Using Stated Preferences Data to Analyze Preferences for Full and Partial Retirement

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Abstract

Structural models explaining retirement decisions of individuals or households in an inter-temporal setting are typically hard to estimate using data on actual retirement decisions, because choice sets are complicated and uncertain, and information on the choice sets in the data is incomplete. This paper describes an experiment in which both perceived retirement opportunities and preferences for retirement are measured. For the latter, respondents evaluate how attractive they find a number of hypothetical, simplified, retirement trajectories involving early retirement, late retirement, and gradual retirement, each with its own corresponding income path. The questions were fielded in the Dutch CentERpanel. The data on preferences are used to estimate a stylized structural model of retirement decisions under free choice. Simulations combine the information on perceived opportunities with estimated preferences and show the importance of restrictions.

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1. **Introduction**

Structural models explaining retirement decisions of individuals or households in an inter-temporal setting are typically hard to estimate using data on actual retirement decisions, because choice sets are complicated and largely unobserved by the researcher. Furthermore, individuals face various sources of uncertainty, which are, again, only partly known to the researcher. See, for example, Lumsdaine and Mitchell (1999) for an overview.

This paper describes an experiment in which preferences are estimated by asking respondents in a Dutch Internet panel (the CentERpanel) to rate a number of hypothetical, simplified, retirement trajectories involving early and late retirement (with corresponding income paths). We also consider gradual retirement plans, where respondents can reduce their working week to three days per week for some years, before retiring completely. In addition, data on respondents' perceptions of their retirement opportunities are collected, describing perceived flexibility of retirement age and retirement replacement rate as a function of retirement age, and opportunities for gradual retirement.

Some gradual retirement programs have been created during the past 20 years, first in combination with early retirement programs and later as an attempt to reduce complete withdrawal from the labor market and to increase the activity rate among the age groups 50-65. In the United States, about 18% of the cohort of salaried workers born between 1931 and 1941 were in phased or partial retirement in 1998 and 2000 (Scott, 2004). In most western countries, the fraction of male and female part-time workers in the age group 60-64 is larger than the fraction of part-time workers among males or females in the population at large (Latiluppe and Turner, 2000). A major Dutch pension fund has recently also suggested to introduce gradual retirement plans for after age 65 (which is the standard retirement age in The Netherlands). In order to design successful plans that are both attractive to older workers and sustainable, it is essential to know the older workers' and their employers' preferences for such plans. More generally one needs to know the trade offs between retiring earlier or later and having less or more income before and after the standard retirement age.

This paper focuses on separate measurement of the preferences of workers and of the restrictions they face. The economic literature explains labor supply behavior at older age in an inter-temporal framework (Lazear, 1986; Hurd, 1990), where workers choose the optimal combination of work, leisure, income, and consumption, taking account of the future by maximizing expected utility over the life cycle. Sophisticated empirical models for retirement have been developed by, e.g., Stock and Wise (1990) and Rust and Phelan (1997). These models rely on observed actual behavior of the individuals in the sample, i.e., on their *revealed preferences* (RP). The main drawback of this type of models is that they require strong assumptions on the (unobserved) expectations and opportunities that workers have. In general it is not clear to which extent observed choices represent workers' preferences and to which extent they represent very limited choice sets (cf. Hurd, 1996). This is particularly problematic for gradual retirement plans, since existing survey data often do not provide information on whether an employer offers such a plan, and, if there is a plan, which trajectory of current income and future pension income that plan entails.

Our analysis of the respondents' choice sets and restrictions is based upon subjective questions regarding whether a respondent's employer would allow retirement before or after the standard retirement age, and, if so, how retiring earlier or later would affect retirement income. Moreover, we ask whether respondents think their employer would allow for phased retirement, i.e., reducing the number of hours worked per week before retiring completely.

Our estimates of preferences are based upon stated preference (SP) experiments. Survey respondents were shown retirement paths with different hours and income patterns over time. They were asked to indicate how attractive they found each plan, on a scale from 1 (very unattractive) to 10 (very attractive). Citing Louviere et al. (2000), "SP data can capture a wider and broader array of preference-driven behaviors than revealed preference (RP) data on actual behavior, allowing for experiments with choice opportunities that do not yet exist in the market." We may add to this that we not only want to estimate preferences for retirement plans that do not yet exist, but also for existing plans that workers do not currently have access to.

Until recently economists have been reluctant to use stated preference methods and have wanted to rely exclusively on data on actual behavior. One of the reasons was a negative experience with willingness to pay (WTP) estimates on the basis of SP data, leading to implausibly large estimates of WTP and over-predictions of the use of, for example, new transport means or environment friendly products. In the past few years, however, the use of SP has gained acceptance, particularly since the SP study on measuring time preferences by Barsky et al. (1997). Louvière et al (2002, Chapter 13) give an overview of studies comparing preference parameter estimates based upon SP data with estimates based upon data on actual behavior (RP, revealed preferences) and find that the two are usually quite close, although formal statistical tests sometimes reject exact equality.

The only example of stated preference data for retirement plans that we are aware of is Nelissen (2001). His study uses very detailed plan descriptions. This turned out to generate a fair amount of dissatisfaction and non-response, particularly among respondents for whom retirement is currently not an issue. Thus a trade-off will have to be made between the amount of detail provided and the desire for succinct descriptions.

The current study keeps the retirement trajectories very simple and thus does not allow for estimating all features of preferences that one would ultimately like to know. In this sense, the project can be seen as a pilot, and further experiments should provide additional information. For example, there is no uncertainty and we do not consider the role of the spouse. We are also not explicit about savings. As a consequence, we cannot study the effect of uncertainty and risk aversion on retirement choices, or the role of joint decision making of spouses. We work with a stylized utility function for one individual, modeling within period utility as a function of leisure and (pension and labor) income, focusing on the trade off between income and leisure in the current period as well as in future periods. The parameters of the utility function are allowed to vary across individuals depending on both observed and unobserved characteristics. The results are used to analyze the effects of financial incentives on the choice of retirement path.

The remainder of this paper is organized as follows. Section 2 explains the nature of the experiment. Section 3 describes the data on perceived retirement opportunities. Section 4 describes the stated preference data, introduces a stylized structural model, and presents the estimates of this model. Section 5 presents the results of some simulations based upon the model estimates and the reported restrictions on retirement. Section 6 concludes.

