



This article was originally published in a journal published by Elsevier, and the attached copy is provided by Elsevier for the author's benefit and for the benefit of the author's institution, for non-commercial research and educational use including without limitation use in instruction at your institution, sending it to specific colleagues that you know, and providing a copy to your institution's administrator.

All other uses, reproduction and distribution, including without limitation commercial reprints, selling or licensing copies or access, or posting on open internet sites, your personal or institution's website or repository, are prohibited. For exceptions, permission may be sought for such use through Elsevier's permissions site at:

<http://www.elsevier.com/locate/permissionusematerial>

## Risk-return preferences in the pension domain: Are people able to choose? ☆

Maarten C.J. van Rooij<sup>a,b</sup>, Clemens J.M. Kool<sup>b,c</sup>,  
Henriëtte M. Prast<sup>a,b,d,\*</sup>

<sup>a</sup> *De Nederlandsche Bank, The Netherlands*

<sup>b</sup> *Netspar, The Netherlands*

<sup>c</sup> *Utrecht School of Economics, The Netherlands*

<sup>d</sup> *Tilburg University, The Netherlands*

Received 13 September 2005; received in revised form 19 June 2006; accepted 4 August 2006

Available online 2 October 2006

---

### Abstract

This paper presents new evidence for the Netherlands on pension preferences and investor autonomy in the pension domain using a representative survey of about 1000 Dutch citizens. Our main conclusions are the following. Risk aversion is domain dependent and highest in the pension domain. The vast majority of respondents favours the currently dominant defined benefit pension system. If offered a combined defined benefit/defined contribution system, the majority would like to have a guaranteed pension income of at least 70% of their net labour income. Self-assessed risk tolerance and financial expertise are important individual explanatory variables of pension attitudes. The average respondent considers himself financially unsophisticated and is reluctant to take control of retirement savings investment, even when offered the possibility to increase expertise. Respondents who have chosen a relatively safe portfolio tend to switch to the riskier median portfolio when they are shown future income streams. This again suggests that many respondents currently lack the skills to have investor autonomy over investment for retirement.

© 2006 Elsevier B.V. All rights reserved.

*JEL classification:* D12; D80; G11; J26

*Keywords:* Investor autonomy; Pension preferences; Risk tolerance; Defined contribution schemes

---

☆ The views expressed in this paper are those of the authors and do not necessarily reflect those of the Nederlandsche Bank.

\* Corresponding author. Economics and Research Division of The Nederlandsche Bank, P.O. Box 98, 1000 AB Amsterdam, The Netherlands. Tel.: +31 205243738; fax: +31 205242506.

*E-mail addresses:* [M.C.J.van.Rooij@dnb.nl](mailto:M.C.J.van.Rooij@dnb.nl) (M.C.J. van Rooij), [C.Kool@econ.uu.nl](mailto:C.Kool@econ.uu.nl) (C.J.M. Kool), [H.M.Prast@dnb.nl](mailto:H.M.Prast@dnb.nl) (H.M. Prast).

## 1. Introduction

In the industrialized world, risk and responsibility in retirement plans are increasingly shifted from employers towards workers. Twenty-five years ago the majority of US private pension plans was purely defined benefit (DB). This number has decreased to 1 out of 10 retirement plans and nowadays the majority is defined contribution (DC) only. The same trend has appeared in many European countries, with the United Kingdom as the most notable example. However, some countries, e.g. the Netherlands, are still dominated by DB pension plans. Nevertheless, even these countries gradually are and will be affected by the trend towards DC systems.

This paper summarizes and discusses the key findings of a survey on risk-return preferences of Dutch employees in the pension domain. The focus is on whether people are able to choose, that is whether individuals have well-defined preferences when it comes to their pension investments. DB retirement plans are convenient for participants because they delegate a number of choices on e.g. risk-return considerations of pension investments. A DC system has the advantage of creating the possibility for individually tailored pension plans. However, individuals may not benefit from autonomy because of a lack of financial sophistication (Lusardi and Mitchell, 2005), self-control problems, and psychological biases (Benartzi and Thaler, 2002; Thaler and Benartzi, 2004). Many DC pension funds in the US do in fact express doubts about the quality of the investment choices made by their participants (Benartzi and Thaler, 2001; Mitchell and Zeldes, 1996). Choi et al. (2004) claim that people seem to be aware that their level of retirement saving may be too low.

Our study contributes to the existing literature on pension preferences and investor autonomy in a number of dimensions. First, we use a representative sample of the Dutch population, whereas most empirical studies are based on US higher educated and/or higher income categories. Second, the respondents in our sample are not used to DC retirement plans. Third, in the Netherlands, retirement age is not at the discretion of the individual worker. Fourth, the social security system in the Netherlands is relatively generous, with a state pension of over €600 per month for single persons aged 65 and older. Fifth, the respondents in our panel have recently experienced a serious stock market decline, whereas those in previous studies were interviewed when the stock market was still booming.

Our main results paint a consistent picture. Dutch employees prefer the status quo of a DB scheme with a limited say, at most, about the level of pension savings and risk-taking. In case of a changeover to an individual DC system, only a minority would choose investor autonomy. Given the prevalence of DB in the Netherlands this is likely to be partly due to a status quo bias, but it is also in line with the fact that employees (correctly) have strong doubts about their financial skills and report a high level of risk aversion in the pension domain. If respondents had to choose their retirement portfolio in a DC scheme, they would be inclined to opt for low-risk, low-return, in line with their risk attitude. When confronted with two different expected retirement income streams, they tend to choose the riskier of the two, even when the other portfolio is the one they had initially opted for. This result may be due to myopic loss aversion and/or to unrealistic asset market expectations. Either way, the results confirm the doubts expressed by respondents about their ability to take control over their pension savings.

The paper is structured as follows. The next section describes current pension arrangements in the Netherlands. Section 3 explains our data set and methodology. In Section 4, the survey results are presented and discussed. Section 5 provides a summary of the results and some policy implications.

## 2. Retirement plans in the Netherlands

The pension system in the Netherlands consists of two pillars.<sup>1</sup> The first pillar is a pay-as-you-go state pension of about €632 per month for every person aged 65 and over. The second pillar is capital funded and linked to employment contracts. Employees are obliged to join their employer's pension scheme and enrol automatically. Collective insurers and especially pension funds are responsible for the organisation and administration of a large majority of the pension schemes. The balance total of all pension funds amounts to more than 600 billion, exceeding the gross domestic product of the Netherlands. These assets are invested in equities (40–45%), fixed income assets (40–45%), real estate (10%) and other investment categories including commodities.

Until recent times, virtual all Dutch pension schemes in the second pillar had a DB character and were based on final pay. Recent developments such as the emergence of new international accounting standards and the ageing of the population have already caused some changes. Increasingly, defined benefit schemes are based on average career wages. Also, several corporate pension funds in the Netherlands replaced their DB systems by (collective) DC arrangements in 2005, while others have expressed their intention to do the same in the future.<sup>2</sup> About 85% of the 6 million pension fund participants now have DB retirement plans based on either final pay or career average wages. Roughly 200,000 employees (3%) have DC pension plans. The remaining combined pension schemes typically are DB-type plans with some DC elements.

The typical employee in the Netherlands now has a career average defined benefit pension, with indexation conditional on asset–liability ratios. During the active working period accrued pension rights are in many cases indexed to negotiated wage increases (without backloading accruals for career steps) and pension benefits are often indexed to consumer price inflation. However, full indexation of pension claims to cost-of-living increases is not guaranteed. Consequently, typical Dutch DB retirement plans de facto contain a DC element. Until recently, though, indexation cuts were very rare. Cost-of-living indexation is generally financed out of excess returns on pension investments. Since nominal liabilities are calculated using nominal bond rates, the more risky–equity–composition of investment portfolios makes average excess returns likely in the longer run.

DB plans in the Netherlands are relatively safe for its participants for a number of reasons. First and foremost, risk is limited through the system's funded nature. Moreover, pension fund supervision is strict and targeted on the prevention of underfunding. Funds are required to have asset portfolios of at least 105% of their nominal liabilities. In the event of underfunding, a pension fund has to submit a plan to remedy this within a year. In addition, the recovery plan should make clear how the fund will reach a capital funding ratio—including a buffer to deal with disappointing asset market developments—within 15 years. The equilibrium funding ratio for an individual pension fund depends on market interest rates and on the composition of the pension fund's investment portfolio. It currently falls between 120% and 130% for most pension funds. As a result of its emphasis on solvency, the Dutch pension system has proved to be able to withstand high losses on equity investments. For example, during the stock market decline in the period 2000–2003 the asset–liability ratio based on a fixed actuarial interest rate of 4% decreased from 150% in 1999 to 109% in 2003 and recovered thereafter. End of 2005 the funding ratio was

<sup>1</sup> In addition, individuals can make private arrangements for further retirement schemes. This facility is of marginal importance in the current system.

