the Dutch plan is even more tax-favored than the U.S. plans, thus giving a stronger tax incentive for participation than related U.S. products, we find that the take-up rate is in the lower part of the existing range for the U.S. Moreover, given the rather low annual ceiling, we would expect almost everyone to invest the full tax-deductible amount. Still, the numbers indicate that almost 50% of the eligible respondents made no or only partial use of ESSPs. Among the participants, 14% reported that they saved less through other saving channels due to participation in ESSPs.

5. Determinants of take-up of ESSP plans

In this section we use probit models to explain participation in ESSPs from household and head of household characteristics. The sample consists of employees with access to ESSPs. The results for various specifications are presented in Table 1. As discussed in the previous section, ESSPs have enormous tax advantages compared to other assets of comparably low risk. Thus eligible savers who do not face serious liquidity constraints and do not expect to face such constraints in the near future, will always have ESSPs in their optimal financial portfolio according to traditional portfolio choice models. The results in column 1 suggest that liquidity constraints are indeed an issue: there is a positive relationship between liquid financial wealth[9] and the take-up of ESSPs, which is almost significant at the 5% level. Similarly, significant positive effects of real wealth[10] and income on the take-up probability are found.

The effect of liquid financial wealth vanishes if we include dummy variables constructed from the following question:

> How difficult is it to make ends meet with the total income of your household?
>
> (*Very hard, hard, neither hard nor easy, easy,* or *very easy*)

The coefficients on these dummy variables are jointly significant, and point in the expected direction: those who find it easy to make ends meet have a higher probability to buy ESSPs. This supports the importance of liquidity constraints.[11]

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[9] Liquid financial wealth consists of transaction and saving accounts, certificates of deposit, bonds, stocks, mutual funds and other liquid financial assets (money lent out to friends), minus all types of debt except mortgage debt.

[10] Real (non-liquid) wealth is composed of housing and other real estate equity, defined contribution plans, cash value of life insurances, business equity, and value of cars, motorcycles, boats, and caravans.

[11] Causality might also go in the other direction: people may find it more difficult to make ends meet because they have used part of their income to buy ESSPs. Since the amounts invested in ESSPs are not very large, we think this effect is less important.

The age coefficients are jointly significant for all specifications, implying a hump-shaped pattern with a top around age 40. An explanation of this finding will be given in the next section when we look at reported reasons for not participating. Family composition does not affect the decision to take out an ESSP. We also tried number of children and the respondent's gender but both were insignificant. One of the explanations for non-take-up discussed above is ignorance or misunderstanding the tax rules. We would expect that this is more relevant for the lower educated than for others, but this is not borne out by the results: education is insignificant and the point estimates go in the other direction. This could be due to the fact that ESSPs were widely advertised and that acquiring only required filling out a simple form. Employers provided extensive information and took care of the administrative work. On the other hand, formal education might not be a good proxy for financial education. In specifications 3 and 4 we have therefore added three dummies based on the question:[12]

How knowledgeable do you consider yourself with respect to financial matters?
(Not knowledgeable, more or less knowledgeable, knowledgeable, or *very knowledgeable)*

The results in the final two columns of Table 1 show that the more knowledgeable people consider themselves with respect to financial matters, the more they participate in ESSPs. Adding these dummies hardly changes the effects of education.

In Section 3 we explained that the tax advantage of an ESSP scheme increases with the marginal tax rate. In specification 1 we indeed find a strong, significant and positive relation between the marginal tax rate and the decision to buy an ESSP. The participation rate among people in the highest tax bracket (with a marginal rate of 60%) is about 10 percentage points higher than among similar people in the lowest tax bracket (marginal rate 37.25%). The difference is smaller and no longer significant in the other specifications, however. This is because people with a high marginal tax rate often are knowledgeable in financial matters and do not face liquidity constraints. In any case, the result on the tax rate should be interpreted with caution, since disentangling marginal tax rate and income effects relies on functional form assumptions.

Finally, we included variables reflecting smoking and drinking behavior. Our results show that regular smokers significantly less often take-up an ESSP than others. For alcohol use, we do not find the same relation with ESSP take-up as for smoking, possibly since alcohol use is only measured to a very limited extent.[13] One explanation for the effect of the smoking variables is that smokers have a high rate of time preference or a low rate of risk aversion and consequently save less (see Barsky, Juster, Kimball and Shapiro, 1997). Fuchs (1982), however, finds only a very low positive correlation between smoking and the rate of time preference ('implicit interest rate').

A second explanation for the smoking effect would be that smokers save less due to high expenditures on smoking. Since the effect of smoking is very large compared to the income effect, however, the latter cannot be the complete explanation. Moreover, the smoking effect remains if dummies on how easily the household can make ends meet are included (specifications 2 and 4). A third explanation is that smokers do not care much

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[12] These dummies are endogenous if ESSP ownership increases interest in financial matters. This is why we also present the specifications that do not include these variables.

[13] About 8% consume more than four alcoholic beverages per day. Surprisingly, the correlation between alcohol use and self-reported knowledge of financial matters is significantly positive.

about financial matters as they also do not care much about their health. The smoking effect remains the same, however, if we control for self-reported expertise in financial matters (specifications 3 and 4).[14]

Our data set contains several variables related to the rate of time preference (both self-reported attitudes and answers to hypothetical choice questions relating to speed-up or delay of gains or losses) that can be used to investigate the reason for the smoking effect in more detail. There is no significant correlation between these variables and smoking behavior, nor do these variables enter significantly in the ESSP ownership decision. Including these time preference variables does not change the effect of smoking. Similarly, the relation between smoking and non-take up of ESSPs does not change if we include variables measuring attitudes towards saving, risk aversion or risk attitude, self-control or willpower, planning horizon and life expectancy, carelessness, etc. These variables are hardly correlated to smoking behavior. (Details are available upon request from the authors.)

