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ABSTRACT

The Saving Behaviour of Two Person Households: Evidence from Dutch Panel Data^{*}

As wives generally are younger than their husbands, and as they also have a higher life expectancy, wives generally have larger incentives to save for old age than their husbands. This paper analyses the household members' attitudes towards saving for old age, and the relation with the household saving and portfolio choice behaviour. Based on a panel of two-person households (e.g. with a husband and a wife) from the Dutch CentER Savings Survey, we find that wives find saving for old age more important than their husbands. In a special high-income subsample we find that for this group the household members find saving for old age equally important. The major determinant of both household members' attitudes is the husband's mandatory pension rights. Both household members' attitude relate to the probability of holding annuity and endowment insurances, while only the husband's attitude relates to the probability of holding stocks. Concerning discretionary household wealth we find evidence for an impact of the husband's attitude, but no evidence for an impact of the wife's attitude.

JEL Classification: C33, C35, D19, D91

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1. Introduction

As wives generally are younger than their husbands, and as they also have a higher life expectancy, wives generally have larger incentives to save for old age than their husbands. For instance, using 1991-1995 Dutch life tables and assuming that mortality probabilities within households are independent, simple calculations reveal that for a couple with the husband being 40 years old, and the woman being 2 years younger, the expected years to go for the husband after retirement at age 65 is 10.1 years, and for the wife 17.6 years. Increasing the difference in age between husband and wife by one year increases the gap in expected years to go by a bit less than one year. Furthermore, making both partners 10 years younger or older hardly changes the result, as mortality rates on these ages are low. Browning (2000) draws similar conclusions using 1986 Canadian life tables. The calculations mean that at the retirement of the husband many wives will have substantially more years to go than their husbands, which makes savings for old age more important to them than to their husbands.

Although there are clear reasons for differences with respect to preferences on saving for old age within households, it is an entirely open question how these differences affect household saving and portfolio choice behaviour. Does the husband determine the household saving behaviour? And if so, does he take certain characteristics of his wife into account, in particular her age? Or does the wife determine the household saving behaviour? Or can she gain influence over the household's savings decisions by having her own income? Besides detailed information on the household members' individual characteristics and on household wealth, the CentER Savings Survey also contains information on the household members' attitudes towards saving for old age. By using these data we will analyse these attitudes, and we will analyse their impact on household saving and portfolio choice behaviour.

Like most OECD-countries, the Netherlands has an extensive social security and mandatory pension system. And although the size of the impact of such a system on discretionary household savings is still an open question, it is conceivable that it at least partly offsets the savings for old age. For the Netherlands this is relevant: The Dutch National Accounts show that the mandatory savings (within the mandatory pension system) outweigh discretionary household saving by far, see for instance Alessie *et al.* (1997). We will take this aspect into account by studying the mandatory pension rights collected by the household members. An

important note has to be made here: the CentER Savings Survey measures the household member's attitudes towards saving for old age conditional on the mandatory pension rights. That means that we will analyse the household member's attitudes and the household portfolio choice and saving behaviour conditional on the collected mandatory pension rights.

The choice to analyse the household saving and portfolio choice behaviour *conditional* on the collected mandatory pension rights is not obvious. The problems on the measurement of the impact of mandatory pensions on saving behaviour are known in the literature (e.g. Gale (1995), Alessie *et al.* (1997)): Households with a high preference for consumption after retirement (or, for instance, with a high life expectancy) have an incentive to collect both substantial amounts of discretionary and pension wealth. For men this effect might not be so important given their inelastic labour supply and their high proportion in early retirement and disability schemes (where the collection of mandatory pension rights continues!). But for women the importance of the issue might be substantial, given their wide observed variation in employment and income. Unfortunately it is difficult to take the endogeneity of the women's employment decisions into account in our empirical analysis. We recognise that we take out part of the action by conditioning on the collected mandatory pension rights (and on employment and income), but we think our analysis still provides interesting insights on the importance of within-household differences in preferences with respect to saving for old age.

The remainder of the paper is organized as follows. Section 2 discusses the literature on household saving and portfolio choice behaviour, with a particular interest in intra-household behaviour. Section 3 describes the Dutch social security and mandatory pension system, which is important for the interpretation of the empirical analysis. Section 4 discusses the mandatory pension rights collected by the household members in the CentER Savings Survey. Section 5 analyses the household members' attitudes towards saving for old age, and the role of the mandatory pension rights. Sections 6 and 7 analyse the portfolio choice and wealth position of the households, and the role of the household member's attitudes. Section 8 concludes.

2. Literature

The economic literature on household saving and portfolio choice behaviour is largely based on the traditional approach of modelling households as though they were single individuals,

the notable exception being Browning (2000). The complexity of the intertemporal aspect of saving and portfolio choice behaviour makes the incorporation of recently developed collective models of household behaviour to a difficult task. This section discusses the recent developments in the literature, and draws some insights. Another part of the literature that considers intra-household issues in household saving and portfolio choice behaviour is the economic psychology literature. This section discusses also some of their insights.

The theory of collective models of household behaviour originates from the beginning of the 1980s (e.g. Manser and Brown (1980), Apps (1981), Ashworth and Ulph (1981), and McElroy and Horney (1981)). These models describe household behaviour by a collective decision process between household members that have their own preferences. As many empirical studies have rejected the traditional household models that describe household behaviour by the maximisation of a unique utility function (e.g. Schultz (1990), Thomas (1990), and Bourguignon *et al.* (1993)), it is conceivable that intra-household issues are important for the determination of household behaviour.

So far almost all developed collective models are conditional on savings and on expenditures on public goods. A notable exception is Browning (2000), who successfully analyses the saving and portfolio choice behaviour of two-person households. An important prediction from his theoretical model is that the household saving behaviour depends on the distribution of income within the household. In case of an 'intermediate' income of the wife her part in total household income matters for household saving. Below a certain income level of the wife, the husband will set the household savings at his preferred level, and above another certain income level, the wife will set the household savings at her preferred level. Another result is that the husband's and wife's income have different impacts on the household portfolio choice; husbands will invest annuities (without survival benefits, in the model the individuals are selfish), and wives will invest in insurances and private savings.

In the empirical literature on household portfolio choice and saving behaviour the intra-household aspect is mostly ignored. This is probably due to the fact that some of the main underlying sources of differences in savings propensities between different household members are unobservable (like differences in expectations, mortality probabilities, or time-preferences). So the proposition in Chiaporri (1992) that if one is ready to believe in collective

household models, there is much to be learned about *internal* rules and allocation processes of the household from the sole observation of its *external* behaviour might be over-ambitious. Identification of collective models is a severe problem. Therefore Kapteyn and Kooreman (1992) conclude that for a truly powerful test of the collective models one needs data that goes beyond what is typically available for empirical research. They state that one clearly needs to know more about the household members' preferences, and they advice to use subjective questions to elicit the utility functions of the household members.

In contrast to the (mainstream) economic literature, the economic psychology literature often deduces internal household rules by collecting data on the opinions and attitudes of the different household members. For instance, Meier, Kirchler and Hubert (1999) collect data of 142 Austrian couples on partnership characteristics and spouses' dominance on financial decision-making. The detail of such data is beyond the scope and interest of our study, but we can draw some interesting insights from studies using such data. For instance, Meier, Kirchler and Hubert (1999) conclude that decisions on life insurances, bonds, and shares are husband-dominated areas. And Kirchler (1993) finds that more egalitarian households do not necessarily have more joint decision-making, but instead have more autonomic decision-making. This means that in our study we should not necessarily find an impact of both partners' attitudes on all aspects of the household saving and portfolio choice behaviour. Furthermore, several economic psychology studies confirm the 'relative resource contribution theory' of Blood and Wolf (1960), which implies that a higher input in the financial household resources by a certain household member results in more dominance for that household member in the decision making. This theory is also confirmed by several economic studies, like Thomas (1990), Browning *et al.* (1994), and Browning (1995).

3. The Dutch Mandatory Pension System

This section discusses the Dutch mandatory pension system, as the functioning of this system is important for the interpretation of the empirical results. The Dutch mandatory pension system consists of two parts: a public (social security) part and a private occupation-specific part. In this study we concentrate on the impact of the private part. The reason is that in this part there is a substantial heterogeneity in the pension rights due to differences in individual

labour histories. We describe this part in more detail further below. The public part is of less interest for our study, as we will explain first.