<sup>2</sup> The recently introduced collective DC retirement schemes emphasise the collective sharing of inflation, longevity and investment risks and the provision of a satisfactory pension income with a high degree of certainty.

close to 130% again.<sup>3</sup> To this end pension premiums were raised from 7.6% of the wage bill to 16.6%. Employers pay the major part of these pension premiums. In addition, many employees and pensioners contributed to the recovery of asset–liability ratios because their pension rights were not fully indexed to price and wage developments. Note that intergenerational risk sharing through the compulsory nature of the DB plans protects retirees partly against shocks in asset markets. The Netherlands does not have an analogue to the PBGC system (safety net).

Second, job change by participants in DB retirement plans in the Netherlands does not imply a large pension risk. The law requires pension claims to be transferable from one employer to the other, provided that the pension is adequately funded.<sup>4</sup> Third, solvency requirements make underfunding let alone default a rare phenomenon. More importantly, the consequences for pension fund participants in case of bankruptcy of their (former) employer are limited. Because companies and pension funds are separate legal identities, pension claims are not affected when the company is liquidated. Of course, the flexibility to deal with asset market developments through intergenerational risk-sharing of active participants and retirees disappears when the pension fund has to continue without a sponsor.

Summarizing, DB plans in the Netherlands are relatively safe as far as nominal rights are concerned, with a low probability of underfunding, and with low bankruptcy or job change risks. Indexation, however, is conditional upon asset–liability ratios.

### 3. Methodology and data

#### 3.1. Data and summary statistics

Our data have been collected through an internet survey among members of the CentERpanel of CentERdata, a survey research institute that is specialized in internet surveys.<sup>5</sup> The questionnaires are answered at home using an internet connection.<sup>6</sup> Thanks to the internet set-up of the survey, participants do not feel rushed to give an answer and are fully anonymous when answering the questions.<sup>7</sup> Data collected with internet surveys manifest higher validity and less social desirability response bias than those collected via telephone interviewing (Chiang and Krosnick, 2003). Participants are not paid for their cooperation.

Our sample consists of those panel members aged 18 and older that are employed, are looking for a job, or are students. The survey comprises two questionnaires in the period April 2004–January 2005. 1314 respondents (out of 1521) returned the first questionnaire.<sup>8</sup> 1150 respondents completed the second questionnaire. Our regression analysis of pension attitudes (Section 4.1) is

<sup>3</sup> Since 1969 pension funds have calculated liabilities using a fixed actuarial discount rate of 4%. In recent years, market valuation of liabilities has started playing a more prominent role. As of 2007 pension funds are required to use the fair value method to calculate their funding ratio. At the end of 2005 the relevant 15-year discount rate was equal to 3.7%.

<sup>4</sup> Retirement plans are only one of many conditions in job contracts. Some variation in plans across employers exists. Nevertheless, it is unlikely that employees choose an employer primarily to obtain a specific retirement plan or that employers compete in the labour market through retirement plan conditions.

<sup>5</sup> CentERdata forms part of the CentER Group at Tilburg University. See also <http://www.uvt.nl/centerdata/en>.

<sup>6</sup> Households who do not have access to a pc are provided with a set-top-box for their television.

<sup>7</sup> In case of attrition of panel members, CentERdata selects new members to keep the panel representative for the Dutch population. High income members are somewhat overrepresented. We have verified that this does not affect the descriptive statistics qualitatively.

<sup>8</sup> If this first questionnaire was not completed the first time, we offered the questionnaire for a second and if necessary a third time to the group of non-respondents to improve the response rate (actually some survey weekends fell within typical vacation periods).

based on the 1134 respondents who completed both questionnaires and for whom we have information on their education level and monthly income.<sup>9</sup> The average age of the 1134 respondents is 42 years, 58% is male and 91% is employed. The gross average monthly income of employees is slightly above €2800 (about €2300 for the median employee). We do not use the type of pension scheme as an explanatory variable in our analysis for a number of reasons. More than 1 out of 3 respondents does not know whether he has a DB or a DC plan. About 9% state that they have a pure DC retirement plan or a plan with DC elements. However, many respondents in this group are covered by collective DC plans and while being exposed to market risk they have no or a very limited set of choice options. Further analysis (not reported here) shows that adding a background variable indicating current DC coverage does not change our results.

The objective background variables that are used to explain individual behaviour are defined as follows:

Age	respondents' age measured in years
Education	dummy for high education level (1 = completed higher vocational or university education, 0 = other)
Single	dummy for being single or having a partner (1 = single, 0 = married or living together)
Male	dummy for gender (1 = male, 0 = female)
Income	respondents' gross monthly salary in euro

### 3.2. The first questionnaire

The first questionnaire consists of questions focusing on self-assessment of financial knowledge, on risk attitude in various domains, on pension plan preferences, and on the investment of pension wealth in a hypothetical DC scheme. We use the first questionnaire to construct the following three explanatory variables that are theoretically relevant in individual choices with respect to retirement schemes:

FinExpert	self-assessment financial expertise (7 classes, from very low to very high)
RiskTolSubj	self-assessment risk tolerance (7 classes, from strongly risk averse to risk tolerant)
RiskTolObj	theoretically measured risk tolerance (6 classes from strongly risk averse to risk tolerant)

Fig. 1 presents the distribution of self-assessed financial expertise and shows that almost half of the respondents rate their financial expertise as very low (categories 1 and 2). This is in line with recent literature that typically finds financial knowledge to be quite limited. Lusardi and Mitchell (2005), for instance, report similar evidence for the US. We introduce two different measures of risk attitude to account for the unsettled debate in the literature on the appropriate measurement of risk tolerance. Barsky et al. (1997) propose a “gambles-over-lifetime-income” approach that is well founded in economic theory. In particular, they measure risk attitude by offering hypothetical choices between uncertain labour income streams. However, Kapteyn and

<sup>9</sup> For consistency, we do not make use of the respondents that did not respond to the second questionnaire (after three trials). Total non-response is fairly randomly distributed on important characteristics as age, income, gender, education and occupation. Selection bias does not seem to be an important problem, though small differences in composition between the sample used and the panel may exist. The descriptive statistics presented in this paper have also been calculated using weights correcting for these differences in composition. Results remain qualitatively unchanged, unless indicated otherwise. All results are available from the authors upon request.

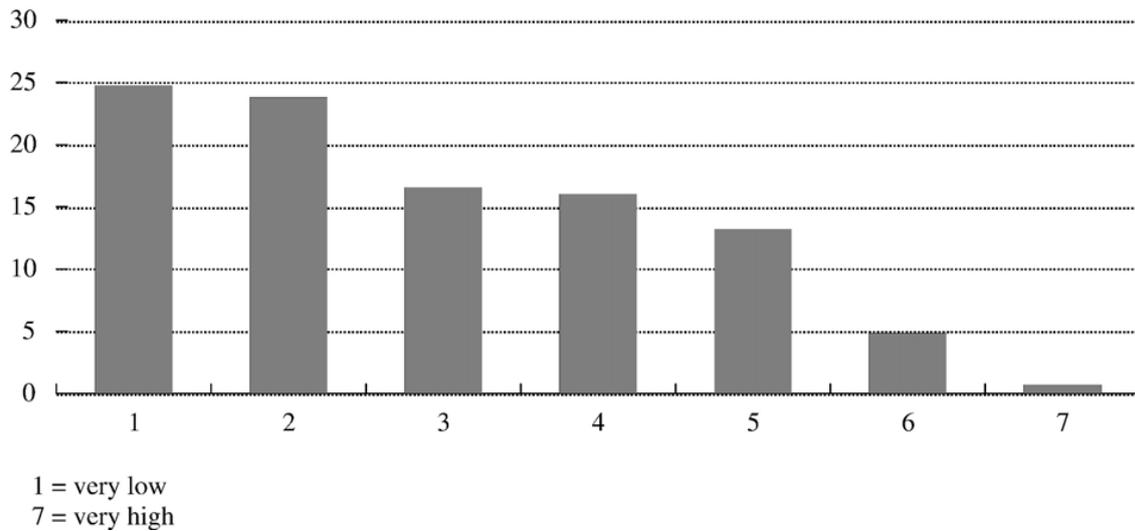


Fig. 1. Self-assessed financial expertise. Percentage of respondents ( $N=1134$ ).

Teppa (2002) compare an extended version of the Barsky et al. approach with simple ad hoc measures of risk attitude using general questions on risk attitude. Kapteyn and Teppa conclude that the latter perform better in predicting portfolio choice.<sup>10</sup> They do find a positive correlation between the two measures, though.