Still, the most plausible explanation of the relation between smoking and non-take up of ESSPs seems the lack of self-control and the dominance of the doer-self over the planner-self among smokers (cf. Thaler and Shefrin, 1981). Smoking provides short-term utility preferred by the doer-self at the cost of long-term health appreciated by the planner-self. The same dominance of the doer leads to lack of financial planning, carelessness in investment choices, procrastination, sticking to the default option, lack of financial knowledge, etc. Although we have a rich set of psychological variables in the data, none of them is able to pick up this particular aspect of lack of self-control.

We have also experimented with other specifications of the probit model than the ones reported in table 1. For instance, we have included variables which proxy for the effects of income uncertainty, income expectations, habitual persistence, and, as mentioned already, time preference and risk aversion. None of these variables contribute significantly to explaining the participation decision. Since ESSPs are almost risk-free with after-tax returns exceeding average stock returns, ESSPs dominate not only risk-free assets but also stocks and bonds for all those who are not extremely risk loving. We therefore see no good reason why and in which direction attitudes towards risk or the rate of time preference should affect the take-up decision of ESSPs. Although investments in ESSP are somewhat illiquid, the money can be retrieved tax-free from the ESSP account if the owner loses the job. This implies that precautionary motives should not reduce ESSP take-up either.[15] On the other hand, employees who participate in the ESSP scheme will receive slightly lower benefits if they become unemployed or disabled (since no social insurance premiums are paid over the ESSP contributions). For risk-averse employees with a high (perceived) probability to become unemployed, this might be an argument not to participate. We will return to this in the next section when we look at reported reasons for non-take-up.

About 80% of ESSP participants invested the maximum tax-favored amount of Dfl. 1580. The other 20% invested less. To analyze the decision how much to invest while correcting for selectivity due to non-take-up, we estimated the following bivariate model.

$$y^* = x'b + u$$

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[14] Smoking is not significantly correlated with knowledge of financial matters. It is negatively correlated to how easily the household can make ends meet and to a self-reported variable on interest in financial matters.

[15] Other empirical studies in which Dutch data are used (e.g., Hochguertel, 2003) find only limited support for precautionary portfolio choice behavior compared to other countries (e.g., Heaton and Lucas, 2000).

$d* = z'a + v$

$(u,v \mid x,z) \sim N(0, V)$ with $V(2,2)=1$

$y = 0$ if $d*<0$; $y=y*$ if $d*>0$ and $y*<ln(1580)$; $y=ln(1580)$ if $d*>0$ and $y*>ln(1580)$

Here y is the observed log of the amount invested, if this is non-zero. The equation for $y*$ is a censored regression equation determining this amount. The equation for $d*$ is the participation equation discussed above. Thus the two-equations model is a generalization of Heckman's selection model, in which the equation of interest is a censored regression equation (Tobit). The vector z of explanatory variables is the same as in specification 4 in Table 1. Education level and expertise in financial matters may determine the take-up decision but there is no reason why they would affect the amount held. These variables are therefore excluded from x, implying that the model is non-parametrically identified. We impose a unit variance on the error of the selection equation to identify the scale of the model.

The model can be estimated by maximum likelihood. The sample is the same as the sample used for the probits in Table 1, including only employees with access to ESSPs. Results for the participation equation are virtually identical to those in Table 1. Detailed results for the amount equation are available upon request. The signs of most of the coefficients in the amount equation are the same as in the participation equation, but significance levels are lower. The evidence of liquidity constraints is confirmed: the dummies reflecting how easily respondents can manage with their household income are jointly significant at the 5% level and have the expected sign. Smoking and drinking behavior are insignificant. The main result is the strong positive effect of the marginal tax rate: respondents with a higher marginal tax rate for whom the (absolute) tax advantage is largest, tend to invest more and have a larger probability to invest the maximum tax-favored amount.[16]

6. Reported reasons for non-participation

Employees who have access to ESSPs but do not participate have answered an open-ended question on the main reason for non-participation. We reviewed all open answers and classified them into the following six categories; representative examples of the answers in each category are given in quotes. The percentage of answers in each category is given in parentheses.

1.   Other forms of saving (27.3%)

"I already save (enough) in other forms."

"I already save through life insurance (annuity insurance) policies."

"I have found better ways of saving money."

"I do not see the advantage of saving through an ESSP scheme."

"ESSP's do not give a high return."

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[16] The estimated correlation coefficient between the error terms u and v in the two equations is small and insignificant. This suggests that unobserved characteristics determining the take-up decision are not the same as those determining the amount.

2.   Liquidity constraints or expected future liquidity constraints (18.6%)

"My income is so low that I cannot save."

"The money in ESSPs is locked in for four years; this period is too long."

3.   Cost and effort related reasons (8.7%)

"Documentation is rather unclear"

"Too much hassle"

"My employer did not give me enough time to fill in the forms"

"I was careless"

"I have not found time yet to look at the documentation"

4.   Not interested (14.6%)

"I am not interested"

"I do not need this"

5.   Partner has ESSP (4.4%)

"My husband/wife already has an ESSP account"

6.   Other reasons (26.3%)

"I have a temporary job"

"I have a part-time job"

"Social insurance benefits decrease due to participation in ESSP scheme."

"I am too old to participate in the ESSP scheme."

