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Non-take-up of Tax-Favored Savings Plans: Are Household Portfolios Optimal?[2]

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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. It suggests that those who have access to this type of savings should participate in them, provided they have some financial wealth that they can allocate to their own choice. Moreover, unless liquid financial wealth is too small, each household should hold the maximum amount to which the tax incentives apply. In this paper, we analyze household data on participation in ESSPs. For those who have access to the asset, we investigate the relationship between the ownership decision, the amount held, substitution of other savings, and background characteristics. 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. Regular smokers often do not hold ESSPs, suggesting that some people in this group do not compose their portfolios optimally. The results question the assumption of rational financial decision making, which is typically maintained in theoretical as well as empirical work on savings and portfolio choice.

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1. Introduction

Several countries try to stimulate household savings by introducing special tax-favored savings schemes. Scholz (2001), for example, discusses the current 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, at least ten times the real return on traditional saving accounts, and much higher than the average returns to risky assets such as stocks or mutual funds. The tax-favored nature of the ESSPs is so obvious, that for those who do not face current liquidity problems or expect liquity problems in the near future, 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 carelessness, lack of interest, etc. 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, where 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 who have access to the ESSPs. We analyze the participation decision and the decision how much to invest. Using objective and subjective measures as explanatory variables, we try to identify the reasons for non-participation or holding less than the maximum amount. Moreover, we look at self-reported reasons for non-take-up, and analyze how these relate to household characteristics.

We find that liquidity constraints that are binding currently or are expected to become binding in the near future are an important source of non-take-up. This is in line with 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. For many respondents, other factors play a role. Some of these can be compared to what Haliassos and Bertaut (1995) refer to as inertial factors in their explanation of the stockholding puzzle: lack of information, (e.g. about the tax-favored nature) and costs associated with participation whether real or perceived. Since detailed information on ESSPs is provided by the employers and since the real take-up costs are quite small with the employer doing most of the red tape, this suggests that many households hold assets that are inferior from a mean-variance point of view. In particular, the results point out that non-take-up of ESSPs is common among regular smokers.

The finding that many people do not choose their portfolios according to the rational optimization models confirms recent evidence in the literature. See, for example Thaler (1994) for a discussion of the psychological aspects that distort utility maximizing behavior, and Zeckhauser et al. (1991) who discuss the consequences of the presence of nonrational actors on financial market macro-phenomena. Particularly in the past few years, interest in non-rational behavior in financial markets has increased, since it also has far-reaching implications for modeling asset pricing relations. See, for example, Barberis and Huang (2001), Brav and Heaton (2001), and 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.

There is also some similarity between our finding and the two puzzles that (1) many US households hold expensive (high interest rate) credit card balances while low-interest alternative forms of borrowing are available, and (2) they hold credit card debt although they simultaneously command over sufficient liquid assets to repay the debt. Brito and Hartley (1995) give a rational explanation for the first puzzle based upon transaction costs, viewing the high interest rates as compensation for low cost and low effort liquidity services. Bertaut and Haliassos (2001) explain the second puzzle using a model in which the credit card debt limit is an instrument for self control. The latter might be a reason why people do not replace long run investments such as life annuities by ESSPs which become liquid after four years.

ESSPs are a real life phenomenon, available to the large majority of employees, widely advertized and offered in a transparent and user-friendly way, with fixed returns not depending on behavior of others. This makes the evidence against rational decision making quite salient, since existing explanations do not apply. Thus the puzzle that so many people do not at all or only partially benefit from the tax-favored nature of the ESSPs can only partially be solved in either the classical paradigm of rationality (portfolio theory with liquidity constraints, transaction costs, and costs of time and effort) or psychological arguments.

The remainder of this paper is organized as follows. Section 2 describes the tax-favored nature of the employer sponsored savings plans and the conditions on the withdrawals, which limit their liquidity.

In Section 3, 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 4 presents Probit results for participation in ESSPs conditional on access. It also presents 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 5, the answers to an open question on why non-participants have not taken part in the ESSP scheme are analyzed. Section 6 briefly addresses substitution of other savings. Section 7 concludes.