Table 1 summarizes the evidence on self-assessed risk tolerance. In the survey, we asked for risk tolerance in general matters, in financial matters and in the pension domain, respectively. The results show that most respondents consider themselves quite risk averse, with the level of risk aversion increasing from general issues, to financial issues to pension issues. The average risk tolerance scores in these categories are 3.2, 2.8 and 2.6 respectively. Differences are statistically significant at standard levels of significance. In Fig. 2, we present measured risk tolerance as extracted from a lifetime income gamble.<sup>11</sup> Again, risk aversion appears high. The correlation between the measures in Table 1 and Fig. 2 is positive but small (0.25). Since they apparently measure different dimensions of risk aversion, we will use them both in our empirical analysis.

### 3.3. The second questionnaire

In the first questionnaire, we asked each respondent to indicate his preferred portfolio investment mix in a hypothetical DC scheme, expressed as the percentage of stocks and bonds respectively. Based on the given investment mix, we then constructed an individually tailored future income benefit scheme (in the form of a probability distribution of the future monthly pension allowance) for each respondent.

<sup>10</sup> See also Donkers and Van Soest (1999).

<sup>11</sup> Respondents are asked to make risky choices in a gamble over lifetime income. In the first round, they must choose between a certain job with fixed income  $Y$ , or a job with a 50% chance of an income of  $2Y$  and a 50% chance of an income of  $aY$  ( $a=0.7$ ). In the second round, the choice becomes more or less risky ( $a$  equals 0.5 or 0.8) depending on their first choice. Similar to Kapteyn and Teppa (2002), respondents who choose either twice the risky alternative or twice the safe alternative enter a third round ( $a$  equals 0.25 or 0.9). Based on their choices, respondents are assigned to one of six categories of different risk appetite.

Table 1  
Self-assessed risk tolerance in three different domains

Percentage of respondents and mean rating			
Rating risk tolerance	General	Financial matters	Pension domain
1 (try to avoid risks as much as possible)	11.9	16.6	21.3
2	22.0	31.8	31.2
3	24.6	24.5	19.2
4	22.9	15.0	22.4
5	14.9	10.1	4.5
6	3.4	1.9	1.1
7 (like to take a chance)	0.4	0.2	0.3
Mean rating	3.18	2.77	2.62

Total number of observations: 1134. Percentages in columns may not add up to 100 due to rounding. A *t*-test on the equality of the mean rating for risk tolerance in general and in financial matters is rejected strongly ( $t=14.7$ ,  $p$ -value=0.000). The same applies to the test on the equality of mean ratings of risk tolerance in financial matters and in the pension domain ( $t=4.5$ ,  $p$ -value=0.000).

In the second questionnaire, we present each respondent both the probability distribution of the pension allowance based on one's own stated preference and the corresponding probability distribution based on the median investment portfolio. We then ask the respondent to rate the attractiveness of each portfolio without revealing that one of the two schemes reflects one's own investment choice. Section 4.3 explains the details of this experiment.

#### 4. Empirical results

In this section, we present and analyze the survey results. First, we summarize what retirement plan participants want and analyze the relation with individual characteristics. Second, we investigate how respondents claim they would invest their pension savings in the hypothetical situation of investor autonomy. Third, we assess individual consistency in an experiment on portfolio choice.

##### 4.1. What do retirement plan participants want?

In order to shed light on the respondents' attitude towards compulsory retirement savings, we first asked whether they are happy with a compulsory pension scheme, and if so, for what reason.<sup>12</sup> The majority of respondents (77%) is in favour of compulsory retirement saving. 12% is against compulsory retirement savings, 6% is indifferent and 5% does not know.<sup>13</sup> About 60% of the respondents in favour of a compulsory pension scheme give the cost of retirement planning (in terms of time and effort) as the most important reason. One-third states that otherwise they would not save enough for retirement, indicating awareness of a self-control problem (see also Thaler and Shefrin, 1981, and Thaler and Benartzi, 2004, for evidence in support of self-control problems).

<sup>12</sup> Response rates differ considerably across questions. Typically the response rates for "easy" (general) questions, such as the self-assessment of risk attitudes, are higher than those for intricate questions which require more thought.

<sup>13</sup> This is related to the unsettled debate on optimality of lifetime savings. See for instance Poterba et al. (2004), Lusardi (1999), Gale (1999), Gustman and Steinmeier (1999), Hurd and Rohwedder (2005) and Scholz et al. (2004). Our analysis does not provide further direct evidence on this issue.

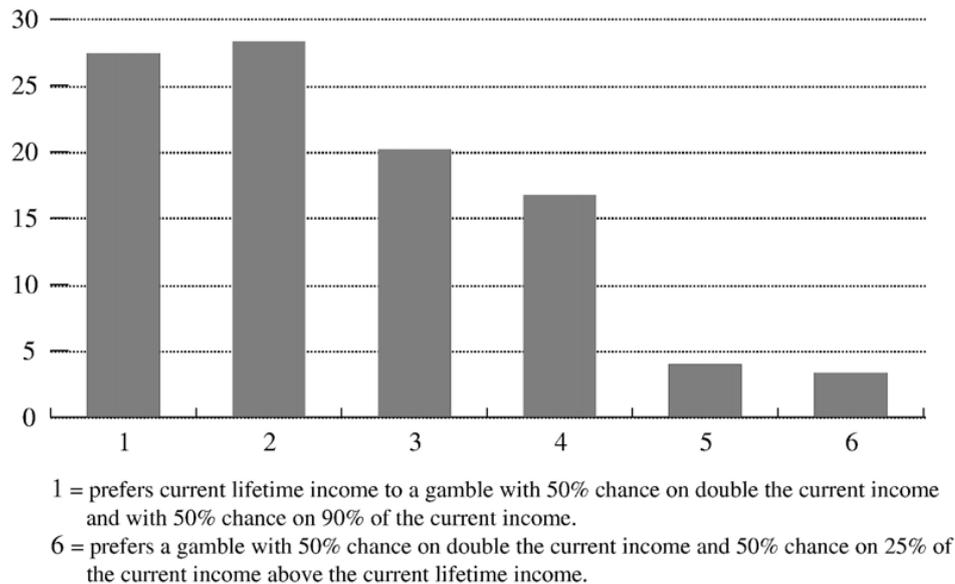


Fig. 2. Risk tolerance in a gamble on lifetime income. Percentage of respondents ( $N=1134$ ).

Subsequently, we ask for respondents' preference for a DB or DC type of plan, respectively. The question explains the trade-off between a DB system with fluctuating pension premiums in order to guarantee a nominally defined benefit level versus a DC system in which premiums are fixed but the benefit varies with investment returns. Almost two-thirds of the respondents (718 out of 1134 respondents, which is 63% of our sample) indicate a preference for DB over an individual DC system. Only 12% prefers a DC system, 10% is indifferent and 15% doesn't know. The strong preference for DB confirms earlier findings in the Netherlands (Vos et al., 1998).

A possible explanation is a status quo bias (see Samuelson and Zeckhauser, 1988). DB systems have dominated the Dutch pension landscape for a long time without noticeable problems. As a result, retirement plan participants are quite satisfied with the current system and may be reluctant to switch to arrangements that they are unfamiliar with.<sup>14</sup> In addition, financial (and pension-related) literacy in the Netherlands is very limited (Van Els et al., 2004). Intuitively, this makes sense. Due to the DB nature of most pension plans and the compulsory participation in these plans by the large majority of Dutch employees, incentives to become more financially educated have been low. Guiso et al. (2002) provide support for the hypothesis that direct exposure to financial markets, e.g. through individual DC retirement plans, is positively correlated with financial knowledge and risk tolerance.

A possible additional reason why people might prefer the certainty of the current DB system is that for many employees in the Netherlands there is virtually no possibility to postpone the age of retirement—as opposed to for example the US where laws against age discrimination offer more flexibility on this issue—to compensate for inadequate (DC) pension allowances. The official retirement age in the Netherlands is 65. Labour contracts end automatically when people reach that age. At the time of the survey most collective labour agreements had even lower

<sup>14</sup> Actually, the wording of the corresponding question in the survey may have contributed to this effect. In the questionnaire, we described the DB system by explaining that it is largely comparable to the current system in the Netherlands. To the extent that this implicitly may have suggested to respondents that the DB systems from the past are sustainable at historical costs, we may have presented the status quo as too inexpensive.