Many respondents reported that they did not participate because they were already engaged in other forms of saving. Many of them especially mention life insurance products (annuities). In Section 2 we have seen that the after tax rate of return of annuities is much lower than that of ESSPs. Apparently respondents are not allowed or not willing to substitute the long-term investments into life insurances by the more liquid ESSPs. This could be explained as imposing self-control, as in Bertaut and Haliassos (2002). Life insurances are a separate (mental) account and the employees in our sample are not willing to transfer money from this account to an account that does not impose long-term saving. Employees also do not buy ESSPs on top of the life insurance products, perhaps due to liquidity constraints. The group "other forms of savings" also includes about 20 respondents (4% of all non-participants) who claim that they have invested their money in 'better' saving products. Given the strongly tax-preferred and risk-free nature of ESSPs (see Section 2), this claim is rather bold; these respondents have probably not fully understood the tax-favored nature of the ESSP scheme.

Almost 15% of all non-participants with access gave reasons such as "not interested" or "no need for ESSPs." Assuming these people are non-satiated, they behave sub-optimally in the standard economic portfolio choice model. Almost 19% of the non-participants gave liquidity constraints as the main reason. About 27% of them mentioned the fear of binding liquidity constraints in the near future.

Only 9% of the non-participants gave cost related reasons. This low percentage is in line with the fact that the administrative burden of participation is kept to a minimum, as explained above. The percentage can still be biased upward due to cognitive dissonance: respondents who were too lazy to fill in the forms, did not always want to admit this and may have looked for another reason.

About 4% of the non-participating respondents did not participate because their partner (husband) had already taken up an ESSP. The tax-favored nature of ESSPs, however, is not affected by the partner's participation. From the point of view of the household, the tax rules imply that the threshold is doubled if both spouses have access to ESSPs, without reducing the tax advantages. Therefore this only justifies non-participation if the family wants to invest less than the maximum amount (Dfl 3160), for example due to (current or expected) liquidity constraints.

The remaining group of non-participants (26%) gave a variety of reasons for non take-up. Very few respondents (1% of all non-participants) reported that in case of unemployment or disability they would receive a lower social insurance benefit, underlining the fact that the effect on the benefits level would be quite small. About 13% of non-respondents said that they have a temporary or a part-time job or that they will retire (very) soon so that it would not be worthwhile to take part in the ESSP scheme. Again, there is nothing in the tax rules that justifies this motivation.

We have further investigated the relation between the reason for non take-up and some background variables using a multinomial logit model, conditional on non-take-up.[17] The results are summarized in Table 2. Not surprisingly, employees with low financial wealth and respondents who have problems to make ends meet with their own family income, often report 'liquidity constraints' as the most important reason of non-take-up. The effect of age is also rather strong: ceteris paribus, younger non-participants more often gave cost and effort related reasons (carelessness, sloppiness etc.) and 'other reasons' (such as 'temporary job') than older respondents. Female respondents have a lower tendency to report cost related reasons than males. In section 5 we found that smoking is a strong predictor for non-participation. Table 2 shows that smoking behavior barely explains the reason for non take-up, although there seems to be some evidence that non-participants who smoke now and then, less often reported 'liquidity constraints' and 'other reasons' as the main reason for non take-up.

7. Substitution of other savings

There has been a vivid policy debate in the United States as to whether tax-favored saving incentives (such as IRAs, Keogh accounts, and 401(k) defined contribution plans) actually stimulate saving or just lead to asset substitution and portfolio reshuffling. See Gale and Scholz (1994), Engen et al. (1994), and Gale (1999), for example. ESSP participants in our sample were asked whether taking up an ESSP induced them to reduce their other savings, allowing us to address the issue of substitution directly without the need of a complete model for savings or detailed data on savings.

An overwhelming majority of ESSP participants, 85.7%, answered this question with *no*, implying they unambiguously have saved more due to participating in ESSPs. The 14.3% who did reduce their other savings may still have saved more in the aggregate, but they may also have reduced their total savings or kept them at the same level. To investigate what drives participants' decisions to reduce other savings or not, we present the results of a probit model in Table 3.[18] The dependent variable is 1 if the answer to the substitution question is *no*, in which case we know total savings have increased due to ESSPs. It is 0 if the answer to the substitution question is *yes*.

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[17] Separate binary probit or logit models looking at one reason versus all the others lead to similar conclusions.

[18] Other variables such as education level, home ownership, etc., were insignificant and excluded from the final specification. Deleting the insignificant variables hardly changed the coefficients on the remaining variables.

The only variables that are jointly significant at the 5% level are the dummies that reflect how well respondents can manage with total household income. Participants who find this easier more often report that they do not reduce other savings. Thus for those whose financial situation is reasonably good, ESSPs have clearly served as an incentive to save more. Controlling for these financial situation variables, financial wealth and real wealth are insignificant separately as well as jointly. The marginal tax rate dummies are jointly significant at the 10% level. Those with higher marginal tax rates have more often reduced other savings when buying ESSPs (keeping wealth and financial situation constant). They have higher tax advantages and will more often substitute other savings by ESSPs.

8. Summary and conclusions

We have analyzed the (non-)take-up of employer sponsored saving plans (ESSPs), an extremely tax-favored form of almost risk-free savings in the Netherlands. Standard economic theory would predict that if such an asset were introduced into consumers' choice sets, its tax-favored nature would incite a take-up rate close to 100% as it is clearly dominating in a mean-variance sense. Yet, about one third of the respondents who had the opportunity to acquire an ESSP in 1995 did not use this opportunity and about one fourth of those who did use it, did not buy the maximum tax-favored amount. We have investigated the determinants of the take-up decision, the amount invested, reported reasons for non-participation, and the decision whether or not to reduce other savings.