2. The ESSP scheme

Since January 1994 new and more generous rules apply concerning Employer-sponsored saving plans (ESSPs).[3] 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.[4] The Dutch ESSPs share some features with retirement accounts known elsewhere. For instance, the tax treatment of ESSPs is similar to that of IRAs in the US, but ESSPs are much more liquid. 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).[5][6] Up to Dfl 1,544 per year,[7] contributions are tax-deductible and employees do not pay social insurance premiums over them. If the money is not withdrawn for four years, the withdrawals are not taxed.[8] This makes these plans somewhat less liquid but much more tax-favored than ordinary savings accounts.

To illustrate the differences between tax treatments of various forms of (risk free) savings, we present some results given by Bovenberg and ter Rele (1998). They follow the method of King and Fullerton (1984) and compute the after-tax return s from the pre-tax return r as

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

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 rate at which contributions can be deducted. Bovenberg and ter Rele (1998) use an

[3] ESSPs already existed before 1994 but their tax treatment was less generous.

[4] Bikker (1994) sketches the reasons for introducing ESSPs.

[5] The same thresholds apply to interest income from ordinary saving accounts.

[6] The 1995 dollar-guilder exchange rate was about 1.65 ($ 1= Dfl 1.65).

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

[8] It is allowed to withdraw the money earlier to buy a house or if employment with the employer who has provided the ESSP ends. It is also possible to invest the money in stocks or mutual funds or in an annuity insurance or whole insurance policy.

inflation rate of 2% and a nominal pre-tax return of 6% for each asset they consider. For households with average marginal tax rates (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.[9] On the maximum tax-favored ESSP amount, this implies an annual interest income differential of Dfl 275 between ESSPs and traditional savings for the household with the average marginal tax rate, almost one fifth of the average interest income per household. For high income (high marginal tax rate) households, the ceiling may make ESSPs relatively less important. On the other hand, the after tax rate of return for the rich is about 1.5 times as high, due to their higher marginal tax rates. 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 incurred however by liquidity constrained consumers who need to restructure their portfolios in order to free funds for ESSP.

Only employees of a participating employer have access to ESSPs. Employers do not pay social insurance contributions on the amounts invested in ESSPs, which reduces their wage costs. In spite of this, some small employers do not offer ESSPs, due to the administration costs and since they have to pay 10% tax on the contribution to the ESSP (the employer is not allowed to recover this tax from the employees).

3. 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.

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 many economic-psychological questions to elicit, for example, risk attitudes, time preference, expectations, and interest in financial matters. It also has extensive information on assets and liabilities. About forty asset and liability categories are distinguished. For each of them, respondents answer an ownership question and, if they own the asset/liability, provide details on the assets and the amounts held. There is hardly any non-response in the ownership questions, but there is substantial item non-response on amounts. To arrive at an aggregate measure of household wealth, missing values on

[9] In this calculation it is assumed that employees withdraw their money from the ESSP account after exactly four years (dur=4).

the amounts have been imputed. See Alessie et al. (2001) for details.

The ESSPs ownership rate rose rapidly upon introduction and has remained approximately constant since 1995. Figure 1, taken from Alessie et al. (2001), presents the household ownership rates of ESSPs for each cohort in each of the six available waves (1993-1998).[10] Whether household members are employees or have access to ESSPs or not, is not taken into account. Cohorts are defined using the five year- of- birth bands of the head 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 shows that the ownership rates of ESSPs have a hump-shaped age curve. For the cohorts of working age, there is a steep increase between 1994 and 1996, reflecting the boom in take-up of ESSPs. 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. The method of data collection via on-line terminal sessions, however, provides CentER*data* with great flexibility to launch extra questions. In the autumn of 1995, CentER*data* has fielded a small 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)*

[10] 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.

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%[11]) had access to the ESSP scheme in 1995. The employers of the other respondents did not offer the scheme. In 1995, 1212 out of the 1742 respondents (67%[10]) decided to take-up an ESSP. Of these, 1212 (77%[10]) made the maximum tax free contribution of Dfl. 1580. Given the very tax preferred nature of the ESSP scheme and the rather low annual ceiling, these high percentages could be expected. Still, the numbers indicate that almost 50% of the eligible respondents made no or only partial use of ESSPs. Among the participants, 14%[10] reported that they saved less money through other saving channels due to participation in ESSPs.