The public part of the mandatory pension system is a pay-as-you-go system that guarantees a minimum income to Dutch inhabitants over age 64. As this minimum income only varies over a limited number of household characteristics, like family composition and the employment of the household members that are not over 65, the public system hardly leads to heterogeneity in pension rights. The benefit level for the public pension is low; for a couple with no other labour income the net benefit level is equal to the net minimum income. In Dutch poverty studies households that have a public pension as their only source of income are mostly classified as being poor. This makes clear that the collection of additional pension rights and/or additional discretionary savings are important.

The private part of the mandatory pension system is capital-funded. It is supplementary to the public part and consists of several occupation-specific pension schemes. The *Witte Vlekken op Pensioengebied* (the ‘Uncovered Areas of the Occupational Pensions’, 1997, Table 4.1) shows that about 91 percent of dependent employees aged between 25 and 65 are covered by an occupational pension scheme. The rules of pension schemes are partly given by law and partly negotiated by collective bargaining at the sector or firm level, the so-called CAOs. Although each sector or large firm has its own pension scheme, they are not so different in practice. The *Pensioenkaart van Nederland* (the ‘Pension map of the Netherlands’, 1987, Table 3.2) shows that of the non-civil servant male participants of a pension fund aged 16 to 64 more than 99 percent have a pension of the defined benefit type. About 75 percent of these pensions are defined on the basis of final pay, the remainder being a mix of fixed amounts and average or final pay. Civil servants are covered by their own pension fund, which gives pensions of the defined benefit type. The numbers are applicable to our sample period as there have been no major changes in the pension system in the last decades. For instance, the *Pensioenmonitor, stand van zaken 1 januari 1998* (the ‘Pension Monitor, January 1, 1998’, page 15) shows that the numbers still hold for 1997.

So summarising the occupation specific pension system: for most pension funds the size of the pension depends on the number of contributed years and on final or average pay. Taking into account social security, the aspiration level of most of the pension funds is a before-tax

replacement rate of 70 percent for participants who collected the maximum number of 40 contributed years. Due to incomplete careers and certain rigidities in the occupational pension system only few workers reach the maximum number of contributed years. This leads to lower replacement rates for certain workers. Furthermore the mandatory pension system offers reasonable survivor pensions: a widow(-er) generally receives 70 percent of the gross pension rights of the partner.

4. Employment and Pension Rights

The data for this study are drawn from the CentER Savings Survey, which contains about 2900 households in 1994, and which is divided in two panels. The first panel is designed to be representative for the Dutch population. It contains about 2000 households in each wave, and refreshment samples are drawn each year to correct for panel attrition. The second panel is drawn from high-income areas and is designed to represent the upper-income-decile of households in the Netherlands in 1993. Initially it consisted of about 900 households.

For this study we use data for the years 1994 to 1997. We select households in which there is a husband and a wife present, where the husband is between 30 and 64 years old, and where both the husband and the wife are not self-employed. We assume that the saving and portfolio choice behaviour of the husband and wife is not affected by the presence of other adults in the household, like (grant-)parents and adult children. Furthermore, we include both married and cohabiting couples in the data, as in the Netherlands the legal rights of cohabiting couples are very much the same as for married couples (the major differences relate to the presence of children). In total we have data on 858 households in the representative panel, and on 469 households in the high-income panel. The time dimension of the data is reasonably large: in the representative panel 231 households are observed in at least three years, while in the high-income panel 151 households are observed for at least three waves. For details on the retrieval of the data, see appendix A.

In this section we are interested in the pension rights collected by the different household members. The main observed variable on the individual pension rights in the CentER Savings Survey is the number of contributed years. Although also wage income is an important determinant of the pension rights, the wage obviously also has a direct impact on savings and

portfolio choice behaviour. In this study we restrict the analysis to the number of contributed years, and we do not make an effort to calculate the exact pension rights.² Table 1 shows some employment and pension right characteristics by the age of the husband. For the husbands the numbers are straightforward. The employment rates decline strongly by age, which is a known fact for the Netherlands. But irrespective of this decline, for all ages is the fraction of husbands with pension rights high, and also the number of contributed years is substantial. The numbers for the wives are very different: in the representative panel the fraction of wives who never had a job is large for older couples. This observation is consistent with the sharp increase in the female labour force participation in the last decades, which was mostly due to the larger labour force participation of young women. Other interesting explanations (that unfortunately we cannot test for) are first, that the older women forget to report previous employment, and second, that women who do not work have a smaller probability to become divorced (which would lead to sample selection). In the high-income panel the employment rates of the wives are substantially larger, but that is obvious as that makes a household to a high-income household. The most remarkable observation from the table is that the fraction of women with pension rights is very low for older groups, and we will come back to this observation later. Less remarkable is the observation that for the women who have pension rights the number of contributed years is substantially lower than for the husbands.

[Tables 1,2,3 about here]

Another important aspect of the occupational pension system is that the size of a pension is proportional to the working hours. In other words, a contributed year with part-time work has less value as a contributed year with fulltime work. As many women and a reasonable number of men work part-time, this is important. Table 2 shows that in our sample of two-person households, relatively few men work 32 or fewer hours per week: about 7% in both panels. For women working 1 to 16 hours per week the fraction having pension rights is low, and an explanation is that this mainly concerns marginal employment. But the relative small fraction of full-time employed women with pension rights is exceptional, and relates to the same observation for older women in Table 1.

² The calculation of the pension rights is burdensome and needs numerous assumptions, see Alessie *et. al* (1999) and Euwals (2000).

As described before, in Table 1 we observed that a substantial fraction of older women who has or had a job reports zero contributed years, while Table 2 showed that also a substantial fraction of women who works or worked fulltime report zero contributed years. To get a clearer picture on this observation Table 3 presents the fraction of women that have pension rights by employment status. Then it becomes clear that especially on the previously employed women we get low pension fund participation figures. A detailed look at this subgroup shows that the women who have no pension rights are relatively old, with an average age of about 49, and stopped working at a relatively young age, at an average age of about 25. For the previously employed women who report to have pension rights these numbers are: current average age 44 and stopped working at average age 31. As it is unlikely that for the previously employed women so many have no pension rights, it seems probable that many forgot about their pension rights. But the approximation of zero pension rights might still not be that bad as they stopped working at a young age. In other words, the pension rights of these women are likely to be small anyway.

[Table 4 about here]

An aspect of the collected pension rights of a household that is hard to illustrate by cross-tabulation is the household interaction effect: is there a trade-off between the husband's and the wife's pension rights? Or in other words: are low pension rights of the one household member compensated by high pension rights of the other household member. Table 4 shows the estimation results for the relation between the husband's and the wife's contributed pension years, where we correct for individual characteristics like age, education, and interactions of age and education to take into account that individuals with a higher education might start working later, and therefore might have different pension right profiles. We only find a significantly different profile for men with a medium level vocational education, which is a remarkable result as it implies that the profiles for lowly and highly educated are not significantly different. But the main result is that in the representative panel we find a negative relation between the husband's and the wife's contributed years, while for the high-income panel we find no evidence for such a relation. By this analysis we do *not* want to stress a causal relation between the husband's and wife's contributed years. An alternative and more reasonable interpretation is that a decision process where husband and wife determine their labour supply and collection of pension rights jointly leads to the negative correlation between

the husband's and wife's pension rights. Note that the size of the relation is small: one contributed year less for the husband is compensated by 0.11 contributed year of the wife. So although we find a statistically significant relation between the husband's and the wife's pension rights, the economic relevance of this relation is likely to be low.

5. Attitudes towards Saving for Old Age

The CentER Savings Survey contains rich information on attitudes and perceptions with respect to savings. Among this information, there is a list of questions on 13 different motives on why individuals might save. In this study we focus on motives with respect to savings for old age. Respondents are asked the following question:

We would like to ask you some questions on your personal opinion about savings. People have many different reasons for saving money for a short or for a long time. Please indicate your opinion about each statement mentioned on the screen below. Is it to you personally of much or little importance?

Question: To supplement my retirement pension, and to have some extra money when I am retired. Possible answers: a scale from 1 (very unimportant) to 7 (very important).

[Table 5 about here]

Table 5 shows the results of this question for both partners. The fraction of missing values is higher for women than for men, and is substantially higher in the representative panel than in the high-income panel. Considering couples with no missing values, it turns out that in the representative panel women find savings for old age more important than men: Table 4 shows that at least two formal tests reject the null hypothesis that partners find savings for old age equally important. In the high-income panel, it turns out that on average men find savings for old age more important than women. But the null hypothesis that the partners find savings for old age equally important is accepted by both tests.