We found clear evidence that part of the observed behavior is explained by liquidity constraints: wealthy respondents who find it easy to make ends meet have larger take-up probabilities and tend to invest more. Still, liquidity constraints cannot explain the full non-take-up rate, and only 19% of those who do not take-up an ESSP report liquidity constraints as the main reason.

The remaining reasons for non-take-up or partial take-up suggest sub-optimal portfolio behavior, that can be explained by bounded rationality, mental accounting, self-control and inertial behavior that is well in line with the theory and empirical evidence of the behavioral life cycle hypothesis. Many people appear not to be willing to substitute long-term forms of savings such as life annuities by ESSPs, in line with the argument of imposing self-control. There is evidence of misperception of the costs of participation and underestimation of the tax advantage, in spite of the fact that full information is readily available.

The fact that the take-up rate increases with the marginal tax rate suggests that these psychological reasons become less important as the tax advantage increases. Controlling for other factors, regular smokers less often took up an ESSP than others, suggesting that for this group, psychological factors are particularly relevant. An interpretation is that smoking behavior is a proxy for carelessness: heavy smokers may care less about financial matters - they also do not care much about their health. Although the data contain a rich set of other variables characterizing attitudes, we could not find convincing evidence supporting this conjecture.

Few of those who did buy ESSPs report that this has induced them to save less in other ways, implying that introducing ESSPs has led to a rise in total savings. Those who did reduce other savings tend to be ESSP participants who had difficulties to make ends meet, again emphasizing the role of liquidity constraints.

The general lesson for the effectiveness of tax policy aimed at increasing savings is mixed. On the one hand, the majority of households use the opportunities that the tax rules offer, inducing them to build up higher

financial wealth. On the other hand, in spite of the user-friendly nature of the arrangement and the obvious tax incentive, a substantial group of inertial households that do not benefit from the arrangements remains. A simple change in the institutional arrangement might rise their take-up rate, such as making participation instead of non-participation the default option, as suggested by Thaler (1994) and in line with the empirical evidence of Madrian and Shea (2001) and Thaler and Benartzi (2004).

The lesson concerning households' portfolio behavior confirms the evidence in the recent literature. Even for a risk-free asset with huge tax advantage such as the ESSP scheme, considerations referred to as "inertial behavior" (Bertaut and Haliassos, 2002) "financial anomalies" (Brav and Heaton, 2001), or "investor psychology" Hirshleifer, 2001) play a role, and constraints alone are insufficient to explain households' choices.

Future research is needed to understand the nature of inertial behavior. In particular, it seems important to know how take-up changes over time. Alessie et al. (2002) have found that the ownership rate of ESSPs has increased considerably between 1994 and 1996. This may be due to the fact that more employers offer ESSPs to their employees. It may also mean that the tendency to take-up an ESSP account increases over time because employees have become more familiar with the ESSPs and their tax-favored nature. Panel data can be used to address this issue. Panel data should also be used for a more detailed analysis on the relation between take-up of ESSPs and substitution with other forms of financial risk free and risky saving, to investigate the extent to which ESSPs have increased total savings.

References

Alessie, R., S. Hochguertel and A. van Soest (2002), "Household portfolios in the Netherlands," in Guiso, L., M. Haliassos and T. Jappelli (eds.), *Household Portfolios*, MIT Press, Cambridge, pp. 340-388.

Barberis, N. and M. Huang (2001), "Mental accounting, loss aversion, and individual stock returns," *Journal of Finance,* 56(4), pp. 1247-1292.

Barsky, R.B., M.S. Kimball, F.T. Juster and M.D. Shapiro (1997), "Preference parameters and behavioral heterogeneity: an experimental approach in the health and retirement survey," *Quarterly Journal of Economics*, 112(2), pp. 537-579.

Bertaut, C.C. and M. Haliassos (1995), "Why do so few hold stocks?" *Economic Journal*, 105, pp. 1110-1129.

Bertaut, C.C. and M. Haliassos (2002), "Debt revolvers for self control," Federal Reserve Board and University of Cyprus, mimeo.

Bikker, J.A. (1994), "Spaarloon: een kunstgreep met grote effecten", *Economische Statistische Berichten*, 79, pp. 1037-1040.

Blundell, R., V. Fry and I. Walker (1988), "Modelling the take-up of means-tested benefits: the case of housing benefits in the United Kingdom," *Economic Journal*, 88 (Supplement: Conference papers), pp. 58-74.

Bovenberg, A.L. and H. ter Rele (1998), "Reforming Dutch capital taxation: An analysis of incentives to save and invest," Research Memorandum No. 142, CPB Netherlands Bureau for Economic Policy Analysis, The Hague.

Brav, A. and J.B. Heaton (2002), "Competing theories of financial anomalies," *Review of Financial Studies*, 15, pp. 575-606.

Brito, D.L. and P.R. Hartley (1995), "Consumer rationality and credit cards," *Journal of Political Economy*, 103, pp. 400-433.

Browning, M, and A. Lusardi (1996), "Household Saving: Micro Theories and Micro Facts," *Journal of Economic Literature*, 34, pp. 1797-1855.

Copeland, C., and J. VanDerhei (2000), "Personal Account Retirement Plans: An Analysis of the Survey of Consumer Finances," Employee Benefit Research Institute, EBRI Issue Brief 223, July 2000.

Deaton, A. S. (1992), *Understanding Consumption*. Clarendon Lectures in Economics. Oxford: Oxford University Press.

Engen, E., W. Gale, and J.K. Scholz (1994), "Do saving incentives work?" *Brookings Papers on Economic Activity*, 1, pp. 85-151.