Table 2  
Determinants of the preference for DB and DC

	Preferences			
	DB	DC	Indifferent	Don't know
<i>(A) Marginal effects on probability for each answer; financial expertise and risk attitude excluded</i>				
Age	0.005 (3.41)	−0.004 (3.82)	0.000 (0.22)	−0.001 (1.40)
Log(Income)	0.016 (1.69)	0.014 (1.95)	−0.009 (1.73)	−0.021 (3.52)
Education	0.037 (1.25)	0.047 (2.34)	−0.035 (1.89)	−0.049 (2.33)
Male	−0.047 (1.56)	0.075 (3.95)	0.006 (0.33)	−0.035 (1.56)
Single	0.044 (1.35)	−0.006 (0.30)	0.005 (0.22)	−0.042 (1.86)
<i>(B) Marginal effects on probability for each answer; financial expertise and risk attitude included</i>				
Age	0.003 (2.07)	−0.002 (1.91)	0.001 (0.70)	−0.002 (1.81)
Log(Income)	0.019 (2.07)	0.009 (1.31)	−0.010 (1.74)	−0.018 (3.09)
Education	0.033 (1.11)	0.023 (1.23)	−0.028 (1.47)	−0.028 (1.29)
Male	−0.041 (1.74)	0.039 (2.10)	0.012 (0.62)	−0.011 (0.47)
Single	0.053 (0.84)	−0.017 (0.91)	0.001 (0.03)	−0.036 (1.56)
FinExpert	0.031 (3.06)	0.020 (3.51)	−0.018 (2.73)	−0.033 (4.36)
RiskTolSubj	−0.057 (4.70)	0.028 (3.90)	0.028 (3.64)	0.002 (0.18)
RiskTolObj	−0.028 (2.50)	0.035 (5.42)	0.010 (1.39)	−0.017 (2.01)

Number of observations: 1134. Log likelihood: −1156.95 (panel A) and −1093.71 (panel B). Marginal effects are calculated from a multinomial probit regression evaluated at the mean value of explanatory variables (discrete changes from 0 to 1 for dummy variables). Absolute values of *t*-statistic are in parentheses.

official retirement ages (often 60 or 62). As a result, labour participation rates of the elderly are quite low.

In Table 2, we provide the results of a more in-depth analysis of individual determinants of pension system preferences using a multinomial probit regression. In panel A, we report the marginal effects of objective personal characteristics on the probability of choosing between DB and DC. The rows show how a unit change in one of the personal characteristics affects the probability of an individual choosing one of the answer categories. *T*-values are in parentheses. In panel B, three more explanatory variables are included that represent self-assessed financial expertise and risk tolerance. These latter three variables are not strictly exogenous as they may be affected by the explanatory variables used in panel A. A comparison of panels A and B may shed light on this. Importantly, both financial expertise and risk preferences may be influenced by actual pension plan coverage. Pension plan participation may affect preferences and thus help people become aware of the need to save (Cagan, 1965a,b; Katona, 1965; Gale and Scholz, 1994). To account for this, we replicated the analysis underlying Table 2 including a dummy for coverage in DB or DC plans respectively.<sup>15</sup> The dummy coefficient fails to be significant and results remain virtually unchanged. Theoretically, it is also possible that preferences affect (the choice of) pension plan coverage. However, for the Netherlands this is unlikely, given the dominance of and automatic enrolment in DB plans as well as the fact that pension plan coverage is only one of many job contract characteristics (see also footnote 4).

A few issues stand out from Table 2. Overall, the explanatory power of the regressions is limited, but we are unable to reject a test on the joint significance of all regression coefficients at standard confidence levels. From panel A, we see that respondents in higher age categories

<sup>15</sup> We thank an anonymous referee for this suggestion. Unreported results are available from the authors on request.

increasingly prefer DB systems over DC systems. The probability of a DB choice goes up significantly, while that of a DC choice goes down. Also, males choose significantly more often for DC systems and less often for DB systems than females. Implicitly, this suggests males are more risk-tolerant on average.<sup>16</sup> Higher income as well as higher educated respondents are less likely to say they are indifferent or don't know. That is, they are more inclined to make a choice. This choice may go either way as both the probability of choosing DB and DC rises, but only the DC effects are (marginally) significant. With the introduction of three additional indicators in panel B, size and significance of the explanatory variables from panel A is reduced across the board, suggesting their effect mostly works indirectly through the impact on financial expertise and risk tolerance measures.<sup>17</sup> Instead, financial expertise and risk tolerance enter significantly. Self-assessed financial expertise reduces the likelihood of "don't know" answers as well as "indifference" while increasing the likelihood of preferring DB and DC systems approximately by an equal amount. Apparently, higher confidence in one's own financial expertise increases the likelihood of a clear-cut choice. Higher (self-perceived) risk tolerance increases the likelihood of choosing a DC system and decreases the likelihood of a DB choice. Interestingly, the risk tolerance indicators appear to be complements rather than substitutes. "Age" remains significant after controlling for expertise and risk tolerance. Possibly, the higher preference for DB versus DC for older people reflects their lower flexibility to compensate for disappointing pension income (in a DC system) through labour market participation and a stronger status quo bias due to their longer exposure to a well-functioning DB system.

In a related question, we asked respondents to indicate which percentage of their pre-retirement net wage income they would want to receive as a guaranteed pension allowance after retirement. We formulated the survey question in the following way: *"Imagine a pension scheme that combines the DB and DC system. Part of the pension benefit is guaranteed through collective arrangements, but premiums may fluctuate and part of the pension benefit depends on developments on stock and bond markets but the payable premium is fixed. If you have to choose a combination of these two systems, what percentage of your net wage income would you want to be guaranteed as pension benefits. Your answer may vary from 0% to 90%"*. Out of the total of 1134 respondents, 870 gave a numerical answer to this question and 264 persons said they didn't know. The mean preferred percentage was 69%, while the median equalled 70%. Only 11% of the respondents would be satisfied with a guaranteed pension income below 50% of their net wage income. Hence the willingness to take risks with future retirement income is very low, which supports the findings on risk tolerance in the pension domain in Section 3.2.<sup>18</sup>

In Table 3 we relate the preferred guaranteed pension income to the individual preference for DB or DC. The results show that a choice for a high (low) guaranteed pension income as a percentage of pre-retirement wage income is strongly positively correlated with the preference for a DB (DC) system. Out of the 718 proponents of the DB system, 49% (22.0+27.0) wants a guaranteed pension income of over 70% of wage income. Only 14% in this group settles for 50% or less. On the other hand, only about 13% of those who prefer a DC system require a certain retirement income in excess of 70%, while over 45% in this group is satisfied with an income guarantee of 50% or less. An additional regression to link the preferred guaranteed income percentage to factual individual characteristics was not very successful. The explanatory power was around 1% and only age and

<sup>16</sup> See Jianakoplos and Bernasek (1998) and Schubert et al. (1999) for research on gender and risk tolerance.

<sup>17</sup> A further analysis is outside the scope of this paper and is left for a follow-up paper. Preliminary regressions indeed show strong dependence of risk tolerance measures on individual characteristics.

<sup>18</sup> Van Els et al. (2004) find that people are willing to pay for the security of guaranteed benefits.

Table 3  
Preferred income guarantee versus preferred pension system

Percentages of respondents preferring the specified pension system						
Preferred system (no. respondents)	Preferred net pension income guarantee as a percentage of net final wage income					
	≤ 50	> 50 and ≤ 60	> 60 and ≤ 70	> 70 and ≤ 80	> 80 and ≤ 90	Don't know
DB (718)	13.5	7.2	19.8	22.0	27.0	10.5
DC (136)	45.6	15.4	19.1	8.8	3.7	7.4
Indifferent (115)	27.8	5.2	13.0	17.4	7.8	28.7
Don't know (165)	2.4	1.2	1.2	1.8	4.9	88.5

Percentages in rows may not add up to 100 due to rounding.

gender are individually significant. The preferred guaranteed retirement income increases with age. Men require on average a 4 percentage points lower guaranteed pension income than women. Inclusion of financial expertise and risk tolerance indicators significantly improves the explanatory power to over 6%. Financial expertise is insignificant. Both higher objective and higher subjective risk tolerance lower the required percentage of guaranteed income.<sup>19</sup>

The caveats with respect to the interpretation of the results on the DB–DC preference question apply again. A current lack of financial expertise, unfamiliarity with DC elements and a high level of risk aversion may be partly the result of the prevailing compulsory DB schemes for most respondents that do not provide direct exposure to financial decision making and consequently do not provide many incentives to become more educated. This may contribute to the attractiveness of the status quo situation. In most Dutch retirement plans the implicit rule of thumb (status quo) is that after retirement gross income can be expected to equal about 70% of final gross wage, which after tax would correspond to about 90% of pre-retirement net income due to additional tax advantages of the retired. Nevertheless, Table 3 shows that there is a lot of heterogeneity in the stated preferences. Only a minority would opt for a full DB retirement plan. Overall, the main message is that the (un)willingness to accept uncertainty with respect to retirement benefits strongly positively correlates with a preference for a DC (DB) system. In that sense, the results are internally consistent.