Next we analyse the determinants of the household members' attitudes towards savings for old age. We apply an ordered probit model, in which we explain the husband's and the wife's

attitudes with the family, the husband's and the wife's characteristics, the net labour and social security income (but not income from assets), and the number of contributed years. Among the individual characteristics we include age, education, and interactions of age and education to take into account that respondents with a higher education might start working later, and therefore might have different age profiles. We estimate this two-equation discrete choice random effects model with simulated maximum likelihood by applying the Geweke-Hajivassiliou-Keane simulator, see for instance Börsch-Supan and Hajivassiliou (1993).

[Table 6.A and 6.B about here]

Tables 6.A and 6.B present the estimation results for the representative and the high-income panel respectively. The fact that the partner's attitudes are not affected by having a marital contract or cohabiting is surprising, as in case of a marital contract or cohabiting the partners can rely less on each other's earnings capacity, wealth and pension rights. In the representative panel, men with a intermediate education find saving for old age less important, although this impact gets smaller by increasing age. Other results on age and education are insignificant for both men and women. The fact that the wife has an own income matters for the husband, but the impact in the two panels is opposite. In the high-income panel, husbands with a wife who has an own income find saving for old age less important, but this impact is offset by a high income of the wife (of at least 100,000 Dfl. per year). Our main interest is in the impact of the collected pension years, as these are a measure for the pension rights. The husband's pension rights have a clear significantly negative impact on the husband's attitude towards savings for old age. The impact on the wife's attitude is insignificant at conventional significance levels, but at least the impact is clearly negative in both panels. The two parameters would be jointly significant at a 10 percent significance level. The impact of the wife's pension rights is positive, but highly insignificant. So overall we find clear evidence for an impact of the husband's pension rights on the husband's attitude, and weak evidence for an impact of the husband's pension rights on the wife's attitude.

6. Household Portfolio Choice

In this section we analyse whether, and more specifically which partner's attitudes affect the household portfolio choice. As the CentER Savings Survey contains individual asset holdings

of 38 different assets, we decide to aggregate the assets in a few groups. Table 7 shows the definitions of the groups, and the ownership rates observed in the data. We aggregate bonds and savings certificates, as both are illiquid investments. The annuities concern long-term contractual savings for which at the end of the contract can be chosen between a lump sum payout and an annuity. Note that the insurances do not include classical life insurances (e.g. insurances against the mortality risk of the partner). In the Netherlands investment in own housing is attractive due to substantial tax-advantages, which results in high home ownership rates for high-income households. More specific details on household portfolio choice in the Netherlands can be found in Alessie *et al.* (2001). In this study we are mainly interested in the impact of the household member's concerns about saving for old age on the household portfolio choice.

[Tables 7, 8.A and 8.B about here]

In this section we test for the impact of the attitudes towards saving for old age on the household portfolio choice, corrected for the family, husband's and wife's characteristics. Among the individual characteristics we include age, education, and interactions of age and education to take into account that respondents with a higher education might start working later, and therefore might have different age profiles. We estimate a multivariate random effects probit model with simulated maximum likelihood by applying the Geweke-Hajivassiliou-Keane simulator, see for instance Börsch-Supan and Hajivassiliou (1993). Tables 8.A and 8.B show the estimation results for four assets: saving accounts, bonds, insurances, and stocks. The asset categories real estate and own housing are excluded from the analysis as the results for these categories turn out to be unreliable.

Tables 8.A and 8.B show that the parameter estimates on the number of children are generally negative, but mostly insignificant. The only clear significant result is for the insurances in the representative panel: couples with more children have a lower probability to have insurance. The legal form of the partnership does not have a significant impact on the portfolio; both the dummies for marital contracts and cohabiting are insignificant. In the representative panel the age and education level of the partners are generally insignificant. In the high-income panel highly educated husbands have a significantly decreasing age profile for savings accounts and bonds. A clear economic interpretation is not easy to find, as one should also not forget that

age patterns in the high-income panel might be caused by selection due to the high-income criterion. The income of the husband always has a positive impact on having certain assets (with one exception: stocks in the high-income panel), but the impact is mostly insignificant. The impact of the wife's income is mostly insignificant.

The main interest of this part of the analysis is the impact of the attitudes towards saving for old age. And there we get some clear results! In both the representative and the high-income panel we find that both the husband's and the wife's attitudes matter for the probability of having an insurance. And in both the representative and the high-income panel we find that the husband's attitude matters for the probability of having stocks.

As discussed in section 2 the relative resource contribution theory claims that the proportion of the member's income in total household income determines the influence of a household member over the household's decisions. We test this theory by weighting the attitudes by the fraction of the household income that is earned by the particular household member. Table 9 shows that the weighted attitude, that is included instead of the unweighted attitude, gives significant results for the same assets. Testing for the impact of the weighted attitude against the impact of the unweighted attitude by including both in the analysis gives inconclusive results: some parameter estimates get the wrong sign, and they are mostly insignificant. Probably the two different measures for the attitude are too strongly correlated to give the test any statistical power (the results are not presented in the table). Weighting by education or age gives more or less the same results: the attitude of both the husband and the wife matter for insurances, and the husband's attitude matters for stocks. So on the basis of these results the relative resource contribution theory cannot be rejected, but on the other hand alternative explanations cannot be excluded.

7. Discretionary Household Wealth

The final part of the empirical analysis concerns the impact of the household member's attitude towards saving for old age on the total amount of discretionary household wealth. The reason why we analyse discretionary household wealth separately from the portfolio choice problem is that a joint model for (1) having a certain asset and (2) the total investment in that asset in case the household does have that particular asset is complicated and burdensome.

In this section we calculate discretionary household wealth by aggregating the monetary value of the assets observed in the CentER Savings Survey, see appendix B for details. In Table 10 we aggregated the different assets in a few groups of assets, and compared to Table 7 we now also take loans into account. In both the representative and the high-income panel it is clear that for Dutch households their own house is their main investment. The second most-important investment turns out to be the simple saving accounts; in the representative panel they outweigh the other assets in every year. And although in the previous section we found that insurances are a preferred investment for both husbands and wives who care about saving for old age, Table 10 shows that the financial importance of insurances is moderate: in the representative panel their financial size turns out to be comparable to the stocks, and in the high-income panel the investment in stocks is even clearly larger.

In the following we test for the impact of the husband's and the wife's attitude towards saving for old age on discretionary household wealth, corrected for the family, husband's and wife's characteristics. Among the individual characteristics we include age, education, and interactions of age and education to take into account that respondents with a higher education might start working later, and therefore might have different age profiles. Table 11 reports the estimation results. Although the sign of the parameters for children are negative, the impact is insignificant. For having a marital contract we get a significant positive impact in the high-income panel, which might be explained by the fact that partners with a substantial amount of discretionary wealth might insist on having a marital contract. For the first and only time in this study we get a significant different age-profile for highly educated, in the representative panel the medium and highly educated men catch up with the lowly educated men at age 37 and 32 respectively. The income of the husband has a strong significant impact on discretionary household wealth. In the high-income panel the dummy for the wife having her own income has a significantly negative impact, which seems also surprising. On the other hand this concerns a sample of high-income households, which implies that in case the women has no own income the income of the husband must be substantial. The result of interest is the impact of the partner's attitudes: In the representative panel we find that the husband's attitude has a significant positive impact on discretionary household wealth, while in the high-income panel the attitude of the husband does not seem to matter. The attitude of the wife is insignificant in both panels.

Like in the previous section we test the relative resource contribution theory by weighting the attitude by income, and also by education and age. We get results similar to the previous section, as there is no difference in the results for the unweighted and the weighted attitudes. And again testing for the impact of the weighted attitude against the impact of the weighted attitude by including them both in the analysis gives inconclusive results.

8. Conclusions

This study analyses the household behaviour of two-person households, e.g. of households with at least a husband and a wife. We are interested in the household members' attitudes towards saving for old age, and the relation between these household members' attitudes and the household saving and portfolio choice behaviour. We are additionally interested in the mandatory pension rights collected by the household members, as these pension rights are likely to influence the household members' attitudes towards saving for old age. We base our study on a panel of households from the Dutch CentER Savings Survey. This survey is particularly suitable for this study as it contains information on the attitudes of the household members towards saving. And it also contains rich information on the household members' income, wealth and mandatory pension rights. From the CentER Savings Survey we select households with a husband and a wife (and with potentially children and other adults present in the household), and with the husband between 30 and 64 years old.