Fuchs, V., (1982), "Time preferences and health: An exploratory study," in V.R. Fuchs (ed.), *Economic aspects of health*. Chicago: University of Chicago Press, pp. 93-120.

Gale, W. (1999), "The impact of pensions and 401(k) plans on savings: A critical assessment of the state of the literature," Brookings Institution, mimeo.

Gale, W.G. and J.K. Scholz (1994), "IRAs and household saving," *American Economic Review*, 84(5), pp. 1233-1260.

Guiso, L., T. Jappelli and D. Terlizzese (1996), "Income risk, borrowing constraints and portfolio choice," *American Economic Review*, 86, pp. 158-172.

Guiso, L., M. Haliassos and T. Jappelli (2002), *Household Portfolios*, Cambridge: MIT Press.

Heaton, J. and D. Lucas (2000), "Portfolio choice in the presence of background risk," *Economic Journal*, 110, pp. 1-26.

Hirshleifer, D. (2001), "Investor psychology and asset pricing," *Journal of Finance*, 56(4), pp. 1533-1597.

Hochguertel, S. (2003), "Precautionary motives and portfolio decisions," *Journal of Applied Econometrics,* 18, pp. 61–77.

Kahneman, D. and A, Tversky (1979), "Prospect theory: An analysis of decisions under risk. " *Econometrica*, 47, pp. 313-327.

Katona, G. (1975), Psychological economics. New York: Elsevier Scientific Publishing Company.

King, M. and D. Fullerton (1984), *The Taxation of Income from Capital*, Chicago: The University of Chicago Press.

Kusko, A. L., J. M. Poterba, and D. W. Wilcox (1994), "Employee Decisions with respect to 401(k) plans: evidence from individual-level data," NBER Working Paper No. 4635.

Madrian, B.C. and D.F. Shea (2001), The power of suggestion: inertia in 401(K) participation and savings behavior, *Quarterly Journal of Economics*, 116(4), pp. 1149-1188.

Markowitz, H. M. (1952), "Portfolio selection," *Journal of Finance*, 7, pp. 77-91.

Modigliani, F. (1986): "Life Cycle, Individual Thrift, and the Wealth of Nations," *American Economic Review*, pp. 76, 297-313,

Nyhus, E.K. (1996), "The VSB-CentER savings project: Data collection methods, questionnaires and sampling procedures," VSB-CentER Savings Project Progress Report no. 42, Tilburg University.

Nyhus, E. K. (2002), *Psychological Determinants of Household Saving Behaviour*, Doctoral Dissertation, Bergen, Norway: Norwegian School of Economics and Business Administration

Poterba, J.M., S. F. Venti, and D. A. Wise (1995), "Do 401(k) plans crowd-out other private saving?" *Journal of Public Economics*, 58, pp. 1-32.

Scholz, J. K. (2001), "Can Americans Maintain Pre-Retirement Consumption Standards in Retirement?" University of Wisconsin, Madison, mimeo.

Shefrin, H. M., and Thaler, R. H. (1988), "The behavioral life-cycle hypothesis," *Economic Inquiry*, 26, pp. 609-643.

Thaler, R.H. (1994), "Psychology and Savings Policies," *American Economic Review, Papers and Proceedings,* 84 (2), pp. 186-192.

Thaler, R.H. (1999), "Mental accounting matters," *Journal of Behavioral Decision Making,* 12, pp. 183-206.

Thaler, R. H., and S. Benartzi (2004), "Save More Tomorrow: Using Behavioral Economics to Increase Employee Saving," *Journal of Political Economy*, Part 2 Supplement , 112, pp. S164-S187.

Thaler, R. H., and H. M. Shefrin (1981), "An Economic Theory of Self-control," *Journal of Political Economy*, 89, 392-406.

Wärneryd, K.-E, (1999), *The psychology of saving: A study on economic psychology.* Cheltenham, U,K., and Northampton, Mass: Elgar.

Zeckhauser, R., J. Patel and D. Hendricks (1991), "Nonrational actors and financial market behavior," *Theory and Decision*, 31, pp. 257-287.
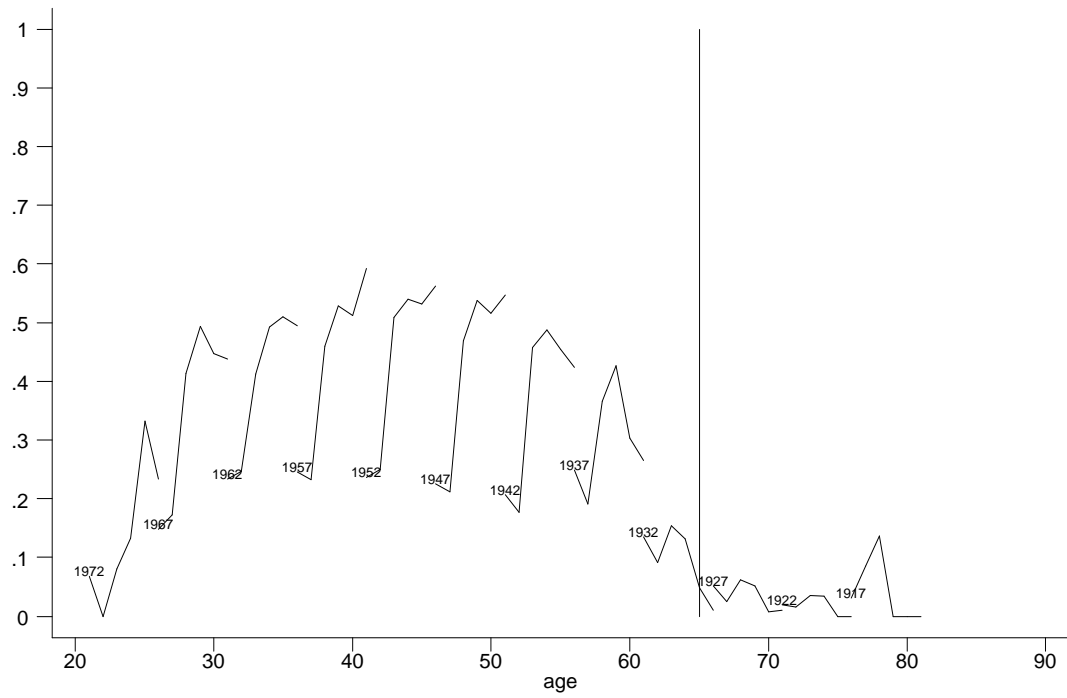
Ownership by Cohort: Spaarloon