To assess the desired degree of autonomy in portfolio investments, we have asked whether, in the hypothetical situation of an individual DC scheme, respondents would want to have control over individualized pension fund accounts (having the opportunity to invest their pension money according to an investment profile offered by their pension fund or according to their own investment choices) or whether they would rather delegate this to the pension fund. Almost half of our sample (48.4%) would leave investment decisions to the pension fund, 26.1% prefers autonomy, 10.6% is indifferent and 14.9% doesn't know. Table 4 summarizes the link with pension system preferences. The set-up is analogous to Table 3. Again, the dichotomy between supporters of DB versus DC systems is clear-cut. A large majority of the former group prefers the pension fund to decide on investments, while an equally large majority of the latter group prefers individual autonomy.

The results of a multinomial probit regression of the preferred degree of investor autonomy on individual characteristics are presented in Table 5. The set-up is similar to Table 2. In Panel A most coefficients are insignificant. Only the probability of respondents preferring delegation to the pension fund significantly increases with education, while men are significantly more likely to choose investor autonomy. When the indicators for financial expertise and risk tolerance are included (panel B), the education effect remains significant, while the gender effect disappears. Self-assessed higher financial expertise is shown to strongly increase the preference for individual

<sup>19</sup> Detailed regression results are available from the authors upon request.

Table 4  
Preference for investor autonomy versus preferred pension system

Percentages of respondents preferring the specified pension system				
Preferred system (no. respondents)	Pension fund	Investor autonomy	Indifference	Don't know
DB (718)	60.7	24.5	9.1	5.7
DC (136)	33.8	56.6	7.4	2.2
Indifferent (115)	37.4	23.5	30.4	8.7
Don't know (165)	14.6	9.7	6.1	69.7

Percentages in rows may not add up to 100 due to rounding.

autonomy and to marginally reduce the preference for pension fund control. The risk tolerance indicator based on the Barsky lifetime income gamble has a strong positive impact on the probability of investor autonomy. This finding opposes the conclusion by Kapteyn and Teppa (2002). Typically, and in line with intuition, income, education, financial expertise and risk tolerance all reduce the likelihood that respondents answer “don't know” in panels A and B.<sup>20</sup>

In order to see whether an increase in financial expertise would change the preference for investor autonomy we have asked respondents whether the opportunity to take a course (for free) to upgrade their financial expertise would affect their willingness to take control over their retirement savings. 42% respond that financial education would make them more inclined to take control of their retirement portfolio; another 42% believe it would not, and the remaining 16% do not know. The answers are correlated with the respondents' preference for DC over DB: six out of ten respondents who prefer a DC system believe that they would take more control over retirement savings investment when offered the possibility to upgrade their financial knowledge.

In summary, we firstly conclude that a large majority of our sample prefers a DB system over a DC system, prefers a relatively high percentage of current income to be guaranteed after retirement, and prefers a professional pension fund to decide about portfolio investment for retirement. Moreover, respondents generally make internally consistent choices on these different items. Secondly, respondents are quite risk averse on average, especially in the pension domain, and financially illiterate. We find that that self-assessed and measured risk attitudes as well as self-assessed financial expertise are significant explanatory variables with respect to pension scheme preferences. Respondents who are more inclined to take risk and consider themselves to be financially sophisticated are more likely to prefer a DC plan, are more likely to prefer a relatively low guaranteed retirement income, and are more likely to prefer investor autonomy. The effects of other explanatory variables like age, gender, income, or education on pension preferences are mostly small and insignificant once financial expertise and risk tolerance are accounted for. An important caveat in our analysis is the potential endogeneity of (self-assessed) risk tolerance and financial literacy as these themselves may be functions of exposure to a specific pension scheme.

#### 4.2. What would retirement plan participants do in case of investor autonomy?

We now focus on the issue how pension plan participants (say they) would behave if they would have to make their own investment decisions.<sup>21</sup> In the hypothetical situation of

<sup>20</sup> When included the dummy on current DC coverage is insignificant and does not change the results.

<sup>21</sup> In this respect it is worthwhile to stress that empirical evidence indicates that individuals are highly sensitive to defaults, notably in the area of investing for retirement (Cronqvist and Thaler, 2004).

Table 5  
Determinants of the preferred degree of autonomy

	Preference			
	Pension fund	Investor autonomy	Indifferent	Don't know
<i>(A) Marginal effects on probability for each preference excluding financial expertise and risk attitude</i>				
Age	0.002 (1.12)	0.000 (0.32)	−0.001 (0.62)	−0.002 (1.44)
Log(Income)	0.015 (1.55)	0.004 (0.51)	−0.005 (0.89)	−0.015 (2.48)
Education	0.064 (2.08)	0.027 (0.98)	−0.007 (0.39)	−0.084 (4.01)
Male	−0.038 (1.22)	0.083 (3.07)	−0.025 (1.27)	−0.020 (0.89)
Single	−0.033 (0.96)	0.040 (1.28)	−0.020 (0.99)	0.013 (0.54)
<i>(B) Marginal effects on probability for each preference including financial expertise and risk attitude</i>				
Age	0.001 (0.56)	0.002 (1.39)	−0.001 (0.54)	−0.002 (2.14)
Log(Income)	0.018 (1.87)	−0.003 (0.34)	−0.005 (0.79)	−0.011 (1.86)
Education	0.078 (2.46)	−0.016 (0.56)	0.001 (0.03)	−0.063 (2.95)
Male	−0.017 (0.51)	0.022 (0.78)	−0.015 (0.73)	0.009 (0.43)
Single	−0.029 (0.84)	0.032 (1.01)	−0.023 (1.09)	0.021 (0.82)
FinExpert	−0.016 (1.51)	0.067 (7.37)	−0.017 (2.46)	−0.034 (4.58)
RiskTolSubj	−0.009 (0.72)	0.009 (0.77)	0.009 (1.17)	−0.009 (0.99)
RiskTolObj	−0.015 (1.28)	0.034 (3.26)	0.004 (0.52)	−0.022 (2.72)

Number of observations: 1134. Log likelihood: −1360.16 (panel A) and −1307.75 (panel B). Marginal effects are calculated from a multinomial probit regression evaluated at the mean value of explanatory variables (discrete changes from 0 to 1 for dummy variables). Absolute values of *t*-statistic in parentheses.

individualized DC pension accounts we first ask how much of the retirement savings portfolio a respondent would invest in stocks and bonds respectively. The preferred percentage of stocks in the portfolio ranges from zero (portfolio completely in the form of bonds) to 100% (portfolio completely in stocks). Fig. 3 presents the results. Out of 1134 respondents, 877 give a numerical answer. Only those respondents are included in Fig. 3. The median and mean response both equal 30%. Those who previously indicated to prefer a DC system (128 out of 877) on average apparently prefer to hold a larger part of their portfolio in stocks than those who prefer a defined benefit system (610 respondents). The mean response of the former group equals 39.6%, while that of the latter equals 28.7%. The preferred percentage of stock by the respondents in our sample is below that typically found in US DC schemes where participants choose the composition of their retirement savings portfolio (Benartzi and Thaler, 2002). Poterba et al. (2003) conclude that households that do not have extremely high risk aversion would be better off, ex ante, by holding a portfolio of stocks rather than bonds. Potential explanations for the relatively low preferred percentage of stocks are the timing of the survey in 2004—with the stock market decline over the period 2000–2003 fresh in mind—as well as low financial expertise and/or risk tolerance.

In Table 6, we display results for two related regressions with the preferred stock percentage as the dependent variable. In the first regression, only strictly exogenous personal characteristics are used as explanatory variables. The results only show a significant gender effect. Being male (female) increases (decreases) the proportion of stock holdings by 6 percentage points on average. In the second regression, indicators of financial expertise and risk attitude are added. Overall, the explanatory power substantially increases. Financial expertise and the willingness to take risks appear the most important factors in determining the preferred portfolio mix. The gender effect is reduced in size but remains marginally significant. The finding that woman are more risk averse is consistent with earlier research (Jianakoplos and Bernasek,

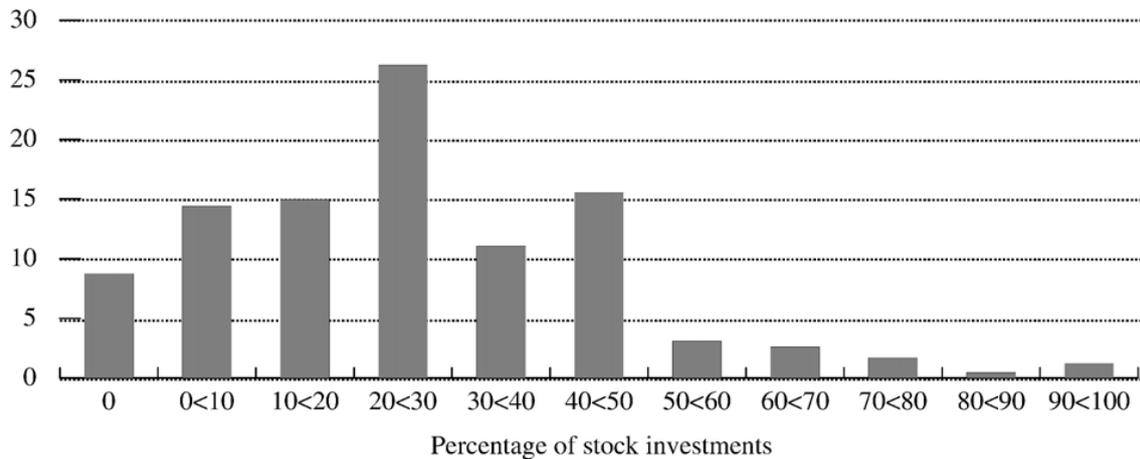


Fig. 3. Preferred retirement savings composition: percentage stock in individual portfolio. Percentage of respondents ( $N=877$ ).