2. Experimental Design

The experiment was fielded in the Dutch CentERpanel, run by CentERdata, a data collection agency affiliated with Tilburg University. The CentERpanel is an ongoing panel comprising about 2,000 households that answer questions on the Internet every weekend. The CentERpanel is not restricted to households with (initial) access to the Internet. Respondents are recruited by telephone. CentERdata provides them with Internet access if they did not have it yet, and gives them a set-top box that can be connected to their television set and a phone line if they do not have a personal computer (and with a television set if they do not have that either). Panel members are selected on the basis of a number of demographics so as to match the distribution of these demographics in the complete Dutch population.

Since this is an ongoing panel, there is a wealth of background information available on the respondents. For example, as part of the "DNB Household Survey", which is administered to the panel members over a number of weekends every year, information is collected on: demographics and work; housing and mortgages; health and income; assets and liabilities; economic psychology. The Internet technology is well suited for adding experimental questions, partly because of the extremely short turn around times between drafting questions and delivery of the collected data (typically a couple of weeks), but also because of the very extensive information already available on the respondents in the sample. The existing information can be added to the newly collected data and used in analysis.

In November 2004, a questionnaire on retirement preferences and actual retirement opportunities and labor market position was fielded among respondents who were either younger than 55 and working for pay, or 55 or older and working for pay when turning 55. This generated a sample of 1395 respondents. Table 1 shows some background characteristics of the respondents.

The sample is selective, since 416 respondents drop out because they do not satisfy the work criterion. These are mainly women, explaining why the remaining sample has more men than women. Similarly, the highly educated and healthy are over-represented compared to the complete CentERpanel representing the Dutch population.

In spite of the work criterion, not everyone younger than 55 gives working for pay as their main occupation; 9.3% of the respondents under 55 report that their main occupation is something else than part-time, full-time work, or self-employment. Two thirds of these respondents are women whose self-reported main occupation is homemaker.

Our questionnaire starts with a number of questions on actual retirement or retirement expectations (depending on whether the respondent is still working or not) and on actual or expected earnings around retirement age. These questions will not be analyzed in the current paper. The next block of questions addresses preferences for retirement, this will be discussed in Section 4. Finally, some questions about opportunities for early, late, and phased retirement are asked, which will be discussed in Section 3.

Table 1. Some Background Characteristics

	Age < 55 (891 obs.)	Age ≥ 55 (504 obs.)
Age	40.9	65.4
Percentage female	42.2	26.6
Education level:		
Primary education	2.1	6.4
Lower vocational	19.2	29.4
Intermediate vocational	26.4	12.3
General, intermediate	11.9	12.5
Higher vocational	27.8	25.8
University	12.5	13.5
Percentage living with partner	77.1	77.6
Main occupation working for pay (%)	90.7	31.5
Hours of work current or last job	32.9	35.5
Monthly net household income more than 2000 euros (%)	63.9	63.3
Median monthly net household income	2300	2353
Percentage Home owners	74.7	75.2
Self-reported health:		
Excellent or very good (%)	48.3	38.0
Good (%)	44.7	49.7
Poor or fair	7.0	12.3

Note: CentERpanel, age < 55 and working for pay or age ≥55 and working for pay when turning 55.

3. Perceived opportunities for flexible and phased retirement

To investigate the actual retirement opportunities of employees at their current or past employer as perceived by the respondents, we asked respondents about these opportunities. Flexible retirement was asked in two stages, formulated as follows for current employees:

> *For most occupations, the traditional (standard) retirement age is 65 years of age. For some occupations (police, military, etc.) there is a lower standard retirement age. What is the standard retirement age for your occupation?*

Do you think your current employer will offer you the opportunity of flexible retirement, i.e., to retire earlier or later than at the standard retirement age?

About 75% of all current or former employees give 65 years as the standard retirement age. All others except one give a younger age: 8.8% give age 60, 10.1% give age 62, and the remaining 4.9% give various ages ranging from 53 to 63. A majority of the respondents say their employer offers some flexibility in terms of retirement age: 61% say they can (or could have) retire(d) before or after the standard retirement age.

Irrespective of how the respondents answered the questions given above, they were then asked about the earliest and latest age of retirement, and the pension as a percentage of net pre-retirement income corresponding to retirement at both of these ages:

What is the earliest/latest age at which you think you can retire according to your employer's pension plan?

If you actually retire at age […/…], which percent of net earnings do you think you will receive as a pension (including social security benefits)?

Here *[…/…]* denotes the earliest or latest age given in the previous question. An adjusted wording was used for former employees about their last job as an employee. Social security benefits refer to the state pension (AOW) to which almost everyone in the Netherlands of age 65 and older is entitled. The amount is independent of previous earnings. It depends on marital status and on the number of years spent in the country. It is included because the typical way in which employers and pension funds present their retirement plans to their workers is to provide amounts including the state benefits. About 74%, gave a different earliest possible and latest possible retirement age, with a majority of respondents indicating that they can retire at an earlier age than the standard retirement age.

Phased retirement was asked as follows for current employees:

Does your employer offer you the possibility of part-time retirement? (Part-time retirement means that you retire part of your working week but keep working the other part, for example from age 62 until age 65).

Figures 1a, b and c present the histograms of the earliest and latest possible retirement ages and of the difference between the latest and earliest age. The earliest possible retirement age is spread out over the age range 55 to 65, with first quartile 60, median 62, and third quartile 65. The mean earliest possible retirement age is 61.7 years.[2] On the other hand, the latest possible retirement age is still very much concentrated at age 65, with 76.5% of all observations. The average latest possible retirement age is 65.1 years. The range in which respondents expect to or were able to retire ranges essentially from 0 to 10 years, with a median of 3 years and a mean of 3.6 years.