Figure 1: the ownership rate of ESSPs by age and cohort
(See text for an explanation of the figure)

Table 1: Determininants of participation: a probit analysis

Parameter	spec. 1	spec. 2	spec. 3	spec. 4
Constant	-2.953	-2.940	-2.780	-2.720
	(3.32)**	(2.79)**	(2.96)**	(2.54)*
financial wealth (hyp. Sine transformation)[19]	0.008	0.005	0.009	0.005
	(2.01)*	(1.05)	(2.01)*	(1.13)
real wealth (hyp. Sine transformation)	0.039	0.038	0.036	0.036
	(3.55)**	(3.37)**	(3.22)**	(3.09)**
Education (ref: low education)	pval=0.03	pval=0.13	pval=0.05	pval=0.14
intermediate and lower vocational	-0.368	-0.361	-0.430	-0.316
	(1.55)	(1.40)	(1.70)	(1.22)
Higher vocational, university education	-0.186	-0.227	-0.261	-0.169
	(0.78)	(0.88)	(1.02)	(0.65)
civil servant	-0.182	-0.180	-0.151	-0.173
	(2.24)*	(2.17)*	(1.78)	(2.03)*
Age/10	0.939	0.857	0.813	0.715
	(2.94)**	(2.38)*	(2.43)*	(1.94)
$(age/10)^2$	-0.113	-0.104	-0.098	-0.087
	(3.10)**	(2.55)*	(2.56)*	(2.10)*
Log(income)	0.136	0.138	0.139	0.130
	(2.51)*	(2.32)*	(2.47)*	(2.15)*
Marginal tax rate (ref: mtr<50%)	pval=0.01	pval=0.04	pval=0.07	pval=0.12
marg tax rate=50%	0.214	0.178	0.175	0.158
	(2.28)*	(1.82)	(1.78)	(1.57)
marg tax rate=60%	0.443	0.390	0.339	0.319
	(2.99)**	(2.54)*	(2.20)*	(2.03)*
Smoking behavior (ref: non-smoker)	pval=0.00	pval=0.00	pval=0.00	pval=0.00
Yes, now and then	-0.388	-0.370	-0.412	-0.369
	(2.81)**	(2.55)*	(2.86)**	(2.50)*
Yes, smoke daily <= 20 cigarettes	-0.306	-0.291	-0.358	-0.323
	(2.82)**	(2.61)**	(3.22)**	(2.85)**
Yes, smoke daily >20 cigarettes	-0.559	-0.560	-0.564	-0.560
	(4.65)**	(4.58)**	(4.54)**	(4.48)**
On average, >=4 alcoholic drinks a day?	-0.168	-0.169	-0.177	-0.144
	(1.14)	(1.12)	(1.15)	(0.93)
How well can you manage on total income of your household? ref: hard/very hard		pval=0.00		pval=0.00
neither hard nor easy		0.007		-0.023
		(0.03)		(0.10)
Easy		0.323		0.305
		(1.49)		(1.36)
very easy		0.297		0.251
		(1.29)		(1.05)
How knowledgeable do you consider yourself wrt financial matters? Ref: not knowl.			pval=0.01	pval=0.02
more or less knowledgeable			0.190	0.189
			(2.07)*	(2.04)*
knowledgeable			0.177	0.157
			(1.53)	(1.33)
very knowledgeable			0.779	0.745
			(3.04)**	(2.86)**
	1415	1368	1320	1301
pseudo R^2	0.09	0.09	0.09	0.09
Log likelihood	-790.96	-755.40	-734.45	-717.36

Absolute value of z-statistics in parentheses
* significant at 5%; ** significant at 1%;
p_values (pval= ...) refer to Wald tests of joint significance of the dummy variables

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[19] Instead of financial and real wealth *x* we used $ln(x+ \sqrt{(x^2+1)})$. This log-type transformation can also accommodate non-positive values.

Table 2: Reasons for non-participation: a multinomial logit analysis (reference group: "other forms of saving")