First we study the mandatory pension rights accumulated by the households in our sample. We find that while the husbands have a substantial amount of accumulated pension rights, the wives have a considerably lower amount of accumulated pension rights. The interaction between the husband's and the wife's pension rights is small: one year contributed to the mandatory pension system less by the husband is compensated by about 0.11 year more by the wife. So the conclusion from this part of the analysis is that although the wives in our sample are 'insured' against the risk of low income due to the mortality of the husband by the Dutch social security system, in terms of welfare they still depend largely on their husbands' mandatory pension rights (which offers survivor benefits).

Secondly, we study the household members' attitudes towards saving for old age. The sample that is representative for Dutch households reveals that wives find saving for old age more

important than their husbands. A special high-income subsample reveals that for this group the household members find saving for old age equally important. We find that the major determinant of both household members' attitudes towards saving for old age is the husband's mandatory pension rights.

Thirdly, we analyse the household portfolio choice and discretionary wealth position. Our analysis reveals that both household members' attitude relate to the probability of holding annuity and endowment insurances, while only the husband's attitude relates to the probability of holding stocks. Concerning discretionary household wealth we find evidence for an impact of the husband's attitude, but no evidence for an impact of the wife's attitude.

The overall conclusion of this paper is that, at least for the generation under consideration, wives own a limited amount of mandatory pension rights, and that wives largely dependent on the mandatory pension rights collected by their husbands. Furthermore, wives have a limited impact on the household portfolio choice and saving behaviour. In case a wife is concerned about saving for old age, she only has an impact on the probability that the household owns an annuity or endowment insurance. The probability of owning stocks and the total amount of discretionary saving are dominated by the husband's concerns about saving for old age. The fact that the husband's attitude towards saving for old age is influenced by his collected amount of mandatory pension rights is positive for his wife, but still it is remarkable that the characteristics of his wife (and in particular her age) do not play a role. These conclusions justify policies that give wives (or better: the dependent partners) more legal rights within the social security and mandatory pension system. The conclusions also justify policies that simulate the economic independence of women in general.

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Appendix A: The CentER Savings Survey

The CentER Savings Survey (CSS) was devised by researchers at CentER, Tilburg University. The sample consists of approximately 2900 households and is divided into two parts. The first part of approximately 2000 households is a random sample of Dutch households, whereas the second part of approximately 900 households is a random sample of the upper-income-decile of households in the Netherlands. The selection criterion for the second part is based on the income in 1993, and the sample is taken from high-income areas in the Netherlands. The first wave of the CSS started in 1993, and subsequent waves are collected at an annual frequency. Households are interviewed by means of a computer questionnaire, which is administrated through modems (CAPAR: Computer Assisted Panel Research). For more information on the method of questioning and on the consequences for the data, see Nyhus (1996).

[Tables A.1,A.2,A.3 about here]

As the first wave of the panel started late in 1993, we decide to take the wave of 1994 as the first wave of our data set. Table A.1 presents the selection process. In the first step we select the men who are between 30 and 64 years old, who are head or partner in their household, and who are married or cohabiting. The second step adds the wealth data, which leads to a substantial reduction in the number of observations due to the substantial amounts of missing values in this part of the data. As the collection of wealth data is not standard, appendix B will explain this part of the data in more detail. The third step adds the income data, which again leads to a substantial reduction of the numbers of observations. But this time the reason for the reduction is panel-attrition, as in the CSS income is measured in the next year's wave based on the to the tax-authorities reported income. The fourth step merges the husbands to their wives. Then steps five and six add the wealth and income data of the wives, which leads to a modest reduction in the number of observations. Table A.2 presents the presence of the households in the different waves. In the representative panel we observe in total 858 households, of which 416 are observed only in one wave, while in the high-income panel we observe in total 469 households, of which 161 are observed in only one wave. The time dimension of the data is reasonable, as in the representative panel 231 households are observed in at least three waves, while in the high-income panel this is the case for 151 households. Table A.3 shows the sample statistics by year.

Appendix B: Measurement of Wealth

The CentER Savings Survey (CSS) is especially designed to study individual and household savings behaviour. This means that a large effort was made in order to measure income and wealth as accurate as possible. This appendix discusses in more detail the measurement of the wealth variables, and discusses how we deal with item non-response.

The CSS makes a large effort was made to measure the value of assets as accurate as possible. In order to prevent misunderstandings the respondents first get a definition of the specific asset under consideration. The question posed is how many assets of each kind they own, and what the financial value of each asset is. In total, 38 assets are considered. Of these we include the following in our definition of private wealth: checking accounts (1), employer sponsored savings plans (2), savings accounts (3), deposit books (4), deposit accounts (5), savings certificates (6), single-premium annuities (7), endowment insurances (8), combined annuity and life insurances (9), pension schemes, not partly paid by the employer (10), growth funds (11), mutual funds (12), mortgage bonds (13), company shares (14), all kinds of options (15-18), real estate not used for own housing (19H), money lent to family/friends (24), other savings (25), own house (26H), second house (27H). On the debt side we include: mortgage on real estate (19M), mortgage on own house (26M), mortgage on second house (27M), private loans (D1), extended credit (D2), hire-purchase contracts (D3), mail-order debt (D4), loans from family/friends (D5), study loans (D6), credit card debts (D7), debts not mentioned before (D8). Also observed in our data are: cars (20), motorbikes (21), boats (22) and caravans (23). We decide not to include them in private household wealth since they are durable consumption goods.

In survey data item non-response is a known problem. Earlier experience shows that this problem is even more serious in case of wealth data than in case of more traditional kinds of data. Therefore we follow the methodology used in the Health and Retirement Survey (HRS) and Asset and Health Dynamics (AHEAD) survey. A question about the value of a certain asset was asked according to the following strategy: First, the respondent whether he/she owns a certain asset. Second, if so then the respondent is asked to give the exact value in Dutch Guilders. If he/she declines to answer this open-ended question, the respondent is asked to give the financial value within certain brackets. The data resulting from the second question is

less accurate, but at least it gives useful information on the value of the asset. For the HRS and AHEAD it was observed that this methodology leads to a substantially lower item non-response.

The followed method for retrieving the asset data leads to two measurement issues. First, one has to deal with the bracketed data. The best way would be to take it explicitly into account in the analysis. But obviously this complicates the analysis substantially, so this method is seldom used. The common solution is to use imputation for the bracketed answers. Several sophisticated imputation methods have been developed (see Little and Rubin (1987) for an overview). In the case of the HRS and AHEAD data often extended versions of the so-called Hot Deck procedure were used (see for instance Hoynes, Hurd and Chand (1997)). A difference with the CentER Savings Survey is that the HRS and AHEAD data contain fewer groups of assets. Using a sophisticated method for imputation in the CentER Savings Survey would be very time-consuming. Therefore, the simplest method is used: In the case of values in brackets, the centre value of the bracket was imputed. Generally, this should give a reasonable approximation, as there are 14 brackets. Except for the last bracket where no centre value exists. This leads to the second measurement issue: missing and censored values. In both the representative and the high-income panel this occurs for about 25 percent of the observations for at least one asset. We will set the value of the asset to zero, and treat this as measurement error in household wealth.

Table 1: age, employment status and pension rights

Age husband		Representative panel		High-Income Panel	
		Husband	Wife	Husband	Wife
30-39 years	Number of observations	398	398	193	193
	Age	34.8	33.3	35.0	33.7
	Currently employed	97%	56%	98%	83%
	Previously employed	3%	35%	2%	15%
	Never employed	0%	9%	0%	2%
	Pension rights	95%	61%	99%	80%
	Contributed years	10.6	6.7	9.5	7.6
40-49 years	Number of observations	548	548	418	418
	Age	44.3	42.2	45.1	43.5
	Currently employed	93%	53%	97%	73%
	Previously employed	7%	38%	2%	25%
	Never employed	0%	9%	1%	2%
	Pension rights	97%	60%	99%	77%
	Contributed years	20.2	9.5	19.5	12.0
50-59 years	Number of observations	427	427	253	253
	Age	54.4	52.0	53.8	50.7
	Currently employed	74%	37%	87%	62%
	Previously employed	26%	39%	13%	31%
	Never employed	0%	24%	0%	7%
	Pension rights	98%	39%	100%	66%
	Contributed years	28.8	11.8	27.7	11.8
60-64 years	Number of observations	252	252	86	86
	Age	61.9	59.1	61.7	58.6
	Currently employed	19%	12%	36%	31%
	Previously employed	77%	57%	60%	60%
	Never employed	4%	31%	4%	9%
	Pension rights	93%	27%	97%	52%
	Contributed years	33.9	14.2	34.4	12.0

Note: the data of the waves 1994 to 1997 are pooled.