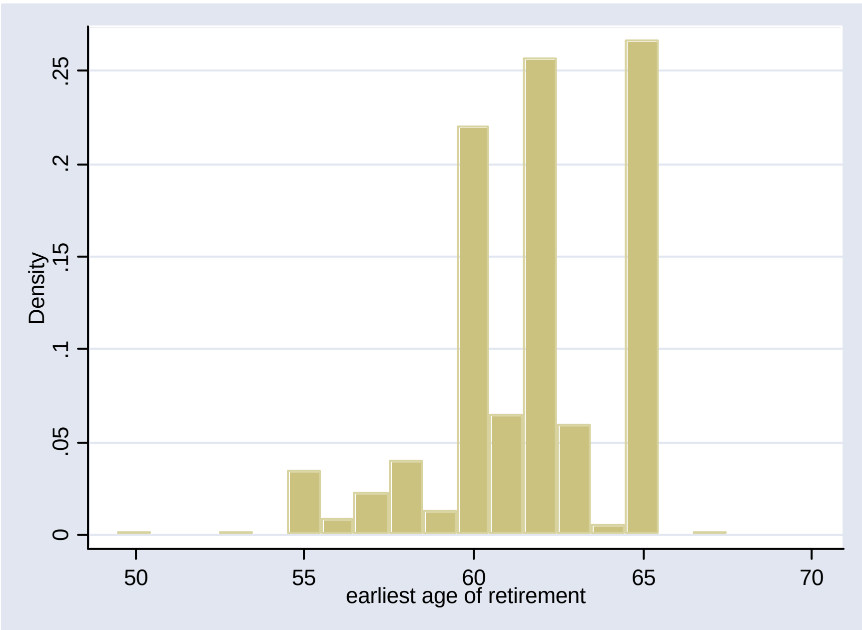

Figure 1a. Earliest possible age of retirement at current or last employer

The distribution of net retirement income as a percentage of pre-retirement earnings at the earliest and latest possible retirement age are presented in Figure 2a. Figure 2b does the same but only for those who can retire earlier and/or later than at the standard retirement age (i.e., the curve for the earliest retirement age only uses observations for which this age is below standard retirement age, etc.). There is a clear spike at 70%, the benchmark percentage in almost all traditional Dutch defined benefit occupational

[2] Seven outliers reporting earliest retirement age above 75 are set to missing.

pension systems,[3] but the spike almost disappears for those who would retire later than the standard retirement age; they can then often make more than 70% and the median of what they get if retiring as late as possible is 80%. The median percentage when retiring earlier than at the standard age is 70%.

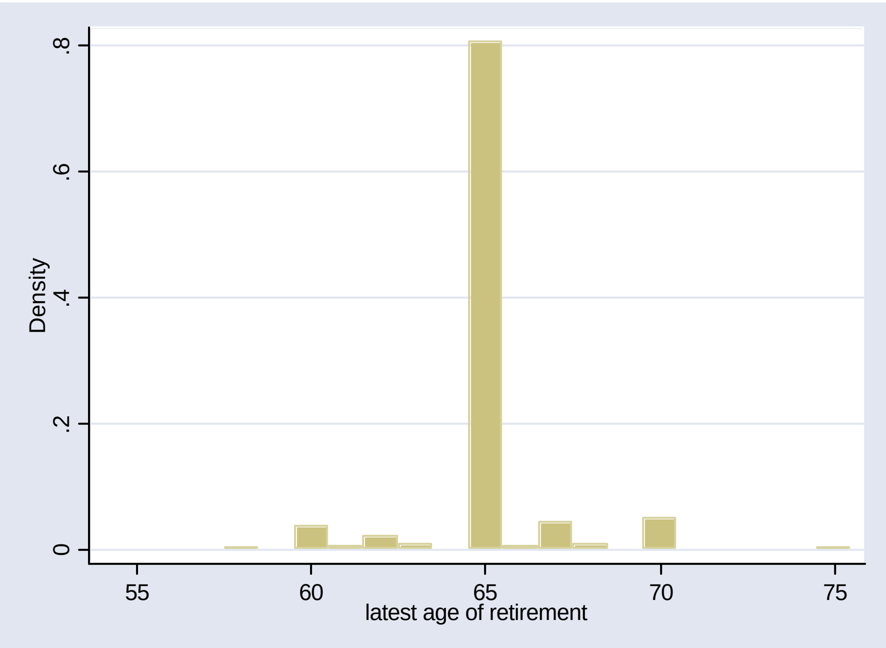

Figure 1b. Latest possible age of retirement; current or last employer

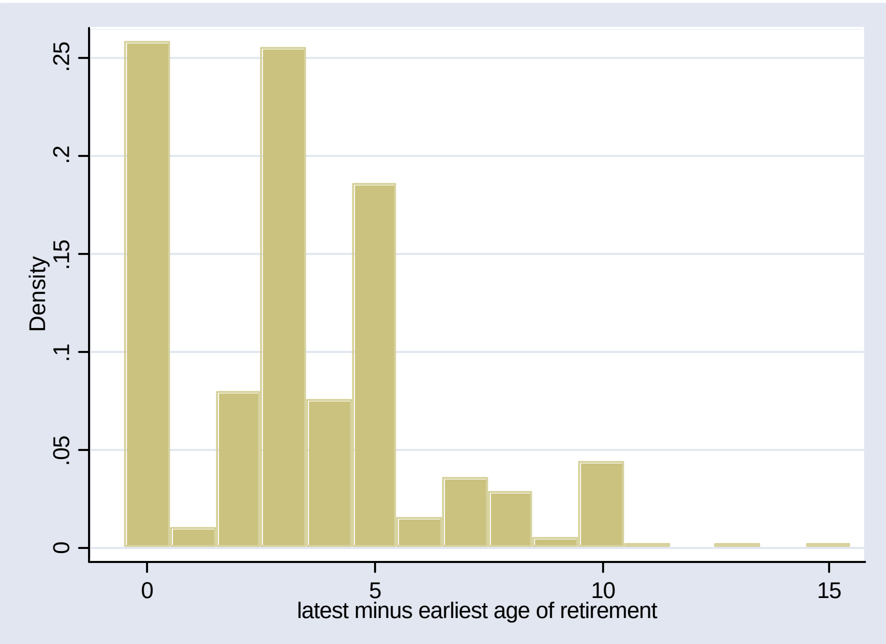

Figure 1c. Range of possible retirement ages; current or last employer

[3] Strictly speaking this is not correct for two reasons: the 70% typically refers to before tax income and is only reached by employees who have worked for 40 years without changing pension fund. However in public discussions 70% is the magic number that people have in mind as the standard.