	liquidity constraints	cost, effort rel. reasons	other reasons	not interested	partner has ESSP
Financial wealth (hyp sine transf)	-0.047	-0.018	-0.012	-0.035	-0.036
	(2.49)*	(0.67)	(0.66)	(1.71)	(1.11)
gender (1= female)	-0.057	-1.177	-0.021	-0.403	2.982
	(0.15)	(2.21)*	(0.06)	(1.01)	(2.72)**
age	p-value	0.020			
linear	-0.195	-0.445	-0.332	-0.107	0.304
	(1.11)	(2.39)*	(2.17)*	(0.57)	(0.76)
quadratic	0.003	0.005	0.004	0.002	-0.004
	(1.26)	(2.44)*	(2.52)*	(0.76)	(0.85)
log (income)	0.151	0.116	0.116	-0.010	0.021
	(0.91)	(0.49)	(0.64)	(0.08)	(0.12)
home	0.474	0.785	0.218	0.199	0.783
	(1.21)	(1.47)	(0.62)	(0.49)	(1.07)
Smoking behavior (ref: non-smoker)	p-value	0.310			
yes, now and then	-1.187	-1.073	-2.706	0.128	0.681
	(1.72)	(1.31)	(2.53)*	(0.24)	(0.80)
yes, daily<= 20 cig	-0.099	0.064	-0.144	0.342	-0.133
	(0.21)	(0.11)	(0.34)	(0.69)	(0.15)
yes, daily> 20 cig	-0.293	-0.357	0.419	0.566	0.921
	(0.56)	(0.50)	(0.99)	(1.11)	(1.15)
How difficult to make ends meet (reference very easy)	p-value	0.300			
Hard	1.788	-0.074	-0.073	0.206	-1.447
	(2.03)*	(0.06)	(0.07)	(0.19)	(1.61)
nether hard nor easy	-0.292	-1.083	-0.372	-0.663	-1.447
	(0.50)	(1.68)	(0.71)	(1.10)	(1.61)
Easy	-0.122	-0.932	-0.115	-0.242	-0.825
	(0.22)	(1.52)	(0.23)	(0.43)	(1.06)
How knowledgeably in finacial matters (ref. not knowledgeable)	p-value	0.300			
more or less knowledgeable	-1.007	-0.096	-0.604	-0.659	-0.784
	(2.61)**	(0.18)	(1.68)	(1.58)	(1.26)
(very) knowledgeable	-0.148	-0.346	0.023	0.092	-0.443
	(0.30)	(0.47)	(0.05)	(0.17)	(0.48)
constant term	1.972	7.620	4.833	1.499	-8.725
	(0.51)	(1.70)	(1.28)	(0.37)	(1.06)
Log likelihood	-525.605				
Number of obs	359				
LR chi2(69)	123.39	p-value	0.000		
Pseudo R2	0.105				

Absolute value of t-statistics in parentheses. * significant at 5%; ** significant at 1%.

Table 3: Probit model for non-substitution

Parameter	Estimate
financial wealth (hyp. Sine transformation)	-0.007
	(1.00)
real wealth (hyp. Sine transformation)	0.031
	(1.69)
Age	0.839
	(1.49)
age2	-0.085
	(1.33)
Log(income)	0.203
	(1.37)
Marginal tax rate (ref: mtr<50%)	
marginal tax rate= 50%	-0.223
	(1.29)
marginal tax rate= 60%	-0.558
	(2.16)*
How difficult to make ends meet (reference very easy)	
hard	0.729
	(2.44)*
nether hard nor easy	0.947
	(3.19)**
easy	0.945
	(2.96)**
head of household	0.297
	(1.52)
female	0.443
	(2.32)*
Constant	-4.565
	(2.21)*

Dependent variable: 1 if ESSPs do not lead to fall in other savings; 0 otherwise. Absolute value of t-statistics in parentheses. * significant at 5%; ** significant at 1%;

Appendix available upon request from the authors

Table 4: Results Heckman type model (continuous equation)

Parameter	estimate	std.error	t-value
Constant	10.589	2.628	4.029
financial wealth (hyp. Sine transformation)	0.009	0.007	1.355
real wealth (hyp. Sine transformation)	-0.062	0.041	-1.507
How well can you manage on the total income of your household? ref: hard/very hard			
neither hard nor easy	0.394	0.299	1.319
easy	0.450	0.335	1.343
very easy	0.402	0.347	1.158
head of household	0.099	0.182	0.543
civil servant	0.136	0.150	0.908
high income sub-panel	0.301	0.151	1.999
Comp. hh (ref single/ without partner)			
living together (married) with partner	0.146	0.194	0.754
other	0.161	0.601	0.268
age/10	-1.083	0.579	-1.872
$(age/10)^2$	0.117	0.067	1.761
log(income)	-0.048	0.142	-0.335
home owner	0.655	0.187	3.510
Marginal tax rate (ref: mtr<50%)			
marg tax rate=50%	0.475	0.165	2.881
marg tax rate=60%	0.550	0.271	2.030
Smoking behavior (ref: non-smoker)			
yes, now and then	-0.429	0.234	-1.835
yes, smoke daily <= 20 cigarettes	-0.121	0.223	-0.540
yes, smoke daily >20 cigarettes	0.062	0.343	0.179
On average, >=4 alcoholic drinks a day?	-0.241	0.256	-0.941
sigma	1.051	0.053	19.731
rho	0.085	1.299	0.065

Management Summary

Research Questions and Methodology

Several countries try to stimulate household savings by introducing special tax-favored savings schemes. Studies in the US, for example, discuss the plans of the US government to introduce new tax-favored savings schemes and to make the tax rules concerning Individual Retirement Accounts (IRAs) more generous, with the aim of stimulating savings for retirement. Knowing how participation in such plans relates to income, wealth and other household characteristics is crucial for understanding the implications for the distribution of savings, wealth, and future income and consumption. Analyzing the reasons for non-take-up is helpful to design the plans in such a way that they will be used by the households they are aimed at.