4. 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 the employees who have access to ESSP's. The results for various specifications are presented in Table 1. As discussed in the previous section, ESSPs are strongly tax-favored up to a limited amount, with an enormous real after-tax advantage compared to other assets of comparably low risk. Investing in ESSPs gives guaranteed after tax returns that clearly dominate the returns to other financial assets. 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, assuming that they are non-satiated and behave rationally. The results in column 1 suggest that liquidity constraints are indeed an issue: there is a positive relationship between liquid financial wealth[12] and the take-up of ESSPs, which is almost significant at the 5% level. Similarly, significant positive effects of real wealth 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:[13]

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[11] These percentages are weighted with household sample weights to make the survey representative.

[12] 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. 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. 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.

[13] The very few respondents who answered *very hard* are added to the reference group of those who answered *hard*.

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 confirms the evidence on the importance of liquidity constraints.[14]

The age coefficients are jointly significant for all specifications. The estimates imply that the quadratic age function is hump-shaped 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.[15] One of the explanations for non-take-up discussed in the introduction was 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 there was widespread advertising of ESSPs, and that acquiring them required nothing more than filling out a simple form. Employers provided extensive information and took care of the administrative work. On the other hand, formal education is not necessarily a good proxy for financial education. In specifications 3 and 4 we have therefore added three dummy variables based on the following question:[16]

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 estimated effects of education.

In Section 2 it was 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. In any case, the result should be interpreted with caution, since disentangling marginal tax rate and income effects relies on functional form assumptions.

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[14] On the other hand, 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.

[15] We also tried number of children and the respondent's gender. Both were insignificant.

[16] These dummy variables might be endogenous if having en ESSP increases respondents' interest in financial matters. This is why we also present the specifications that do not include them.

Finally, we included variables reflecting smoking and drinking behavior. Our results show that regular smokers significantly less often take-up an ESSP than others. One explanation is that heavy 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)). They may also save less due to the 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 the dummies on how easily the household can make ends meet are included. A third explanation is that heavy smokers do not care much about financial matters - 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).[17] Alcohol use has no significant relation with ESSP take-up, possibly since alcohol use is not measured very well.[18]

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, time preference, risk aversion, and habitual persistence. 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 would not only dominate 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 becomes unemployed (see footnote 7). This implies that precautionary motives should not reduce ESSP take-up either.[19] 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 all those who participate in ESSPs invested the maximum tax-favored amount (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.

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[17] In our sample, 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.

[18] 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.

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

$y^* = x'b + u$

$d^* = z'a + v$

$(u,v| x,z) \sim N(0, V)$ *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.

The model can be estimated by maximum likelihood. The sample is the same as the sample used for the probits in Table 1, only employees with access to ESSPs are included. Results for the participation equation are virtually identical to those in Table 1 and therefore not presented. The results for the amount equation are presented in Table 2. The signs of most of the coefficients are in line with those in the participation equation, but significance levels are lower. Some evidence of liquidity constraints is again provided by the effects of the dummies reflecting how easily respondents can manage with their household income. The dummies are jointly significant at the 5% level. 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.

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. As a consequence, Tobit estimates using participants only and not correcting for selection would give very similar results.

5. Reported reasons for non-participation

Employees who have access to ESSPs but do not participate have answered an open-ended question on their main reason of non-participation. We have divided these open answers into the following six categories; some 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."
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 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 (2001). They also do not buy ESSPs on top of the life insurance products, perhaps due to liquidity constraints. This group also includes about 20 respondents (4% of all non-participants) who claim that they have invested their money in 'better' saving products. Given the strong tax-preferred 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

of." Assuming these people are non-satiated, they do not choose their financial portfolio in the optimal way. 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: people 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 all 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 are no incentives in the tax rules that justify this motivation.

We have investigated the relation between the reason of non take-up and some background variables using a multinomial logit model, conditional on non-take-up.[20] The results are summarized in Table 4. 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. Females have a lower tendency to report cost related reasons. In section 4 we found that smoking is a strong predictor for non-participation. Rather surprisingly, 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.