1998), although other studies come to opposite conclusions (e.g. Schubert et al., 1999). Our results imply that even after controlling for risk tolerance, women prefer less stock in their retirement savings portfolio.

Following the survey question on the preferred stock percentage, we first asked which factors played a role in that (initial) choice, and second which factors could play a role in the future in adjusting the preferred percentage of stocks in the total portfolio. Table 7 summarizes the outcomes. Overall, about 90% of the respondents states that either personal circumstances—age, family composition, personal financial position or accumulated pension claims—or general economic conditions and financial markets expectations have played a role in choosing the preferred portfolio mix and will continue to influence future adjustment decisions. About 10% regards none of these factors as relevant for either the initial portfolio composition or future adjustments. Apart from age, determinants of initial choice of portfolio and determinants of later changes are more or less the same. Interestingly, 44% of the respondents indicate age as a relevant determinant of their initial choice, whereas our regression analysis (see Table 6 above) indicates

Table 6  
Determinants of preferred retirement portfolio composition

	Preferred percentage of stocks	
	A	B
Age	-0.075 (1.11)	0.056 (0.86)
Log(Income)	0.367 (0.87)	0.057 (0.12)
Education	1.635 (1.15)	-0.070 (0.05)
Male	6.051 (4.11)	2.590 (1.82)
Single	0.304 (0.19)	-0.121 (0.08)
FinExpert		2.290 (5.13)
RiskTolSubj		3.418 (6.21)
RiskTolObj		2.237 (4.25)
Constant	26.171 (6.49)	3.961 (0.92)
Adj. $R^2$	0.018	0.141

Number of observations: 877. Regression coefficients from an ordinary least squares regression. Regression A (B) excludes (includes) financial expertise and risk attitude. Absolute values of  $t$ -statistic in parentheses.

Table 7

Underlying determinants of initial choice and subsequent changes in retirement portfolio composition according to respondents

Percentage of respondents naming the category		
Determinant	Initial composition	Reasons for change
None	9.6	8.3
Age	44.4	23.4
Family composition	24.3	18.1
Personal financial situation	52.9	49.4
Accumulated pension wealth	38.8	31.9
General economic condition	49.8	59.3
Financial market expectations	39.9	45.9
Other	1.9	1.6

Number of observations: 877. Percentages do not add up to 100 as respondents could give several answers.

that in a multivariate analysis, age is not significant. The percentage of respondents that believes age to be an important factor for future portfolio adjustments is much lower, namely 23 as opposed to 44 for the initial composition. An explanation might be that age—unlike the other factors—is perfectly predictable. People may choose their optimal portfolio mix now given their (known) time to retirement and may not consider future changes. All other factors are subject to (unexpected) changes and as such may require portfolio adjustments from the perspective of the respondents. Not all factors are equally important, though. Especially one's personal financial situation (49%) and the two indicators of general economic circumstances (59% and 46%, respectively) apparently are strong drivers of future investment decisions. About half of our respondents would consider changing their own portfolio mix in case of (important) changes in any of these three variables. Assuming that changes in these circumstances are quite likely to happen more than once over, say, a 10-year period, this implies a relatively high (stated) degree of activism in portfolio management. Interestingly, empirical evidence in previous studies (for example Ameriks and Zeldes, 2001) typically reports a much lower degree of activism. Possibly, the respondents in our sample overestimate their activism.

Subsequently, we relate the stated degree of activism to individual characteristics using probit regressions with the dependent variable being 1 when respondents state that specific individual or general circumstances do not influence their choice of portfolio mix and 0 when they state that one or more of the arguments in Table 7 play a role in their decision. In Table 8, we report the results. Generally, the overall explanatory power is low and coefficients are insignificant. Only self-assessed financial expertise has a sizeable and significant effect on the degree of stated activism. Apparently, higher perceived financial expertise leads individuals to stronger believe in the information in specific economic indicators and/or in their own ability to interpret such information. Thus, increased financial expertise may be an important driving force for people's willingness to actively manage their portfolio.<sup>22</sup> Risk tolerance, on the other hand, does not play any role.

<sup>22</sup> Similar regressions to those in Table 8 were performed for individual drivers of portfolio choice and portfolio adjustment respectively. That is, the dependent variable was set to one when a respondent stated that a specific determinant—say one's personal financial position—would not be a factor in his portfolio choice or adjustment and to zero when it would. Consistently, higher financial expertise is significant with a negative sign in these regressions. The effect is strongest for financial market expectations, family composition and age, and weakest for the case of general economic conditions and one's personal financial situation.

Table 8  
Determinants of planned activism

	Initial composition does not depend on economic factors		Change in composition does not depend on economic factors	
Age	-0.000 (0.08)	-0.000 (0.49)	0.000 (0.27)	-0.000 (0.19)
Log(Income)	-0.008 (1.27)	-0.006 (1.00)	-0.011 (2.05)	-0.010 (1.80)
Education	-0.027 (1.32)	-0.014 (0.70)	-0.030 (1.56)	-0.019 (1.03)
Male	-0.008 (0.38)	0.013 (0.62)	-0.002 (0.13)	0.016 (0.84)
Single	-0.018 (0.80)	-0.016 (0.74)	-0.018 (0.88)	-0.016 (0.81)
FinExpert		-0.027 (3.84)		-0.021 (3.18)
RiskTolSubj		0.002 (0.30)		-0.002 (0.28)
RiskTolObj		-0.006 (0.84)		-0.007 (0.93)
Loglikelihood	-265.21	-274.32	-246.99	-239.65
Pseudo $R^2$	0.009	0.033	0.017	0.047

Number of observations: 877. Marginal effects on probability are calculated from probit regressions evaluated at the mean value of explanatory variables (discrete changes from 0 to 1 for dummy variables). Absolute values of  $t$ -statistic in parentheses.

In summary, when forced to choose, respondents pick a relatively safe portfolio with only about 30% of stocks on average. High risk tolerance and self-assessed expertise—as well as being male—raise the chosen percentage of stocks in portfolio. Respondents also think they will be quite activist in changing their portfolio when conditions change. Especially those who think they are better experts are inclined to (say they will) change their portfolio.

#### 4.3. Are retirement plan participants able to choose?

In order to further investigate whether respondents are able to make retirement investment choices and have well-defined preferences, we carry out an experiment similar to the one by [Benartzi and Thaler \(2002\)](#). We asked respondents in our sample to rate the attractiveness of two benefit schemes on a 5-point scale. One scheme was based on each individual's own preferred portfolio (as answered in the first questionnaire), the other on the median portfolio choice of all respondents (consisting of 30% stocks and 70% bonds). We did not reveal that one of the two benefit schemes was based on the individually chosen portfolio.

We constructed the benefit schemes using Monte Carlo simulations. The distribution of retirement income conditional on gross salary of the respondent, the percentage of stock investment, and the mean and volatility of bond and stock returns is determined using 1000 runs with a 40 year horizon. We assume annual bonds returns to be drawn randomly from a distribution with a mean of 5% and a standard deviation of 4%, taking account of persistence in interest rates. Stock returns are randomly drawn from a distribution with a mean of 8% and a standard deviation of 18%. These distributional assumptions match historical data and are quite standard in pension funds' ALM analysis. We assume the annual premium contribution to be 13% of the individual's gross wage, which currently is the break-even point in a typical Dutch pension scheme (see [Van Rooij et al., 2004](#)). The premium contributions are invested in stocks and bonds (with an average maturity of 5 years) according to the portfolio mix chosen by the respondent. The portfolio is rebalanced at the end of each year as to maintain the chosen mix of stock and bond investment. After each 40-year run, final wealth is invested in an annuity, the annual pension benefit of which is assumed to equal 1/15th of final wealth (roughly based on Dutch mortality tables). We then

## Box 1

**Question on the rating of pension schemes**

Consider two pension schemes without guaranteed pension benefit. The actual benefit depends on among others general economic and financial market developments. The table below presents the retirement benefit you may expect under each benefit scheme. The numbers present gross benefits in euro per month. The pension contributions you have to pay are equal in both arrangements. The numbers are excluding the state pension benefit (this gross benefit equals €921 per month for singles and €632 per person each month for married couples and people living together). Any pension plan you may have arranged on top of these arrangements is not included. For each benefit scheme we present three possible outcomes (an unfavourable scenario, a favourable scenario and a middle variant).