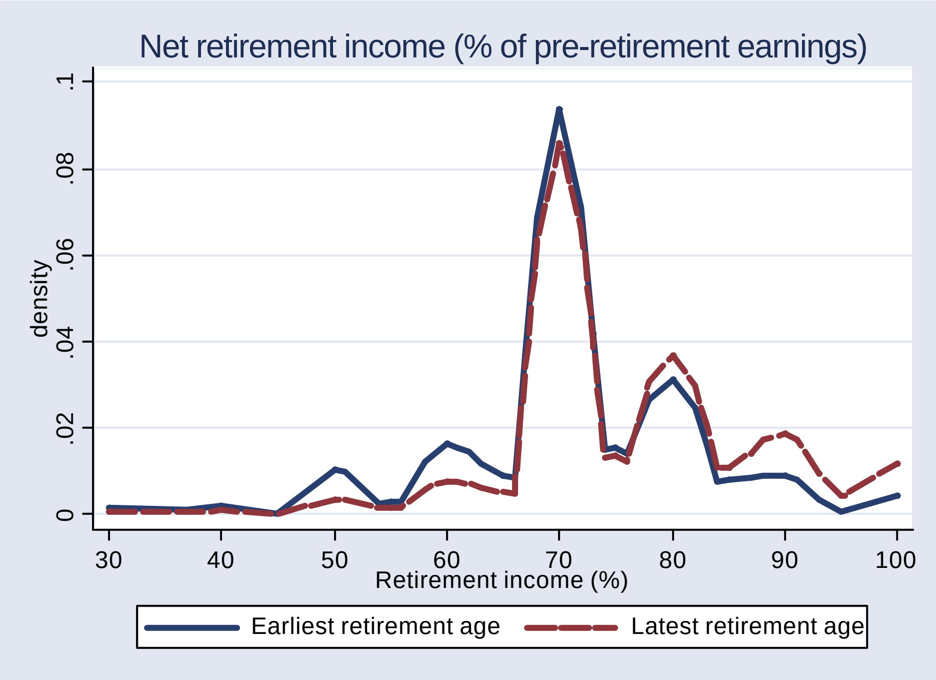

Figure 2a. Retirement income as a percentage of pre-retirement earnings (after taxes and social premiums) at earliest and latest possible retirement age.

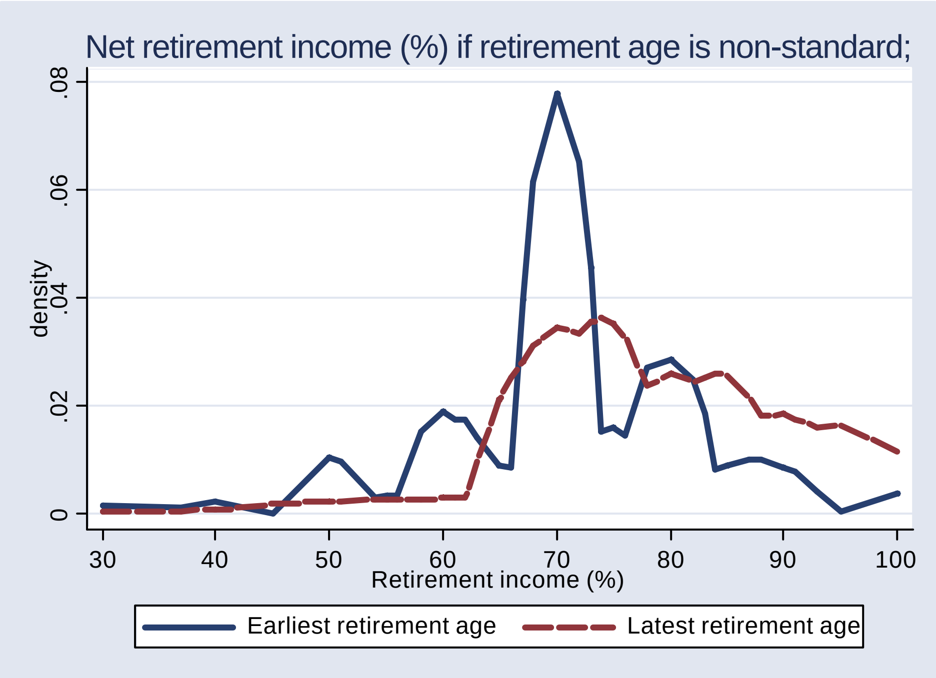

Figure 2b. Retirement income as a percentage of pre-retirement earnings (after taxes and social premiums) at earliest and latest possible retirement age; respondents who can retire earlier or later than the standard retirement age only.

Figures 3a and 3b present the same distributions separately for respondents younger than 55 and 55 or over. The elderly perceive high percentages for early retirement, in line with the generous early retirement arrangements that many of them can benefit from. The younger workers do not expect the same generous arrangements, which seems quite understandable given the policy debate on the ageing population and the gradual elimination of overly generous early retirement schemes.