6. Substitution of other savings

There has been a vivid debate in the United States as to whether tax-favored saving incentives (such as IRAs and Keogh accounts, and 401(k) defined contribution plans) actually stimulated saving or just

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

lead to asset substitution and portfolio reshuffling. See Gale and Scholz (1994) and Engen et al. (1994), for example. In Section 2 we saw that ESSP participants answered a question on whether taking up an ESSP induced them to reduce their other savings. This question allows us to address the issue of substitution directly without the need of a complete model for savings or the need of detailed data on savings with all the measurement problems involved.

An overwhelming majority of ESSP participants, 85.7%, answered this question with *no*. Assuming the answers are correct, these people unambiguously have saved more due to participating in ESSPs. The other 14.3% who reported that they did reduce their other savings may have saved more as well but may also have reduced their total savings or kept them at the same level, depending on the amount by which other savings were reduced.

To investigate what drives participants' decisions to increase their total savings or not, we have estimated some binary probit models. The results for one specification are presented in Table 4.[21] 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*.

The only group of variables which are jointly significant at the 5% level are the dummies that reflect how well respondents can manage with total household income. Those 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 due to buying ESSPs, conditional on their financial situation. They have higher tax advantages and will more often substitute other savings by ESSPs.

7. Summary and conclusions

In this paper we have analyzed the take-up of employer sponsored saving plans (ESSPs), an extremely tax-favored form of almost risk free savings in the Netherlands. We have investigated the determinants of the take-up decision, the amount invested, reported reasons for non-participation, and the decision of participants whether or not to reduce other savings.

About 33% of respondents who had the opportunity to acquire an ESSP in 1995 did not use this opportunity and 23% of those who did use it, did not buy the maximum tax-favored amount. We found clear evidence that part of this 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,

[21] Other variables (education level, home ownership, etc.) were insignificant and not included in the final specification. If more insignificant variables are deleted, results on remaining coefficients do not change much.

that can be explained by inertial behavior that is irrational from a purely economic point of view, such as misperception of the costs of participation, lack of information, or wrong perception of the arrangements and underestimation of the tax advantage, in spite of the fact that full information is readily available. Other psychological factors may also play a role, such as choosing for long-term illiquid life annuities as a form of self-control, or extreme forms of mental accounting, prohibiting people to substitute other types of savings by ESSPs.

The fact that take-up 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. Heavy smokers may care less about financial matters - they also do not care much about their health.

Few of those who did buy ESSPs report that this has induced them to save less in other ways. This suggests 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 uses the opportunities that the tax rules offer, and this induces 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).

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" (Haliassos and Bertaut (1995)), "financial anomalies" (Brav and Heaton (2001)), or "investor psychology" Hirshleifer (2001)) play a role, and preferences 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. (2001) 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.

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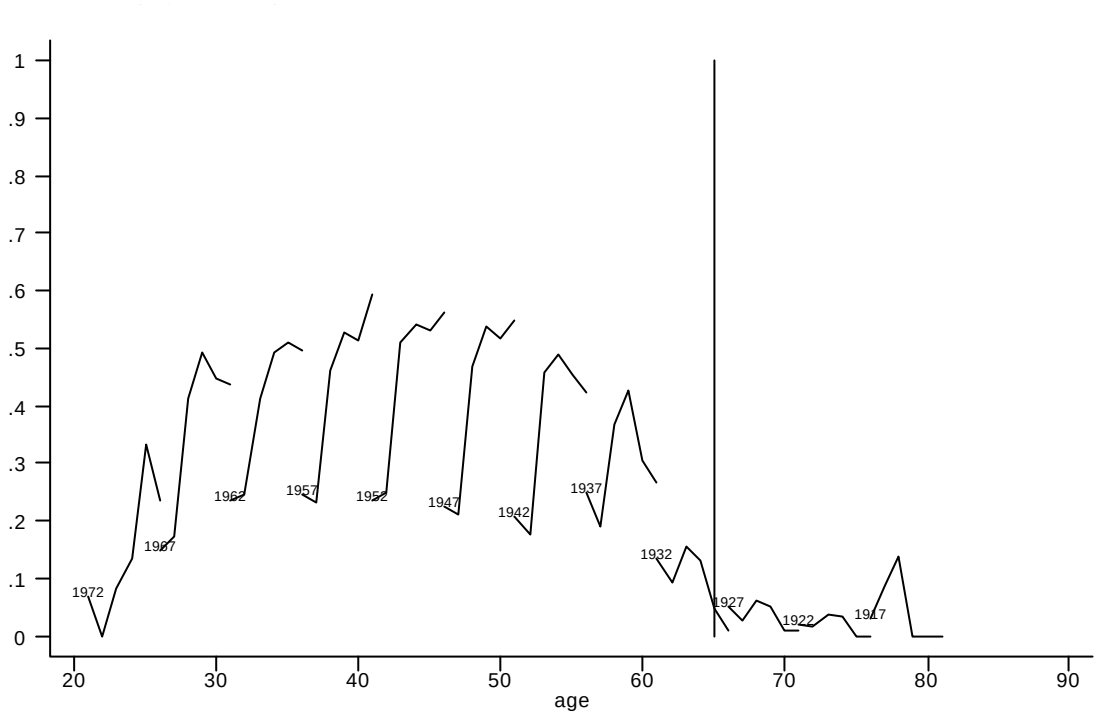