Economic scenario	Pension scheme I	Pension scheme II
Very unfavourable	610	540
Average	920	1012
Very favourable	1414	1920

The interpretation of these numbers is as follows. There is a 5% probability of a retirement income above the very favourable retirement income, there is a 50% probability of a retirement income above the average retirement income and there is a 5% probability of a retirement income below the very unfavourable retirement income.

Question: How do you rate these two pension schemes on a scale from 1 to 5 with 5 being 'very attractive' and 1 being 'very unattractive'?

confront each respondent with the 5th, 50th and 95th percentile of the resulting individualized benefit scheme.

Box 1 presents an example for the case of an employee with a gross salary of €2300 per month who indicated his preferred portfolio consisted of equal proportions stocks and bonds. Pension scheme I is the result of an investment strategy of 30% stocks and 70% bonds (the median choice) and pension scheme II is the result of the investor's own preferred portfolio. The latter one has a higher upward potential but also more risk on the downside. Note though that the pattern is asymmetric. The extra downside risk of portfolio II is relatively small compared to its extra upside potential. The numbers exemplify (1) the fact that the riskiness in terms of holding stocks is relatively smaller—at least in terms of probabilities—on a long horizon than on a short one and (2) the fact that yearly contributions become relatively more (less) important when accumulated wealth is eroded (increased) by a number of years with disappointing (encouraging) returns in the stock market.

In Table 9, we present the resulting distribution of ratings. We distinguish between three groups of respondents: those who prefer a relatively safe portfolio (334 respondents with a preferred percentage of stocks less than or equal to 20), those who prefer a relatively risky portfolio (289 respondents with a preferred percentage of stock greater than or equal to 40), and

Table 9

Attractiveness of two investment portfolios for three groups of respondents

Percentage of respondents and mean rating						
Rating attractiveness portfolio	% Stocks $\leq 20\%$		20 < % Stocks < 40		% Stocks $\geq 40$	
	Median (30%)	Own	Median (30%)	50%	Median (30%)	Own
1 (very unattractive)	4.5	10.2	3.9	2.8	4.8	1.7
2	7.8	21.9	19.3	10.6	19.0	15.2
3 (neutral)	30.2	47.3	47.6	31.1	46.7	27.0
4	42.2	17.7	26.8	45.3	24.9	39.5
5 (very attractive)	15.3	3.0	2.4	10.2	4.5	16.6
Mean rating	3.56	2.81	3.04	3.50	3.05	3.54
<i>t</i> -test ( $H_0$ : mean ratings are equal)	$t=10.29$ ( $p=0.000$ )		$t=5.78$ ( $p=0.000$ )		$t=6.12$ ( $p=0.000$ )	

Total number of observations: 877 (334 respondents indicated to invest 20% stock or less, 254 respondents indicated to invest between more than 20% but less than 40% stocks and 289 indicated to invest 40% stocks or more). Percentages in columns may not add up to 100 due to rounding.

those with an average portfolio (254 respondents with a preferred stock percentage between 20% and 40%). The first two groups unknowingly rate their own portfolio and the median portfolio, the last one its own portfolio with the 50% portfolio.<sup>23</sup>

As Table 9 shows, across all groups respondents prefer the most risky of the two portfolios presented to them, regardless of their initial choice. Consider first the group of risk averse respondents (<20% stocks). On average, they rate the pension scheme based on the median portfolio 3.56 as opposed to 2.81 for the pension scheme based on their own preferred portfolio. In fact, 61.1% of this group of conservative investors prefers the median to their own portfolio, while only 15.6% prefers their own portfolio and 23.3% of the group is indifferent. Put differently, ex post they regret their original choice. The group of respondents that favoured a risky portfolio (>40% stocks), on the other hand, rates the median portfolio as less attractive than their own (average ratings of 3.05 and 3.54 respectively) on average and typically sticks to the original choice. 59.5% of the respondents in this group prefer their own portfolio to the median. Finally, the middle group that chose a preferred stock percentage close to the median (between 20% and 40%) rates their own portfolio on average at 3.04 and the more risky 50% portfolio at 3.50. 55.9% of this group prefers the 50% portfolio to their own original choice.<sup>24</sup>

Our results contrast markedly with Benartzi and Thaler (2002). Whereas in their sample respondents tend to go for the median portfolio irrespective of their initial portfolio choice, our respondents unambiguously choose the riskier portfolio of the two, regardless of their initial choice. Other empirical evidence on the consistency of preferences is mixed as well, see Benartzi and Thaler (2001) and Huberman and Jiang (2004).

One explanation for our finding—see Benartzi and Thaler (1999)—is that our respondents are subject to ‘myopic loss aversion’. Under this assumption, the probability of a short-term loss receives too much weight in long-term portfolio decisions. When confronted with the (true) distribution of long-run returns, individuals then switch to more risky portfolios. A second

<sup>23</sup> In fact, for simplicity we approximate individually chosen own portfolios with stock percentages between 20% and 40% with the uniform mean portfolio, which has 30% stocks.

<sup>24</sup> We have also replicated the analysis in Table 9 separately for those respondents covered by DC and DB plans. The results do not show significant differences. In interpreting all these results it is important to note that the sample with DC participants is small and heterogeneous, including those participating in collective retirement plans without choice options.

explanation could be that the respondents' expectations of asset markets may differ from ours. The observed shift towards a preference for more risky portfolios then arises from the fact that respondents are more pessimistic on the stock market's risk return profile relative to the bond market than implied by our assumptions underlying the Monte Carlo simulations.<sup>25</sup> Note that at the time of the survey in 2004, stock market returns had been disappointing for a number of years. Either way, both explanations suggest that many respondents currently lack the skills for being in charge of the investment for retirement purposes. The shift towards a more risky portfolio by a majority of the respondents suggests that either the initial preferences were fragile and not firmly grounded or that they were based on an unrealistically pessimistic—in comparison with historical averages—assessment of the distribution of stock versus bond returns.<sup>26</sup>

## 5. Summary and conclusions

In the Netherlands, the large majority of employees compulsory participates in the DB retirement plan of their employer. For a long time, the national pension system worked satisfactorily. The average employee typically never had much influence on pension fund policies and—possibly as a consequence—is relatively ignorant about many of his own retirement plan's details. Although employee confidence in the system and in the safety of future pension allowances has been and still is very high, the fall in stock prices around the turn of the century, the new international accounting standards and the ageing of the population have triggered a debate on the sustainability and design of the system. Many funds have switched from a system where pension benefits are based on the final gross wage to a system that is based on career-average wages. After the 2000–2003 stock market crash, pension premiums were raised while indexation was cut by many pension funds to compensate for large investment losses. Some pension funds in the Netherlands have started to experiment with mixed DB/DC and even full (collective) DC systems.

Against this background, this paper provides evidence on pension preferences and investor autonomy with respect to retirement savings in the Netherlands. The focus is on whether employees are willing and able to deal with more retirement plan choice. We use questionnaire responses from about 1000 members of the household panel run by CentERdata, which is a representative sample of the Dutch population.

Our main conclusions are the following. Risk aversion is quite high on average. When asked about risk attitude with respect to general matters, financial matters and pension matters respectively, risk aversion is highest in the pension domain. Simultaneously, the typical employee considers himself to be financially illiterate. Lack of exposure to self-directed savings plans and investments may go some way in explaining both the low level of self-assessed financial expertise and the high level of self-assessed risk aversion. However, US evidence indicates that financial literacy has not disappeared with the widespread introduction of individual DC plans (Lusardi and Mitchell, 2005).

<sup>25</sup> Potentially, the results may be affected by the emergence of important new economic information in the period between the two surveys that may have changed respondents' view on the attractiveness of the various portfolios. Given the lack of major economic developments during the period under investigation, we doubt the quantitative importance of such effect.

<sup>26</sup> One might argue that respondents are sensitive to the way the distribution of pension benefits is presented. However, Benartzi and Thaler (1999) show that individuals are not very sensitive to variations in the presentation of the retirement income distribution.

The vast majority of Dutch employees is in favour of compulsory saving for retirement and favours a DB pension system. This preference, according to the employees, is primarily due to their wish not to spend time on retirement savings decisions and to a perceived self-control problem, but respondents may also be affected by a status quo bias. If offered a combined DB/DC system, the majority would choose a guaranteed pension income of 70% or more of their net labour income. In case of the introduction of an individual DC scheme, most respondents would prefer to delegate decisions about the investment of their retirement portfolio to a pension fund. The possibility to enrol in a program for free to improve financial expertise would only induce a minority—42%—of the employees to become more supportive of investor autonomy.