Since 1994, the Dutch tax system allows for a tax-favored form of risk free savings through employer-sponsored savings plans (ESSPs). Up to some maximum amount, contributions to these plans are tax-deductible, and the returns as well as the withdrawals are tax-free if the asset is held for at least four years. This makes these plans extremely attractive, with real after-tax returns of about 20 percent per year, at least ten times the real return on traditional saving accounts and much higher than the average returns on risky assets such as stocks or mutual funds. The tax-favored nature of the ESSPs is so large that for those who do not face current liquidity problems or expect liquidity problems in the near future, standard economic theory implies that not buying the asset or buying less than the maximum tax-favored amount is clearly sub-optimal. Employers provide their employees with full information on the opportunities and bear the costs of acquiring and holding the ESSPs. Taking up ESSPs does not involve the negative stigma that has been found to reduce take-up of welfare benefits. Not holding ESSPs thus points at serious concerns about liquidity, or at decision-making that is based upon non-economic arguments, such as mental accounting. If reasons for non-take-up of ESSPs can be identified, these reasons will almost certainly also play a role in the take-up decisions of many other financial assets for which tax advantages are less clear, information is not as readily available, and transaction costs are higher.

In this paper we analyze household data on access to and participation in ESSPs. The raw data show that in the initial years, about 80% of all employees had access to ESSPs, but only 67% of those with access actually bought them. About 23% of those who acquired ESSPs spent less than the full tax-favored amount. Less than 15% of the participants reported that participating in ESSPs induced them to reduce their other financial savings.

We focus on employees with access to ESSPs. We analyze their participation decision and the decision how much to invest. Using a rich data set allowing to include conditioning variables that describe attitudes towards savings and time preference, we aim at identifying the reasons for non-participation or holding less than the maximum amount. We also analyze how self-reported reasons for non-take-up relate to household characteristics.

We find that liquidity constraints that are currently binding or are expected to become binding in the near future are an important reason for non-take-up. This is in line with the economic theory on borrowing constraints and with empirical evidence that borrowing constraints are detrimental to portfolio diversification and risk taking. Liquidity constraints alone, however, are not the only explanation for non-take-up or partial take-up. Since employers provide detailed information on ESSPs and take over most of the administrative burden, real take-up costs for employees are quite small. Arguments based on costs of acquiring information or transaction or participation costs will validly explain non-participation if perceived costs exceed real costs. ESSPs are available to the large majority of employees, are widely advertised and offered in a transparent and user-friendly way, and can be chosen such that they have risk-free returns. Thus our results strongly suggest that many households hold assets that are inferior from a mean-variance point of view, confirming recent evidence in the literature on the psychology of savings.

Findings and conclusions

We have analyzed the (non-)take-up of employer sponsored saving plans (ESSPs), an extremely tax-favored form of almost risk-free savings in the Netherlands. Standard economic theory would predict that if such an asset were introduced into consumers' choice sets, its tax-favored nature would incite a take-up rate close to 100% as it is clearly dominating in a mean-variance sense. Yet, about one third of the respondents who had the opportunity to acquire an ESSP in 1995 did not use this opportunity and about one fourth of those who did use it, did not buy the maximum tax-favored amount. We have investigated the determinants of the take-up decision, the amount invested, reported reasons for non-participation, and the decision whether or not to reduce other savings.

We found clear evidence that part of the observed behavior is explained by liquidity constraints: wealthy respondents who find it easy to make ends meet have larger take-up probabilities and tend to invest more. Still, liquidity constraints cannot explain the full non-take-up rate, and only 19% of those who do not take-up an ESSP report liquidity constraints as the main reason.

The remaining reasons for non-take-up or partial take-up suggest sub-optimal portfolio behavior, that can be explained by bounded rationality, mental accounting, self-control and inertial behavior that is well in line with the theory and empirical evidence of the behavioral life cycle hypothesis. Many people appear not to be willing to substitute long-term forms of savings such as life annuities by ESSPs, in line with the argument of imposing self-control. There is evidence of misperception of the costs of participation and underestimation of the tax advantage, in spite of the fact that full information is readily available.

The fact that the take-up rate increases with the marginal tax rate suggests that these psychological reasons become less important as the tax advantage increases. Controlling for other factors, regular smokers less often took up an ESSP than others, suggesting that for this group, psychological factors are particularly relevant. An interpretation is that smoking behavior is a proxy for carelessness: heavy smokers may care less about financial matters - they also do not care much about their health. Although the data contain a rich set of other variables characterizing attitudes, we could not find convincing evidence supporting this conjecture.

Few of those who did buy ESSPs report that this has induced them to save less in other ways, implying that introducing ESSPs has led to a rise in total savings. Those who did reduce other savings tend to be ESSP participants who had difficulties to make ends meet, again emphasizing the role of liquidity constraints.

The general lesson for the effectiveness of tax policy aimed at increasing savings is mixed. On the one hand, the majority of households use the opportunities that the tax rules offer, inducing them to build up higher financial wealth. On the other hand, in spite of the user-friendly nature of the arrangement and the obvious tax incentive, a substantial group of inertial households that do not benefit from the arrangements remains. A simple change in the institutional arrangement might rise their take-up rate, such as making participation instead of non-participation the default option.

The lesson concerning households' portfolio behavior confirms the evidence in the recent literature. Even for a risk-free asset with huge tax advantage such as the ESSP scheme, considerations referred to as "inertial behavior," "financial anomalies," or "investor psychology" play a role, and constraints alone are insufficient to explain households' choices.

Future research is needed to understand the nature of inertial behavior. In particular, it seems important to know how take-up changes over time. In another study, The ownership rate of ESSPs has increased considerably between 1994 and 1996. This may be due to the fact that more employers offer ESSPs to their employees. It may also mean that the tendency to take-up an ESSP account increases over time because employees have become more familiar with the ESSPs and their tax-favored nature. Panel data can be used to address this issue. Panel data should also be used for a more detailed analysis on the relation between take-up of ESSPs and substitution with other forms of financial risk free and risky saving, to investigate the extent to which ESSPs have increased total savings.