Figure 1: the ownership rate of ESSPs by age and cohort
(See text for an explanation of the figure)

Table 1: Determininants of participation: a probit analysis

Parameter	spec. 1	spec. 2	spec. 3	spec. 4
Constant	-2.701	-2.682	-2.537	-2.410
	(3.03)**	(2.55)*	(2.69)**	(2.26)*
financial wealth (hyp. Sine transformation)	0.008	0.004	0.008	0.004
	(1.90)	(0.90)	(1.87)	(0.98)
real wealth (hyp. Sine transformation)	0.030	0.029	0.027	0.026
	(2.28)*	(2.16)*	(2.01)*	(1.89)
Education (ref: low education)	pval=0.07	pval=0.19	pval=0.08	pval=0.22
intermediate and lower vocational	-0.364	-0.344	-0.426	-0.301
	(1.53)	(1.34)	(1.69)	(1.16)
Higher vocational, university education	-0.201	-0.224	-0.281	-0.175
	(0.84)	(0.86)	(1.10)	(0.67)
head of household	0.156	0.176	0.125	0.174
	(1.58)	(1.70)	(1.20)	(1.61)
civil servant	-0.165	-0.164	-0.135	-0.155
	(2.02)*	(1.97)*	(1.59)	(1.81)
high income sub-panel	0.090	0.042	0.113	0.078
	(0.97)	(0.44)	(1.18)	(0.80)
Comp. hh (ref single/ without partner)	pval=0.33	pval=0.22	pval=0.44	pval=0.26
living together (married) with partner	0.138	0.141	0.114	0.137
	(1.15)	(1.11)	(0.91)	(1.05)
other	0.429	0.590	0.393	0.564
	(1.28)	(1.63)	(1.15)	(1.53)
age/10	0.838	0.781	0.703	0.604
	(2.60)**	(2.15)*	(2.08)*	(1.62)
$(age/10)^2$	-0.102	-0.095	-0.085	-0.075
	(2.77)**	(2.32)*	(2.22)*	(1.79)
log(income)	0.114	0.107	0.122	0.102
	(2.09)*	(1.79)	(2.15)*	(1.70)
home owner	0.107	0.120	0.114	0.137
	(1.01)	(1.10)	(1.03)	(1.22)
Marginal tax rate (ref: mtr<50%)	pval=0.08	pval=0.18	pval=0.30	pval=0.41
marg tax rate=50%	0.177	0.140	0.143	0.118
	(1.81)	(1.38)	(1.38)	(1.12)
marg tax rate=60%	0.337	0.299	0.236	0.214
	(2.12)*	(1.82)	(1.42)	(1.26)
Smoking behavior (ref: non-smoker)	pval=0.00	pval=0.00	pval=0.00	pval=0.00
yes, now and then	-0.378	-0.369	-0.399	-0.364
	(2.73)**	(2.54)*	(2.76)**	(2.46)*
yes, smoke daily <= 20 cigarettes	-0.290	-0.276	-0.337	-0.305
	(2.65)**	(2.45)*	(3.00)**	(2.66)**
yes, smoke daily >20 cigarettes	-0.544	-0.547	-0.544	-0.540
	(4.49)**	(4.43)**	(4.34)**	(4.28)**
On average, >=4 alcoholic drinks a day?	-0.154	-0.158	-0.166	-0.135
	(1.04)	(1.04)	(1.07)	(0.86)
How well can you manage on total income of your household? ref: hard/very		pval=0.00		pval=0.00
neither hard nor easy		-0.001		-0.032
		(0.00)		(0.14)
easy		0.336		0.312
		(1.54)		(1.38)
very easy		0.325		0.271
		(1.39)		(1.12)
How knowledgeable do you consider yourself wrt financial matters? Ref: not			pval=0.01	pval=0.02
			0.190	0.183
more or less knowledgeable			(2.06)*	(1.96)
			0.163	0.133
knowledgeable			(1.39)	(1.13)
			0.774	0.737
very knowledgeable			(3.01)**	(2.82)**
	1415	1368	1320	1301
pseudo R^2	0.09	0.09	0.09	0.10
Log likelihood	-787.95	-752.09	-731.89	-714.05