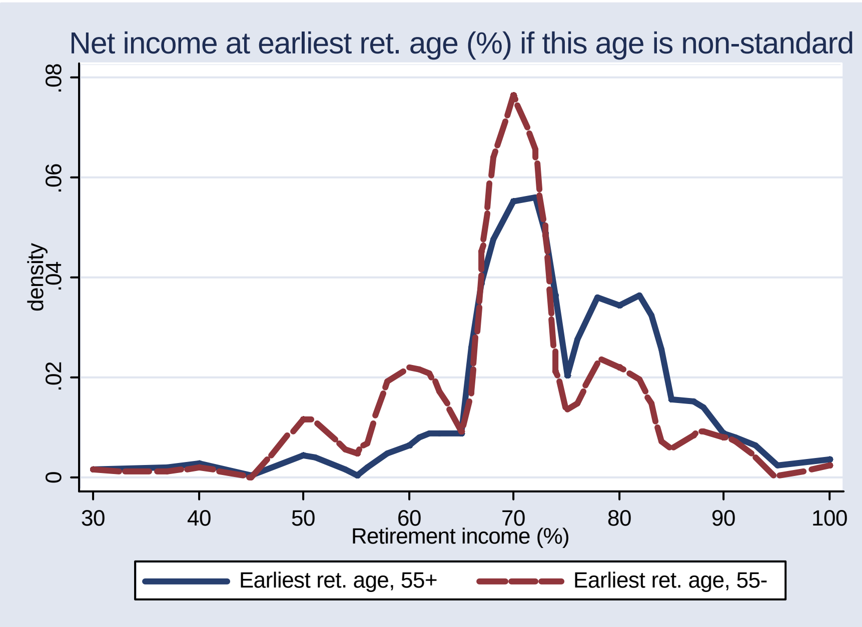

Figure 3a. Net income at earliest retirement age (%) if this age is non-standard

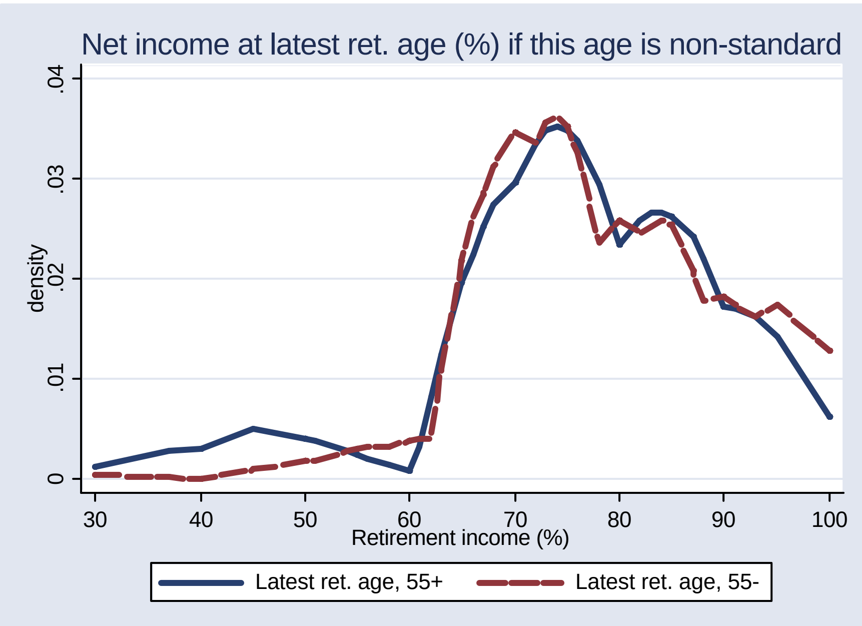

Figure 3b. Net income at latest retirement age (%) if this age is non-standard

We do not find any such difference for the percentage at the latest possible retirement age, which is in line with the fact that no major policy change concerning late retirement has taken place or is expected.

Table 2 presents some regression results, indicating which factors drive the earliest and latest retirement age and retirement age flexibility. Older respondents have a significantly smaller age range for flexible retirement than younger workers, keeping gender, education level and labor force status constant. The main reason is that the elderly report a lower latest possible age of retirement; there is no significant age effect on the earliest possible age of retirement. Gender has no significant effect on either the earliest or the latest possible age. Educational dummies are jointly significant for both. For the earliest retirement age, the pattern is not very clear, though it seems that the highest education levels have the lowest earliest possible retirement age, ceteris paribus (university level is the benchmark). Respondents with the highest education level (university) also report the highest latest possible retirement age. As a consequence, the highest levels also have a significantly larger retirement age range than the lower educated. Those whose main occupation is work report a higher earliest age and a lower latest age of retirement than respondents with other main occupation, suggesting that they expect less flexibility in the future than there was in the past. Still, these effects are significant at the 10% (two-sided) level only.

Table 2. Regressions Explaining Retirement Age

	Earliest age		Latest age		Age range	
diff	Coef.	t-val	Coef.	t-val	Coef.	t-val
constant	60.958	79.47	68.245	126.09	0.200	0.82
age	0.003	0.34	-0.049	-6.74	-0.056	-3.46
female	-0.218	-1.08	0.011	0.08	0.182	0.52
primary	0.167	0.32	-0.431	-1.31	-0.826	-1.36
lowvoc	0.633	1.93	-0.556	-2.44	–1.196	-2.32
intvoc	0.277	0.80	-0.753	-3.17	–1.188	-2.30
intgen	0.703	1.92	-0.317	-1.27	–1.645	-3.00
higvoc	-0.092	-0.28	-0.491	2.20	-0.392	-0.75
lfs_work	0.489	1.65	-0.344	-1.71	-0.713	-1.71
Observations	1313		1284		1262	
R-squared	0.013		0.068		0.028	
Root MSE	3.27		2.32		4.83	

Notes: Age range: latest age at which respondent can retire – earliest age at which respondent can retire

Lfs_work: dummy; 1 if currently working (full-time, part-time or self-employed)

Table 3 presents some regressions explaining the retirement replacement rates at the youngest and oldest age of retirement. As expected, both increase with the deviation from the standard retirement age, but the slope is much smaller than what would be actuarially fair. Women expect lower percentages than men, probably reflecting the fact that not all women have enough years of labor market experience to be entitled to a full pension (40 years, usually). The education variables indicate higher percentages for the lower educated groups. This may reflect more years of experience among the lower educated; an alternative explanation is that Social Security benefits are integrated into occupational systems. Since SS benefits are a flat rate (equal to the statutory minimum wage), low wage workers may face very modest income falls, or no fall at all, at retirement. We observe that current workers are more pessimistic about replacement rates at early retirement than non-workers, possibly reflecting the anticipations of pension cuts that play a role in the public debate of pension reforms in an aging population.