Table 2: part-time employment and pension rights

Working hours husband		Representative Panel			
		Working hours wife			
		0 hours per week	1 - 16 hours per week	17 - 32 hours per week	33 - 90 hours per week
0 - 32 hours per week	Number of observations	20	17	39	39
	Husband: age	57.6	50.1	45.0	53.4
	Husband: pension rights	55%	88%	87%	77%
	Husband: contributes years	33.7	25.6	17.6	25.2
	Wife: age	55.0	47.4	43.1	50.7
	Wife: pension rights	0%	35%	85%	59%
	Wife: contributed years	0.0	8.5	14.1	13.7
33 - 90 hours per week	Number of observations	245	315	463	487
	Husband: age	52.2	45.8	45.3	47.0
	Husband: pension rights	97%	98%	98%	98%
	Husband: contributes years	26.5	21.2	20.1	22.6
	Wife: age	49.8	43.8	43.4	44.7
	Wife: pension rights	0%	53%	74%	49%
	Wife: contributed years	0.0	8.0	9.7	9.3
Working hours husband		High-Income Panel			
		Working hours wife			
		0 hours per week	1 - 16 hours per week	17 - 32 hours per week	33 - 90 hours per week
0 - 32 hours per week	Number of observations	3	5	30	31
	Husband: age	60.7	52.4	50.6	49.9
	Husband: pension rights	67%	100%	93%	90%
	Husband: contributes years	24.0	24.0	23.2	24.6
	Wife: age	57.7	49.8	49.5	47.4
	Wife: pension rights	0%	60%	97%	65%
	Wife: contributed years	0.0	12.0	13.3	14.7
33 - 90 hours per week	Number of observations	32	119	396	334
	Husband: age	50.4	47.2	45.8	47.0
	Husband: pension rights	100%	98%	99%	100%
	Husband: contributes years	24.3	22.2	19.7	21.3
	Wife: age	48.4	44.8	43.7	44.9
	Wife: pension rights	0%	69%	86%	64%
	Wife: contributed years	0.0	9.1	11.1	10.8

Note: the data of the waves 1994 to 1997 are pooled, the working hours refer to the current or to the last job.

Table 3: employment status and pension rights

		Representative Panel			
		Wife			
Husband		Currently employed	Previously employed	Never employed	Total
Currently employed	Number of observations	632	457	166	1255
	Pension rights husband	98%	98%	96%	99%
	Pension rights wife	77%	45%	0%	55%
Previously employed	Number of observations	69	191	93	353
	Pension rights husband	96%	97%	95%	96%
	Pension rights wife	80%	30%	0%	32%
Never employed	Number of observations	2	9	6	17
	Pension rights husband	0%	0%	0%	0%
	Pension rights wife	100%	11%	0%	32%
Total	Number of observations	703	657	265	1625
	Pension rights husband	98%	96%	93%	96%
	Pension rights wife	78%	40%	0%	50%
		High-Income Panel			
		Wife			
Husband		Currently employed	Previously employed	Never employed	Total
Currently employed	Number of observations	608	210	28	846
	Pension rights husband	99%	100%	100%	99%
	Pension rights wife	88%	48%	0%	75%
Previously employed	Number of observations	40	54	6	100
	Pension rights husband	95%	100%	100%	98%
	Pension rights wife	78%	41%	0%	53%
Never employed	Number of observations	2	1	1	4
	Pension rights husband	0%	0%	0%	0%
	Pension rights wife	50%	100%	0%	50%
Total	Number of observations	650	265	35	950
	Pension rights husband	99%	99%	97%	99%
	Pension rights wife	87%	46%	0%	72%

Note: the data of the waves 1994 to 1997 are pooled, the working hours refer to the current or to the last job.

Table 4: estimation results on pension rights

Dependent variable: contributed years husband

Estimation method: linear regression with random effects

	<u>Representative Panel</u>		<u>High-Income Panel</u>	
	par.	(s.e.)	par	(s.e.)
Intercept	-52.621	(10.454)	-8.631	(24.652)
<u>Characteristics family</u>				
Children at home	-0.279	(0.254)	0.294	0.261
Children left home	0.428	(0.261)	0.121	0.257
Marital contract	-3.476	(0.835)	-1.454	0.583
Cohabiting	-1.395	(1.118)	-2.444	0.933
<u>Characteristics husband</u>				
Age	2.120	(0.555)	-0.144	1.034
Age ²	-0.016	(0.006)	0.010	0.011
Edu. level medium	32.414	(15.113)	-10.058	26.538
Edu. level medium x age	-1.623	(0.657)	0.555	1.122
Edu. level medium x age ²	0.019	(0.007)	-0.007	0.012
Edu. level high	7.469	(15.942)	-19.951	23.349
Edu. level high x age	-0.466	(0.684)	0.907	0.965
Edu. level high x age ²	0.006	(0.007)	-0.010	0.010
<u>Characteristics wife</u>				
Age	0.498	(0.417)	0.534	0.665
Age ²	-0.005	(0.004)	-0.006	0.007
Edu. level medium	-18.464	(11.286)	-5.318	16.107
Edu. level medium x age	0.869	(0.518)	0.235	0.723
Edu. level medium x age ²	-0.009	(0.006)	-0.003	0.008
Edu. level high	-4.787	(13.921)	7.746	14.894
Edu. level high x age	0.120	(0.636)	-0.535	0.662
Edu. level high x age ²	0.000	(0.007)	0.007	0.007
Contributed years	-0.111	(0.046)	0.041	0.039
<u>Year of observation</u>				
1995	0.583	(0.433)	0.569	0.276
1996	0.892	(0.446)	0.838	0.364
1997	0.091	(0.497)	0.539	0.817
<u>Standard deviations</u>				
Individual error term	5.9270		4.916	
Remainder error term	4.6630		3.163	

Note: a low education level concerns no and lower vocational education, a medium education level concerns medium vocational education, and a high education level concerns a higher vocational and university education. The contributed years are corrected for part-time employment.

Table 5: attitudes towards saving for old age

Representative Panel									
Attitude	Attitude wife								Total
Husband	missing	1	2	3	4	5	6	7	Total
missing	76	0	3	6	6	2	7	10	110
1	27	35	17	16	14	15	13	5	142
2	31	23	32	20	22	12	17	5	162
3	21	9	14	19	36	23	16	8	146
4	41	10	22	22	45	45	24	19	226
5	34	10	7	16	43	57	62	33	262
6	51	6	18	15	39	41	86	75	331
7	45	4	5	6	11	30	62	83	246
Total	324	97	118	120	216	225	287	238	1625
Test on means for paired observations, test-statistic:						2.78			
Mean (standard deviation) for husbands:						4.520 (1.885)			
Mean (standard deviation) for wives:						4.657 (1.842)			
Rank test for paired observations, test-statistic:						2.77			
Husband finds saving for old age more important (#obs.):						413			
Wife finds saving for old age more important (#obs.):						497			

High-Income Panel									
Attitude	Attitude wife								Total
Husband	missing	1	2	3	4	5	6	7	Total
missing	18	0	0	0	2	1	2	1	24
1	3	45	13	5	9	11	7	5	98
2	8	15	25	11	10	5	9	7	90
3	6	10	18	10	18	13	9	8	92
4	6	12	13	7	18	16	18	11	101
5	8	9	11	12	23	39	28	17	147
6	14	8	12	8	20	43	78	50	233
7	9	9	3	7	11	13	54	59	165
Total	72	108	95	60	111	134	198	157	950
Test on means for paired observations, test-statistic:						1.18			
Mean (standard deviation) for husbands:						4.585 (1.973)			
Mean (standard deviation) for wives:						4.508 (2.019)			
Rank test for paired observations, test-statistic:						1.57			
Husband finds saving for old age more important (#obs.):						318			
Wife finds saving for old age more important (#obs.):						280			

Note: the data of the waves of 1994 to 1997 are pooled. The scale of the attitude towards saving for old age varies from (1) very unimportant to (7) very important, see section 5 for details. The test-statistics follow a standard normal distribution.