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

Table 2: 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

Table 3: Reasons for non-participation: a multinomial logit analysis (reference group: “other forms of saving”)

	liq. Constraints		**cost, effort rel reason**		**other reasons**		**not interested**		**partner has ESSP**	
	estimate	t-value	estimate	t-value	estimate	t-value	estimate	t-value	estimate	t-value
financial wealth (hyp sine transf)	-0.047	-2.49	-0.018	-0.67	-0.012	-0.66	-0.035	-1.71	-0.036	-1.11
gender (1= female)	-0.057	-0.15	-1.177	-2.21	-0.021	-0.06	-0.403	-1.01	2.982	2.72
				pvalue	0.020					
age	-0.195	-1.11	-0.445	-2.39	-0.332	-2.17	-0.107	-0.57	0.304	0.76
age2	0.003	1.26	0.005	2.44	0.004	2.52	0.002	0.76	-0.004	-0.85
log (income)	0.151	0.91	0.116	0.49	0.116	0.64	-0.010	-0.08	0.021	0.12
home	0.474	1.21	0.785	1.47	0.218	0.62	0.199	0.49	0.783	1.07
Smoking behavior (ref: non-smoker)				pvalue	0.31					
yes, now and then	-1.187	-1.72	-1.073	-1.31	-2.706	-2.53	0.128	0.24	0.681	0.8
yes, daily<= 20 cig	-0.099	-0.21	0.064	0.11	-0.144	-0.34	0.342	0.69	-0.133	-0.15
yes, daily> 20 cig	-0.293	-0.56	-0.357	-0.5	0.419	0.99	0.566	1.11	0.921	1.15
How difficult to make ends meet (reference very easy)				pvalue	0.300					
hard	1.788	2.03	-0.074	-0.06	-0.073	-0.07	0.206	0.19	-1.447	-1.61
nether hard nor easy	-0.292	-0.5	-1.083	-1.68	-0.372	-0.71	-0.663	-1.1	-1.447	-1.61
easy	-0.122	-0.22	-0.932	-1.52	-0.115	-0.23	-0.242	-0.43	-0.825	-1.06
How knowledgeably in finacial matters (ref. Not knowledgeable)				pvalue	0.300					
more or less knowledgeable	-1.007	-2.61	-0.096	-0.18	-0.604	-1.68	-0.659	-1.58	-0.784	-1.26
(very) knowledgeable	-0.148	-0.3	-0.346	-0.47	0.023	0.05	0.092	0.17	-0.443	-0.48
constant term	1.972	0.51	7.620	1.7	4.833	1.28	1.499	0.37	-8.725	-1.06

Log likelihood = -525.605

Number of obs = 359

LR $P^2(69)$ = 123.39 (p-value=0.000)

Pseudo R2 = 0.105

Table 4: Probit model for non-substitution

Parameter	**Estimate**	**t-value**
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