Table 3. Regressions Explaining Retirement Income

	Percentage earliest age		Percentage latest age		Difference Percentages	
diff	Coef.	t-val	Coef.	t-val	Coef.	t-val
constant	74.707	31.55	79.355	33.17	-0.380	-0.13
ret age diff	-0.361	-2.29	0.756	4.48	1.211	5.20
age	-0.038	-1.16	-0.099	-2.97	-0.030	-0.77
female	-3.347	-4.64	-1.630	-2.07	1.146	1.35
primary	3.315	1.98	3.151	1.57	0.531	0.21
lowvoc	5.188	4.95	3.791	3.32	-1.705	-1.25
intvoc	4.323	4.18	3.882	3.60	-0.644	-0.51
intgen	3.317	2.76	1.172	0.90	-2.367	-1.49
higvoc	1.296	1.35	0.993	0.96	-0.131	-0.11
lfs work	-4.103	-4.19	-1.475	-1.46	4.561	3.81
Observations	1070		1068		817	
R-squared	0.083		0.059		0.109	
Root MSE	10.27		10.82		11.06	

Notes: Percentage earliest/latest age: Net pension income as a percentage of last net earnings when respondent would retire/have retired at earliest/latest retirement age.

Difference percentages: percentage at latest retirement age minus percentage at earliest retirement age; only for those for whom these ages are different.

Ret age diff: standard retirement age -/- earliest possible retirement age (columns 2-3), latest possible retirement age -/- standard retirement age (columns 4-5), or latest possible retirement age -/- earliest possible retirement age (columns 6-7).

Lfs work: dummy; 1 if currently working (full-time, part-time or self-employed).

The final column explains the difference in percentages for retiring late and retiring early (excluding cases where there is no flexibility and latest and earliest retirement age are equal). As expected, this difference increases when the age range increases, either through early retirement or through late retirement. Again, however, the slope is much smaller than what would be implied by an actuarially fair system. There is no significant difference between men and women. Those who are at work expect a much steeper slope of the retirement income percentage as a function of retirement age than those who are not or no longer at work. This indicates that future retirees expect a system that is much closer to actuarially fair than the system experienced by those who have already retired.

Perceived flexibility in terms of the retirement age is more common than flexibility in terms of gradual reduction of the working week. Only 34.2% of the current or former employees say their employer offers (or offered) the opportunity of gradual retirement. Table 4 shows how this is associated with characteristics of the respondent. The lower educated have fewer opportunities to reduce hours worked in anticipation of retirement than the higher educated. Women have more options than men, perhaps because they often have a part-time job anyhow or work in a sector where part-time work is common. Those who are currently at work are more optimistic about opportunities for gradual retirement than those who are not at work.

Table 4. Access to phased retirement – Probit results

	Coef.	t-val
constant	–0.507	-2.02
age	-0.003	-0.82
female	0.357	4.71
primary	-0.406	-1.78
lowvoc	-0.301	-2.41
intvoc	-0.337	-2.67
intgen	-0.335	-2.33
higvoc	-0.023	-0.19
lfs_work	0.418	3.86

Notes: 1356 observations;
Dependent variable: 1 if employer offers phased retirement, 0 otherwise

4. Preferences

4.1 Stated preference questions

Respondents are asked to evaluate a number of simple retirement trajectories. The wording of the questions depends on whether they have already retired or are still working for pay. We present the questions for those who are still at work. They first get the introductory text:

> *In the next questions we describe a number of possible ways to move into retirement. Assume that your employer fully cooperates with all options that are described and assume that at least until age 60, you keep working your current hours.*

After this introduction, eight trajectories are described. Respondents are randomly allocated to three groups that in all but the first question get trajectories with different percentages, given in square brackets.[4] The eight scenarios are given in Table 5. The presentation in the table is different from that in the survey, where we used time lines. An example of such a time line is given below:

until 65	**from 65 until 70**	**70 and over**
Working 38 hrs per week	Working 23 hrs per week, after tax earnings are 100% of earnings at age 65.	Not working, pension equal to 90% of after tax earnings at age 65.

In each of the questions, the respondent is asked to evaluate the scenario on a ten-point scale from 1 (*I don't like this at all*) to 10 (*This is perfect*).[5]

Figure 4 presents a histogram of the evaluations of the benchmark option SP1, which can be seen as the traditional standard retirement trajectory that was very common before early retirement plans were introduced. The mean is 4.8 but the distribution is quite dispersed. This can be due to preference heterogeneity (some people really like this option and others do not) or due to variation in the response scales used by different respondents (some people give everything a high evaluation

[4] The order in which the questions are presented is randomized. Order effects are not analyzed in the current paper.

[5] There was no opportunity to answer "don't know" or "refuse." There are some missing values (7 for most questions) because respondents stopped their interview before getting to he SP questions.

and others only give low evaluations). To control for the latter, we can consider differences between the evaluations of the other scenarios with the evaluation of this benchmark scenario (SP2-SP1, …, SP8-SP1).

Table 5. Stated Preference Questions

SP1	Work 40 hours till age 65; retire full-time at age 65; disposable pension income is 70% of last earnings.
SP2	Work 40 hours till age 67; retire full-time at age 67; disposable pension income is [80%; 85%; 90%] of last earnings.
SP3	Work 40 hours till age 70; retire full-time at age 70; disposable pension income is [90%; 95%; 100%] of last earnings.
SP4	Work 40 hours till age 62; retire full-time at age 62; disposable pension income is [50%; 55%; 60%] of last earnings.
SP5	Work 40 hours till age 60; retire full-time at age 60; disposable pension income is [40%; 50%; 60%] of last earnings.
SP6	Work 40 hours till age 60; work 24 hours per week from age 60 till age 65 for a disposable income [90%; 80%; 70%] of earnings before age 60; full-time retirement at age 65 for a disposable pension income of [55%; 60%; 65%].
SP7	Work 40 hours till age 63; work 24 hours per week from age 63 till age 67 for a disposable income [90%; 85%; 80%] of earnings before age 63; full-time retirement at age 67 for a disposable pension income of [80%; 75%; 70%].
SP8	Work 40 hours till age 65; work 24 hours per week from age 65 till age 70 for a disposable income [90%; 95%; 100%] of earnings before age 60; full-time retirement at age 67 for a disposable pension income of [80%; 85%; 90%].

Notes: The presented questions are those for someone who works or worked 40 hours per week in the current or last job. Hours are reduced proportionally for part-timers.

Percentages in square brackets: depends on randomized group number. Group I always gets the first number, group II the second, group III the third.

Figures 5 and 6 present the distributions of SP2-SP1 and SP4-SP1; SP2 is a scenario with delayed retirement and SP4 is a scenario with early retirement. In the pictures the three groups (with three different pension replacement rates) are merged. In both cases, the modal difference is zero, indicating indifference between the alternatives, but there is substantial variation. In particular, many respondents give lower evaluations to the alternatives than to the benchmark.