Table 6.A: estimation results on attitude towards saving for old age

Dependent variable: attitude towards saving for old age

Estimation method: ordered probit with random effects

Representative Panel	Husbands		Wives	
	par.	(s.e.)	par	(s.e.)
Intercept	1.6661	(0.5081)	1.8358	(0.4974)
<u>Characteristics family</u>				
Children at home	-0.0012	(0.0622)	-0.0330	(0.0477)
Children left home	0.0558	(0.0484)	0.0956	(0.0508)
Marital contract	-0.0797	(0.1565)	-0.0014	(0.1778)
Cohabiting	0.1131	(0.4442)	0.3155	(0.2690)
<u>Characteristics husband</u>				
Age	-0.0086	(0.0155)	-0.0160	(0.0145)
Edu. level medium	-1.2558	(0.5549)	0.0128	(0.5781)
Edu. level medium x age	0.0242	(0.0120)	-0.0004	(0.0124)
Edu. level high	0.1217	(0.6203)	0.6104	(0.5888)
Edu. level high x age	-0.0079	(0.0127)	-0.0136	(0.0120)
Income (DFL 10,000 p.a.)	0.0003	(0.0133)	-0.0115	(0.0128)
Contributed years	-0.0151	(0.0063)	-0.0089	(0.0058)
<u>Characteristics wife</u>				
Age	0.0186	(0.0137)	0.0206	(0.0126)
Edu. level medium	0.5332	(0.5136)	-0.2920	(0.5197)
Edu. level medium x age	-0.0134	(0.0116)	0.0072	(0.0119)
Edu. level high	-0.0674	(0.6384)	0.3191	(0.6749)
Edu. level high x age	0.0035	(0.0147)	-0.0032	(0.0156)
Dummy income>0	0.2407	(0.1144)	0.1870	(0.1185)
Income (DFL 10,000 p.a.)	-0.0040	(0.0237)	-0.0040	(0.0273)
Contributed years	0.0014	(0.0075)	-0.0004	(0.0078)
<u>Year of observation</u>				
1995	-0.0058	(0.0900)	0.0450	(0.0971)
1996	0.2871	(0.0950)	0.2957	(0.1030)
1997	0.0627	(0.1042)	0.3145	(0.1177)
<u>Standard deviations</u>				
Individual error term	0.9815	(0.0738)	0.9723	(0.1030)
Remainder error term	1.0000		1.0000	
<u>Correlations</u>				
Individual error terms		0.7849	(0.0505)	
Remainder error terms		0.2745	(0.0499)	

Note: the scale of the attitude towards saving for old age varies from (1) very unimportant to (7) very important, see section 5 for details. Higher order terms of age and income are insignificant. The contributed years are corrected for part-time employment.

Table 6.B: estimation results on attitude towards saving for old age

Dependent variable: attitude towards saving for old age

Estimation method: ordered probit with random effects

High-Income Panel	Husbands		Wives	
	par.	(s.e.)	par.	(s.e.)
Intercept	3.0848	(1.4975)	0.9981	(1.3917)
<u>Characteristics family</u>				
Children at home	-0.0824	(0.0711)	-0.0189	(0.0671)
Children left home	0.0462	(0.0747)	-0.0411	(0.0730)
Marital contract	-0.0175	(0.1696)	-0.0755	(0.1633)
Cohabiting	-0.2203	(0.2447)	-0.2262	(0.2712)
<u>Characteristics husband</u>				
Age	0.0061	(0.0282)	0.0291	(0.0289)
Edu. level medium	-0.2873	(1.4132)	1.3020	(1.4865)
Edu. level medium x age	0.0025	(0.0296)	-0.0204	(0.0322)
Edu. level high	-1.8432	(1.1911)	0.3283	(1.1665)
Edu. level high x age	0.0383	(0.0248)	0.0001	(0.0250)
Income (DFL 10,000 p.a.)	-0.0002	(0.0116)	0.0005	(0.0110)
Contributed years	-0.0384	(0.0137)	-0.0146	(0.0113)
<u>Characteristics wife</u>				
Age	-0.0063	(0.0209)	-0.0153	(0.0210)
Edu. level medium	-0.3234	(1.0213)	-1.3481	(0.8792)
Edu. level medium x age	0.0049	(0.0224)	0.0279	(0.0200)
Edu. level high	-0.2960	(0.8828)	-0.3506	(0.8481)
Edu. level high x age	0.0029	(0.0199)	0.0053	(0.0190)
Dummy income>0	-0.5354	(0.1953)	-0.2261	(0.1765)
Income (DFL 10,000 p.a.)	0.0531	(0.0262)	0.0476	(0.0251)
Contributed years	0.0038	(0.0101)	0.0117	(0.0098)
<u>Year of observation</u>				
1995	-0.0065	(0.0890)	0.1078	(0.0939)
1996	0.3200	(0.1191)	0.0829	(0.1136)
1997	0.1190	(0.2850)	0.0048	(0.2392)
<u>Standard deviations</u>				
Individual error term	1.1894	(0.0989)	1.0570	(0.1021)
Remainder error term	1.0000		1.000	
<u>Correlations</u>				
Individual error terms		0.7215	(0.0568)	
Remainder error terms		0.2600	(0.0581)	

Note: the scale of the attitude towards saving for old age varies from (1) very unimportant to (7) very important, see section 5 for details. Higher order terms of age and income are insignificant. The contributed years are corrected for part-time employment.

Table 7: portfolio choice

Asset type	Definition
Checking accounts	Checking accounts
Saving accounts	Saving and deposit accounts, deposit books, and saving arrangements
Bonds	Bonds, mortgage bonds, and saving certificates
Insurances	Annuity and endowment insurances
Stocks	Stocks, shares, growth funds, and mutual funds
Real estate	Real estate (not for own living)
House	Own house (primary residence)

Ownership rates	<u>Representative Panel</u>				<u>High-Income Panel</u>			
	1994	1995	1996	1997	1994	1995	1996	1997
Checking accounts	0.966	0.967	0.977	0.972	0.983	0.985	0.989	1.000
Saving accounts	0.868	0.875	0.843	0.847	0.914	0.880	0.866	0.923
Bonds	0.103	0.108	0.114	0.088	0.145	0.108	0.134	0.115
Insurances	0.260	0.283	0.330	0.302	0.412	0.486	0.520	0.654
Stocks	0.169	0.215	0.239	0.257	0.438	0.437	0.430	0.615
Real estate	0.061	0.038	0.041	0.040	0.131	0.074	0.073	0.077
House	0.696	0.752	0.774	0.802	0.921	0.908	0.950	0.923

Table 8.A: estimation results on portfolio choice

Dependent variable: ownership of assets

Estimation method: multivariate probit

Representative Panel	<u>Savings acc.</u>		<u>Bonds</u>		<u>Insurances</u>		<u>Stocks</u>	
	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)
Intercept	2.158	(0.959)	-5.566	(1.390)	-3.454	(0.998)	-3.045	(1.248)
<u>Characteristics family</u>								
Children at home	-0.089	(0.081)	-0.084	(0.120)	-0.193	(0.089)	-0.133	(0.116)
Children left home	-0.134	(0.081)	-0.046	(0.103)	-0.190	(0.097)	-0.111	(0.112)
Marital contract	-0.121	(0.322)	0.576	(0.436)	-0.068	(0.294)	-0.660	(0.429)
Cohabiting	0.239	(0.373)	-0.056	(0.570)	-0.390	(0.484)	0.260	(0.463)
<u>Characteristics husband</u>								
Age	-0.056	(0.031)	0.044	(0.039)	0.034	(0.030)	-0.020	(0.040)
Edu. Level medium	-0.294	(0.992)	0.465	(1.688)	0.373	(1.173)	-1.570	(1.535)
Edu. Level medium x age	0.001	(0.021)	-0.008	(0.034)	-0.004	(0.026)	0.044	(0.033)
Edu. Level high	-1.283	(1.156)	-0.265	(1.712)	-0.426	(1.181)	-1.042	(1.560)
Edu. Level high x age	0.027	(0.024)	0.010	(0.034)	0.009	(0.025)	0.039	(0.032)
Income (DFL 10,000 p.a.)	0.064	(0.033)	0.033	(0.036)	0.165	(0.034)	0.045	(0.030)
Attitude	0.032	(0.046)	0.064	(0.067)	0.137	(0.047)	0.089	(0.052)
<u>Characteristics wife</u>								
Age	0.043	(0.029)	0.003	(0.034)	-0.030	(0.027)	0.019	(0.037)
Edu. Level medium	-0.299	(0.987)	-0.735	(1.474)	-0.249	(1.008)	0.082	(1.267)
Edu. Level medium x age	0.018	(0.022)	0.019	(0.032)	0.004	(0.023)	0.002	(0.028)
Edu. Level high	-0.081	(1.217)	0.448	(1.858)	-0.260	(1.270)	0.684	(1.621)
Edu. Level high x age	0.007	(0.028)	-0.004	(0.041)	0.010	(0.030)	-0.011	(0.036)
Dummy income>0	0.003	(0.220)	0.054	(0.326)	-0.043	(0.231)	-0.518	(0.274)
Income (DFL 10,000 p.a.)	0.118	(0.059)	-0.051	(0.085)	-0.039	(0.050)	0.052	(0.047)
Attitude	-0.026	(0.051)	-0.011	(0.064)	0.127	(0.049)	0.055	(0.048)
<u>Year of observation</u>								
1995	-0.019	(0.189)	0.193	(0.233)	0.070	(0.181)	0.276	(0.196)
1996	-0.213	(0.187)	0.043	(0.257)	0.149	(0.197)	0.197	(0.207)
1997	-0.071	(0.205)	-0.215	(0.298)	-0.093	(0.232)	0.398	(0.227)
<u>Variances, Correlations</u>								
	<u>Savings acc.</u>		<u>Bonds</u>		<u>Insurances</u>		<u>Stocks</u>	
Variances	1.304	(0.202)	1.961	(0.293)	1.758	(0.213)	2.000	(0.000)
Savings accounts			0.092	(0.115)	0.094	(0.087)	0.184	(0.095)
Bonds	0.092	(0.115)			0.200	(0.087)	0.508	(0.075)
Insurances	0.094	(0.087)	0.200	(0.087)			0.398	(0.070)
Stocks	0.184	(0.095)	0.508	(0.075)	0.398	(0.070)		