Self-assessed risk tolerance and financial expertise are important explanatory variables of pension system attitude. Respondents who are more inclined to take risk and consider themselves to be financially sophisticated are more likely to prefer a DC plan, to prefer a relatively low guaranteed retirement income, and to prefer investor autonomy. When given investor autonomy, the typical respondent chooses a conservative portfolio with stocks making up only 30% of the average portfolio. Employees expect to be quite activist in managing the composition of their retirement savings portfolio if they were forced to investor autonomy in an individual DC scheme. Drivers behind a planned change in portfolio composition are changes in one's personal financial situation, general economic conditions, and expectations of financial markets. Respondents with more confidence in their financial expertise and lower risk aversion choose more risky portfolios and are more inclined to actively manage their portfolio when circumstances change.

In a final experiment we show that respondents who originally stated that they would prefer a relatively safe investment portfolio for retirement with only a small proportion of stocks tend to switch to a riskier portfolio when shown the distribution of long-run returns on their own portfolio and the mean risk portfolio (containing more stocks). The same holds for investors who originally opted for a mean risk portfolio. They too switch to a more risky portfolio. This result suggests that many Dutch pension plan participants currently lack the necessary skills to be in charge of their own investment portfolio for retirement purposes.

Our finding that most respondents are reluctant to switch from a DB to a DC system with more freedom of choice is not surprising, given their high risk aversion in the pension domain and their low self-assessed degree of financial expertise. However, risk tolerance and financial literacy are likely to be endogenous, possibly depending on individuals' exposure to self-directed savings and investment plans. The conclusions in this paper are conditional on current preferences and knowledge. Changes in the institutional design may change preferences and behaviour. Be that as it may, changes in the pension scheme design will affect financial expertise and risk attitude of employees only very gradually. The policy implication therefore is that in case of a change over to more individualized DC plans in the Netherlands, many employees would have to be guided in their retirement planning, for example by mandatory collective arrangements, made-to-measure defaults or plans offering the possibility of commitment to long-term savings strategies. Even within DC systems, there are important gains to have from maintaining compulsory savings to avoid the pitfall of undersaving due to self-control problems and procrastination. Our results indicate that a large fraction of employees is aware of this problem. Similarly, given myopic loss aversion and lack of financial expertise, a switch to a system with full autonomy over investment choices is far from recommendable. In any case more freedom of choice in employee retirement plans would have to be accompanied by appropriate default portfolios and/or a limited menu of investment options with differing risk characteristics. Finally, liberalization of the market for pension investment would increase the importance of supervision and regulation of the market for professional pension advice.

## Acknowledgements

The authors are grateful to two anonymous referees, to Rob Alessie, Dimitris Georgarakos, Lex Hoogduin, Kristin Kleijnans, James Poterba (editor), Fred van Raaij, Susann Rohwedder, Margreet Schuit, Paul Sengmüller, Arthur van Soest, Peter Vlaar, Peter van Els, and to participants of the 7th DNB Annual Research Conference on Household Behaviour and Financial Decision Making (Amsterdam, November 2004), the 6th RTN Conference on Economics of Ageing (Frankfurt, May 2005) and seminars at DNB, Utrecht University and Netspar, for their valuable comments and suggestions. Moreover, we thank the staff of CentERdata and in particular Corrie Vis for their assistance in setting up the survey and the fieldwork.

## References

- Ameriks, J., Zeldes, S., 2001. How do household portfolio shares vary with age? Mimeo. Columbia Graduate School of Business.
- Barsky, R.B., Juster, F.T., Kimball, M.S., Shapiro, M.D., 1997. Preference parameters and behavioural heterogeneity: an experimental approach in the health and retirement study. *Quarterly Journal of Economics* 112, 729–758.
- Benartzi, S., Thaler, R., 1999. Risk aversion or myopia? Choices in repeated gambles and retirement investments. *Management Science* 45 (3), 364–381.
- Benartzi, S., Thaler, R., 2001. Naïve diversification strategies in defined contribution saving plans. *American Economic Review* 91 (1), 79–98.
- Benartzi, S., Thaler, R., 2002. How much is investor autonomy worth? *Journal of Finance* 57 (4), 1593–1616.
- Cagan, P., 1965a. The effect on pension plans on aggregate saving: evidence from a sample survey.
- Cagan, P., 1965b. National Bureau of Economic Research. New York.
- Chiang, L.C., Krosnick, J.A., 2003. Comparing oral interviewing with self-administered computerized questionnaires: an experiment. Ohio State University.
- Choi, J., Laibson, D., Madrian, B., Metrick, A., 2004. For better or for worse: default effects and 401(k) savings behaviour. In: Bodie, Z., Shoven, J.B., Wise, D. (Eds.), *Perspectives on the Economics of Aging*. University of Chicago Press, Chicago.
- Cronqvist, H., Thaler, R.H., 2004. Design choices in privatized social-security systems: learning from the Swedish experience. *American Economic Review* 94 (2), 424–428.
- Donkers, B., Van Soest, A., 1999. Subjective measures of household preferences and financial decisions. *Journal of Economic Psychology* 20, 613–642.
- Gale, W.G., 1999. Comments to Annamaria Lusardi, Information, Expectations and Savings for Retirement. In: Aaron, H.J. (Ed.), *Behavioral dimensions of retirement economics*, Brookings Institutions Press, Washington DC/Russel Sage foundation Newark, New York, pp. 116–123.
- Gale, W.G., Scholz, John Karl, 1994. IRAS and household saving. *American Economic Review* 84 (5), 1233–1260.
- Guiso, L., Haliassos, M., Jappelli, T., 2002. *Household Portfolios*. MIT Press, Cambridge.
- Gustman, A.L., Steinmeier, T.L., 1999. Effects of pensions on savings: analysis with data from the health and retirement study. *Carnegie Rochester Conference Series on Public Policy*, pp. 271–324 (50).
- Huberman, G., Jiang, W., 2004. The 1/N Heuristic in 401(k) Plans. Columbia Business School Working Paper.
- Hurd, M., Rohwedder, S., 2005. Changes in consumption and activities at retirement. DNB Working Paper, vol. 39.
- Jianakoplos, N.A., Bernasek, A., 1998. Are women more risk averse? *Economic Inquiry* 36 (4), 620–630.
- Kapteyn, A., Teppa, F., 2002. Subjective Measures of Risk Aversion and Portfolio Choice. Center/RAND.
- Katona, G., 1965. *Private Pensions and Individual Saving*. University of Michigan.
- Lusardi, A., 1999. Information, Expectations, and Savings for Retirement. In: Aaron, H.J. (Ed.), *Behavioral dimensions of retirement economics*, Brookings Institutions Press, Washington DC/Russel Sage foundation Newark, New York.
- Lusardi, A., Mitchell, O.S., 2005. Financial Literacy and Planning: Implications for Retirement Wellbeing. DNB Working Paper, vol. 78.
- Mitchell, O., Zeldes, S., 1996. Social security privatization: a structure for analysis. *American Economic Review* 86 (2), 363–367.
- Poterba, J.M., Venti, S.F., Wise, D.A., 2003. Utility evaluation of risk in retirement saving accounts. NBER Working Paper, vol. 9892.

- Poterba, J.M., Venti, S.F., Wise, D.A., 2004. The transition to personal accounts and increasing retirement wealth: macro- and microevidence. In: Wise, D.A. (Ed.), *Perspectives on the Economics of Aging*. University of Chicago Press.
- Samuelson, W., Zeckhauser, R., 1988. Status quo bias in decision making. *Journal of Risk and Uncertainty* 1, 7–59.
- Scholz, J.K., Seshadri, A., Khitatrakun, S., 2004. Are americans saving “optimally” for retirement? Mimeo.
- Schubert, R., Brachinger, H.W., Brown, M., Gysler, M., 1999. Are women really more risk-averse? *American Economic Review* 89 (2), 381–385.
- Thaler, R., Shefrin, H., 1981. An economic theory of self-control. *Journal of Political Economy* 89, 392–406.
- Thaler, R.H., Benartzi, S., 2004. Save more tomorrow: using behavioural economics to increase employee saving. *Journal of Political Economy* 112 (1), 164–187.
- Van Els, P.J.A., Van den End, W.A., Van Rooij, M.C.J., 2004. Pensions and public opinion: a survey among Dutch households. *De Economist* 152 (1), 101–116.
- Van Rooij, M.C.J., Siegmann, A.H., Vlaar, P.J.G., 2004. PALMNET: a pension asset and liability model for the Netherlands, DNB Research Memorandum WO 760.
- Vos, K.de, Alessie, R.J.M., Fontein, P.F., 1998. Pensioenpreferenties (Pension preferences). *Economisch Statistische Berichten*.

Author's personal copy