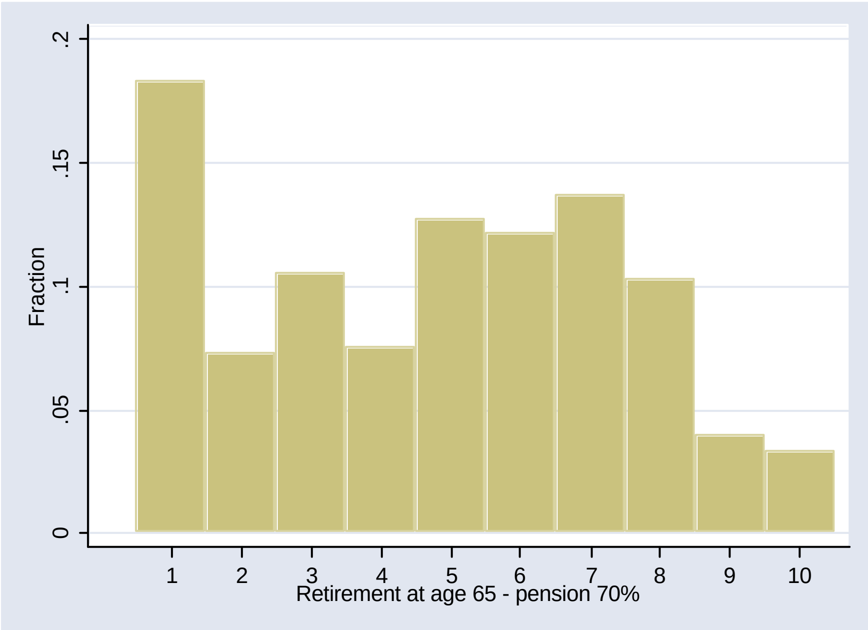

Figure 4. Histogram of evaluations of the benchmark retirement scenario (SP1)

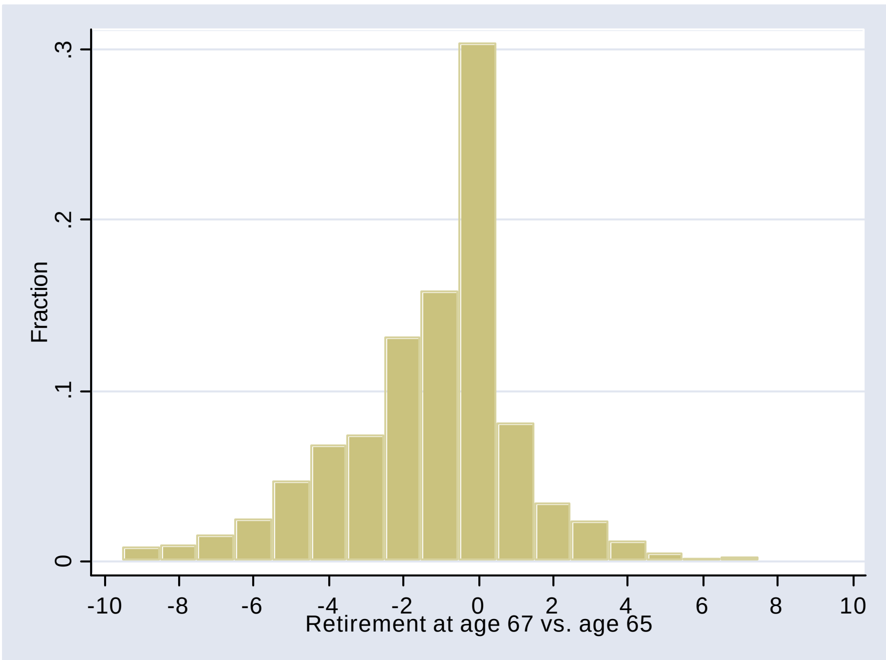

Figure 5. Histogram of SP2-SP1 (Postponed retirement - benchmark)

Table 6 presents means and standard deviations of the evaluations SP2 to SP8 in deviations from the SP1 evaluation, separately for the three treatment groups. The table confirms the asymmetry in Figures 5 and 6: The most salient finding is that on average almost all scenarios are rated less positively than the benchmark. Only scenarios 6 and 7, with part-time work before age 65, are close to the benchmark. But all scenarios involving immediate full-time retirement at ages other than 65, whether earlier or later, and irrespective of the pension level, are given significantly less favorable average ratings than the benchmark scenario of retirement at 65. Perhaps this benchmark is so much the norm that status quo bias leads to its high ratings. SP3, the scenario where everyone works till age 70, is clearly evaluated as the least favorable. SP5, the scenario with full retirement at age 60, seems to generate the largest dispersion. This is also the scenario where the pension benefit level seems to matter most, leading to substantial differences between the three groups.

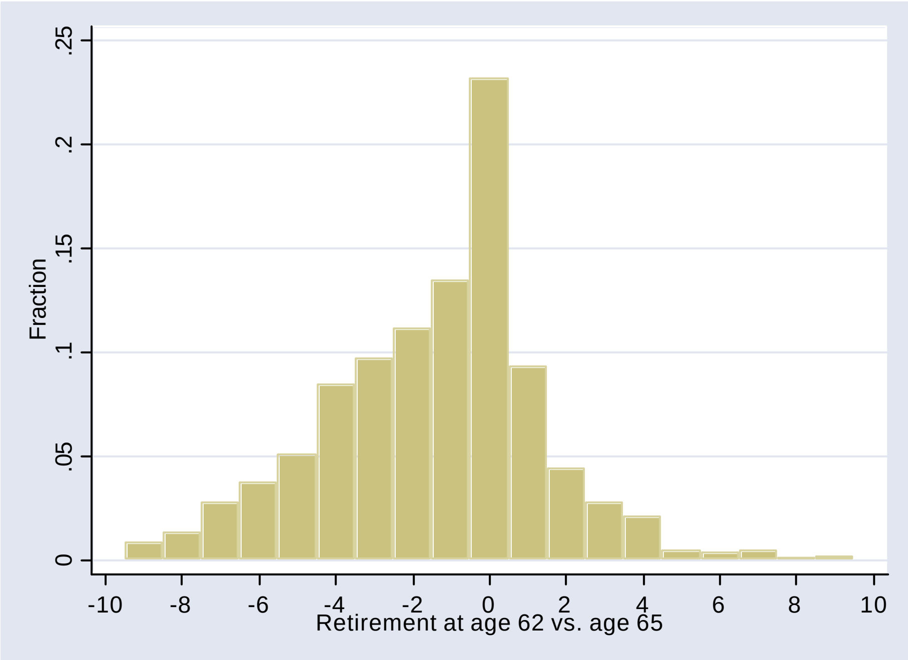

Figure 6. Histogram of SP4-SP1 (Early retirement - Benchmark)