Note: the variances of the remainder error terms are set to 1, and the correlations between the remainder error terms are set to 0. So the correlations between the ownership of certain assets only go through the individual specific error terms. Higher order terms in age and income are insignificant. The contributed years are corrected for the size of the job in working hours. For a survey on necessary parameter constraints, see Börsch-Supan and Hajivassiliou (1993).

Table 8.B: estimation results on portfolio choice

Dependent variable: ownership of certain assets

Estimation method: multivariate probit

High-Income Panel	<u>Savings acc.</u>		<u>Bonds</u>		<u>Insurances</u>		<u>Stocks</u>	
	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)
Intercept	1.285	2.372	-8.104	2.818	-2.284	2.299	-0.219	3.504
<u>Characteristics family</u>								
Children at home	-0.280	0.157	-0.027	0.109	-0.036	0.127	-0.244	0.174
Children left home	0.048	0.162	-0.038	0.093	0.053	0.134	-0.383	0.182
Marital contract	-0.022	0.412	0.022	0.242	0.425	0.319	0.228	0.398
Cohabiting	0.390	0.610	0.171	0.444	0.011	0.459	0.021	0.633
<u>Characteristics husband</u>								
Age	0.052	0.053	0.057	0.059	-0.093	0.051	-0.040	0.076
Edu. Level medium	5.567	2.699	5.831	2.715	-2.404	2.431	-3.085	3.498
Edu. Level medium x age	-0.106	0.057	-0.105	0.052	0.053	0.053	0.067	0.072
Edu. Level high	4.849	2.045	3.163	2.567	0.133	1.983	-2.882	3.205
Edu. Level high x age	-0.089	0.042	-0.058	0.049	0.007	0.042	0.058	0.064
Income (DFL 10,000 p.a.)	0.011	0.027	0.007	0.019	0.012	0.020	-0.026	0.027
Attitude	0.023	0.065	-0.027	0.046	0.247	0.059	0.189	0.066
<u>Characteristics wife</u>								
Age	-0.021	0.050	0.065	0.032	0.087	0.044	0.060	0.060
Edu. Level medium	-1.929	2.165	0.177	1.361	3.216	1.785	-1.872	2.488
Edu. Level medium x age	0.031	0.046	0.006	0.029	-0.066	0.040	0.032	0.055
Edu. Level high	-3.115	2.139	1.768	1.360	1.027	1.602	-0.864	2.262
Edu. Level high x age	0.055	0.045	-0.034	0.029	-0.025	0.035	0.014	0.049
Dummy income>0	0.657	0.465	-0.318	0.268	0.181	0.349	-0.868	0.460
Income (DFL 10,000 p.a.)	-0.026	0.071	0.014	0.038	-0.016	0.048	0.022	0.063
Attitude	-0.110	0.074	0.096	0.046	0.106	0.054	-0.069	0.055
<u>Year of observation</u>								
1995	-0.282	0.210	-0.341	0.144	0.412	0.160	-0.118	0.192
1996	-0.735	0.300	-0.224	0.199	0.506	0.234	-0.270	0.254
1997	-0.286	0.656	-0.710	0.368	0.574	0.445	-0.026	0.355
<u>(Co-)variances</u>								
Savings accounts	1.859	0.391	0.221	0.124	0.289	0.097	0.486	0.090
Bonds	0.221	0.124	2.000	0.000	0.177	0.098	0.551	0.083
Insurances	0.289	0.097	0.177	0.098	1.985	0.257	0.309	0.078
Stocks	0.486	0.090	0.551	0.083	0.309	0.078	2.827	0.432

Note: the variances of the remainder error terms are set to 1, and the correlations between the remainder error terms are set to 0. So the correlations between the ownership of certain assets only go through the individual specific error terms. Higher order terms in age and income are insignificant. The contributed years are corrected for the size of the job in working hours. For a survey on necessary parameter constraints, see Börsch-Supan and Hajivassiliou (1993).

Table 9: estimation results on portfolio choice, weighting of attitudes

Dependent variable: ownership of certain assets

Estimation method: multivariate probit

	Representative Panel							
	<u>Savings acc.</u>		<u>Bonds</u>		<u>Insurances</u>		<u>Stocks</u>	
	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)
<u>Attitude husband</u>								
Unweighted	0.032	(0.046)	0.064	(0.067)	0.137	(0.047)	0.089	(0.052)
Weighted by income	0.015	0.046	0.032	0.068	0.202	0.052	0.073	0.053
Weighted by education	0.065	0.081	0.180	0.117	0.224	0.083	0.164	0.093
Weighted by age	0.069	0.089	0.119	0.129	0.271	0.090	0.169	0.101
<u>Attitude wife</u>								
Unweighted	-0.026	0.051	-0.011	0.064	0.127	0.049	0.055	0.048
Weighted by income	0.038	0.127	0.176	0.199	0.286	0.130	0.331	0.124
Weighted by education	-0.054	0.103	-0.112	0.137	0.286	0.105	0.110	0.100
Weighted by age	-0.058	0.104	-0.018	0.132	0.254	0.101	0.119	0.099
	High-Income Panel							
	<u>Savings acc.</u>		<u>Bonds</u>		<u>Insurances</u>		<u>Stocks</u>	
	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)	par.	(s.e.)
<u>Attitude husband</u>								
Unweighted	0.023	0.065	-0.027	0.046	0.247	0.059	0.189	0.066
Weighted by income	-0.029	0.074	-0.020	0.051	0.294	0.071	0.211	0.077
Weighted by education	0.001	0.117	-0.071	0.081	0.430	0.106	0.286	0.114
Weighted by age	0.031	0.126	-0.038	0.090	0.490	0.116	0.361	0.129
<u>Attitude wife</u>								
Unweighted	-0.110	0.074	0.096	0.046	0.106	0.054	-0.069	0.055
Weighted by income	-0.293	0.179	0.448	0.130	0.405	0.157	-0.066	0.144
Weighted by education	-0.243	0.156	0.256	0.104	0.240	0.114	-0.052	0.115
Weighted by age	-0.213	0.152	0.182	0.094	0.211	0.108	-0.137	0.113

Note: all regressions contain correction for additional variables, see Tables 8.A and 8.B. The results on the unweighted attitudes are therefore simply copied from Tables 8.A and 8.B. The weighting by education is done the formulation of the variable education level that takes values from 1 (no and lower vocational education) to 3 (higher vocational and university education).

Table 10: discretionary household wealth

Asset type	Definition
Checking accounts	Checking accounts
Saving accounts	Saving and deposit accounts, deposit books, and saving arrangements
Bonds	Bonds, mortgage bonds, and saving certificates
Insurances	Annuity and endowment insurances
Stocks	Stocks, shares, growth funds, and mutual funds
Real estate	Real estate, not for own living (mortgage is taken into account)
House	Own house, primary residence (mortgage is taken into account)
Loans	Loans (subtracted in total wealth)

Value in DFL. 1,000	<u>Representative Panel</u>				<u>High-Income Panel</u>			
	1994	1995	1996	1997	1994	1995	1996	1997
Checking accounts	3.54	2.60	2.96	3.05	4.52	3.68	5.37	4.63
Saving accounts	16.80	12.26	12.18	13.07	23.57	23.12	27.14	61.67
Bonds	1.05	1.37	1.11	1.37	3.90	2.62	2.94	5.44
Insurances	7.31	5.56	7.02	6.77	18.97	17.46	29.08	47.39
Stocks	5.97	5.02	5.90	8.75	22.97	31.36	38.17	54.84
Real estate	6.70	2.48	2.89	5.14	19.80	12.58	11.57	7.73
House	86.47	94.48	80.43	87.50	136.42	139.96	154.24	197.74
Loans	6.86	7.66	8.60	6.45	14.27	15.27	13.99	1.79
Total	121.00	116.11	103.89	119.20	215.88	215.52	254.51	377.64

Table 11: estimation results on household wealth

Dependent variable: household wealth (DFL 10,000)

Estimation method: linear regression with random effects

	<u>Representative panel</u>		<u>High-Income Panel</u>	
	par.	(s.e.)	par	(s.e.)
Intercept	-6.6412	5.7695	-18.3276	19.0711
<u>Characteristics family</u>				
Children at home	-0.5571	0.5556	-1.8584	1.0124
Children left home	-0.5314	0.5242	-1.3232	0.9609
Marital contract	0.4696	1.8126	4.8852	2.2649
Cohabiting	0.3969	2.5593	0.2980	3.6050
<u>Characteristics husband</u>				
Age	-0.1022	0.1923	0.5298	0.4305
Edu. level medium	-11.2128	7.0323	3.2784	19.3818
Edu. level medium x age	0.3017	0.1507	-0.0727	0.4112
Edu. level high	-9.7965	7.3415	14.6074	15.7648
Edu. level high x age	0.3109	0.1523	-0.3048	0.3253
Income (DFL 10,000 p.a.)	0.4066	0.1703	0.4504	0.1629
Attitude	0.6489	0.2229	0.3897	0.3591
<u>Characteristics wives</u>				
Age	0.3576	0.1796	0.2474	0.3683
Edu. level medium	-0.5202	6.3750	-4.9706	14.7352
Edu. level medium x age	0.0474	0.1454	0.2465	0.3296
Edu. level high	6.0932	8.0469	5.9535	14.0401
Edu. level high x age	-0.0699	0.1835	-0.0267	0.3060
Dummy income>0	-1.2236	1.2159	-7.8601	2.7420
Income (DFL 10,000 p.a.)	0.1128	0.2228	-0.3828	0.3717
Attitude	0.0805	0.2239	0.4579	0.3371
<u>Year of observation</u>				
1995	-0.2695	0.8015	0.0006	0.9809
1996	-1.7775	0.8606	2.4410	1.3169
1997	-0.0311	0.9711	7.5526	2.9213
<u>Standard deviations</u>				
Individual error term	15.2737		20.6041	
Remainder error term	7.8294		10.8197	

Note: higher order terms in age and income are insignificant. The contributed years are corrected for the size of the job in working hours.

Table 12: estimation results on household wealth, weighting of attitudes

Dependent variable: household wealth (DFL 10,000)

Estimation method: linear regression with random effects

	<u>Representative Panel</u>		<u>High-Income Panel</u>	
	par.	(s.e.)	par	(s.e.)
<u>Attitude husband</u>				
Unweighted	0.6489	0.2229	0.3897	0.3591
Weighted by income	0.7478	0.2589	0.3864	0.4216
Weighted by education	1.1860	0.4227	0.6104	0.6327
Weighted by age	1.1756	0.4594	0.8342	0.6990
<u>Attitude wife</u>				
Unweighted	0.0805	0.2239	0.4579	0.3371
Weighted by income	0.4949	0.6449	1.3164	0.9621
Weighted by education	0.2532	0.4880	1.1741	0.7236
Weighted by age	0.1782	0.4862	0.9022	0.6918

Note: all regressions contain correction for additional variables, see Tables 10.A and 10.B. The results on the unweighted attitudes are therefore simply copied from Tables 10.A and 10.B. The weighting by education is done the formulation of the variable education level that takes values from 1 (no and lower vocational education) to 3 (higher vocational and university education).

Table A.1: numbers of observations

	Representative Panel				High-Income Panel			
	1994	1995	1996	1997	1994	1995	1996	1997
<u>Husband</u>	1230	1123	1104	1013	793	584	438	263
Wealth	888	998	959	831	637	534	385	197
Income	577	622	614	512	519	414	219	38
<u>Wife</u>	550	607	605	457	488	397	213	35
Wealth	507	527	529	433	481	382	206	35
Income	445	465	475	375	457	356	198	29
<u>Additional criterion</u>	408	424	440	354	420	325	179	26

Note: the additional criterion concerns current self-employment.

Table A.2: waves and observations

Waves observed				Representative Panel		High-Income Panel	
<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>households</u>	<u>obs.</u>	<u>households</u>	<u>obs.</u>
1	0	0	0	162	162	131	131
0	1	0	0	95	95	24	24
0	0	1	0	81	81	6	6
0	0	0	1	78	78	0	0
1	1	0	0	67	134	134	268
1	0	1	0	11	22	7	14
1	0	0	1	4	8	0	0
0	1	1	0	39	78	16	32
0	1	0	1	4	8	0	0
0	0	1	1	86	172	0	0
1	1	1	0	49	147	125	375
1	1	0	1	8	24	1	3
1	0	1	1	12	36	0	0
0	1	1	1	67	201	3	9
1	1	1	1	<u>95</u>	<u>380</u>	<u>22</u>	<u>88</u>
				858	1626	469	950

Table A.3: sample statistics

	Representative Panel				High-Income Panel			
	1994	1995	1995	1996	1994	1995	1996	1997
<u>Characteristics family</u>								
Children at home	1.10	1.25	1.24	1.25	1.11	1.06	1.07	0.96
Children left home	0.83	0.85	0.82	0.90	0.71	0.74	0.77	1.00
Marital contract	0.08	0.09	0.08	0.09	0.17	0.14	0.13	0.12
Cohabiting	0.06	0.07	0.06	0.05	0.08	0.08	0.05	0.00
<u>Characteristics husband</u>								
Age	46.28	47.05	47.38	48.54	45.55	47.08	49.08	51.46
Education level low	0.44	0.38	0.36	0.35	0.06	0.14	0.15	0.11
Education level medium	0.27	0.31	0.31	0.33	0.15	0.15	0.17	0.35
Education level high	0.29	0.31	0.33	0.32	0.79	0.71	0.68	0.54
Employed: currently	0.77	0.79	0.77	0.76	0.90	0.90	0.86	0.85
Employed: previously	0.22	0.21	0.22	0.23	0.10	0.10	0.13	0.15
Employed: never	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00
Part-time employed	0.05	0.04	0.04	0.05	0.04	0.03	0.01	0.08
Contributed years > 0	0.96	0.97	0.96	0.96	0.99	0.98	0.99	1.00
Contributed years*	21.39	21.85	22.66	23.17	19.63	20.99	23.47	26.31
Contr. years* (corr.)	20.66	21.17	22.13	22.65	18.08	20.39	23.13	25.16
Income (Fl. 1,000 p.a.)	67.33	70.07	69.33	72.07	120.57	119.50	117.16	118.63
<u>Characteristics wife</u>								
Age	44.73	44.85	45.06	46.32	44.00	44.58	46.53	48.92
Education level low	0.63	0.55	0.52	0.49	0.31	0.26	0.30	0.31
Education level medium	0.24	0.25	0.28	0.31	0.24	0.24	0.19	0.31
Education level high	0.13	0.20	0.20	0.20	0.45	0.50	0.51	0.38
Employed: currently	0.41	0.48	0.44	0.39	0.70	0.68	0.68	0.54
Employed: previously	0.45	0.38	0.39	0.39	0.27	0.28	0.28	0.35
Employed: never	0.14	0.14	0.17	0.22	0.03	0.04	0.04	0.11
Part-time employed	0.45	0.45	0.46	0.39	0.45	0.43	0.49	0.42
Contributed years > 0	0.51	0.54	0.51	0.42	0.72	0.72	0.77	0.62
Contributed years*	9.37	9.71	9.34	9.83	10.30	11.41	11.89	9.82
Contr. years* (corr.)	6.64	6.78	6.46	7.13	7.74	8.36	8.59	7.67
Income (Fl. 1,000 p.a.)	13.19	13.85	13.23	11.45	32.28	33.76	33.22	20.69

Note: a low education level concerns lower vocational and no education, a medium education level concerns medium vocational education, and a high education level concerns a higher vocational or university education. The average pension years are calculated for the individuals who have contributed to the system (pension years>0), the corrected contributed years concern a correction for part-time employment. Income is measured in 1,000 Dutch guilders per year.

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