For each of the seven questions SP2 - SP8, the differences between the three groups with different pension replacement rates are jointly significant at the 5% level. For SP2 – SP5 and for SP8, the first group gets a less attractive scenario than the second group, and the third group gets the most attractive scenario. The average evaluations reflect this, although the differences between groups are much clearer for SP4 and SP5 than for the other questions. For SP7, the order is reversed from most to least attractive, and this is also reflected in the means. For SP6, none of the three scenarios dominates any of the other two, so that we cannot expect any ordering of the means a priori.

Table 6. Means and Standard Deviations of Stated Ratings

	Group I		Group II		Group III		P-value
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	
SP2-SP1	-1.40	2.47	-1.37	2.52	-0.98	2.32	0.0116
SP3-SP1	-2.57	2.98	-2.44	2.86	-2.10	2.67	0.0292
SP4-SP1	-1.75	2.90	-1.67	2.82	-0.78	2.63	0.0000
SP5-SP1	-2.32	3.12	-1.72	3.19	-0.28	3.08	0.0000
SP6-SP1	-0.60	3.07	-0.13	3.01	-0.03	2.64	0.0084
SP7-SP1	0.05	2.75	-0.30	2.57	-0.35	2.37	0.0381
SP8-SP1	-1.51	2.77	-1.12	2.61	-0.83	2.63	0.0008

Note: See Table 5 for a definition of the scenarios. All ratings are in deviations from the rating of the benchmark "standard retirement" scenario (SP1).

P-value: the p-value for a test that the three groups have equal means (obtained from linear regressions on group dummies).

Table 7. Correlation coefficients

Group I	SP1	SP2	SP3	SP4	SP5	SP6	SP7
SP2	0.588*						
SP3	0.295*	0.637*					
SP4	0.302*	0.184*	0.107*				
SP5	0.134*	0.020	0.033	0.567*			
SP6	0.290*	0.291*	0.171*	0.396*	0.300*		
SP7	0.507*	0.554*	0.395*	0.154*	-0.018	0.429*	
SP8	0.447*	0.573*	0.553*	0.134*	0.025	0.340*	0.614*
Group II	SP1	SP2	SP3	SP4	SP5	SP6	SP7
SP2	0.562*						
SP3	0.342*	0.653*					
SP4	0.344*	0.239*	0.140*				
SP5	0.150*	0.036	0.000	0.694*			
SP6	0.319*	0.230*	0.113*	0.435*	0.338*		
SP7	0.552*	0.604*	0.368*	0.280*	0.088	0.550*	
SP8	0.538*	0.632*	0.557*	0.191*	0.014	0.326*	0.663*
Group III	SP1	SP2	SP3	SP4	SP5	SP6	SP7
SP2	0.628*						
SP3	0.406*	0.721*					
SP4	0.389*	0.208*	0.124*				
SP5	0.232*	0.031	-0.030	0.700*			
SP6	0.418*	0.240*	0.133*	0.470*	0.389*		
SP7	0.559*	0.571*	0.407*	0.367*	0.175*	0.550*	
SP8	0.499*	0.647*	0.658*	0.184*	0.038	0.338*	0.653*

Notes: Groups I, II and III have 460, 468 and 467 observations, respectively.
* significant at two-sided 5% level

Table 7 presents the correlation coefficients of SP1, …SP8 for each of the three groups.[6] The correlations patterns are similar across groups. Most correlation coefficients are significantly positive at the 5% level. Exceptions are those between SP5, the scenario with full retirement at age 60, and the late retirement scenarios (SP2, SP3, SP8 and in two cases also SP7, with full retirement at age 67). The positive correlations can be explained by a general tendency to give either favorable or unfavorable evaluations to every scenario, a respondent specific effect. The fact that some people have a preference for retiring early (or a large utility of leisure versus income) while others have a preference for retiring late, would lead to a negative correlation between the early and late retirement scenarios. Indeed we find that the correlations between early and late retirement scenarios are smaller than those between two late or two early retirement scenarios, but only for SP5 the negative component is enough to compensate for the positive respondent specific effect.

4.2 Model for Retirement Preferences

In this section we introduce a stylized model that can be estimated with the SP data at hand and has enough structure to simulate the preferences for alternative retirement trajectories. It is assumed that ratings reflect "life cycle utility" from age 60 onward. Utility is assumed to be additively separable over time. In each time period, within-period utility depends on leisure and income in the following way. First, it depends on whether respondents work the original number of hours before going into partial (or full) retirement, whether they work the reduced number of hours (60% of their original working week), or whether they do not work at all (full retirement). These are the only three choices considered in the SP questions; estimating a complete specification of the utility function as a function of all possible hours of work is beyond the scope of this paper. Second, within period utility depends on income as a percentage of pre (partial) retirement earnings, i.e., the percentages stated in the SP questions. We condition on pre (partial) retirement earnings and hours worked, and include these variables as taste shifters in the model. A special case of the model will be the case where utility depends on absolute income rather than relative income.

To be precise, we specify utility of individual *i* at age *t* as

[6] The correlations of SP2-SP1,…,SP8-SP2 are all significantly positive, probably due to idiosyncratic noise in SP1. The relative magnitudes of these correlations are in line with those in Table 7.

$$U_{it}(L,Y) = a_{0i} + a_{Pit} D_P(L) + a_{Rit} D_R(L) + a_{Yit} \ln Y; t = 60,61,...$$

Here L is labor force status, which can be not retired $(D_P(L) = D_R(L) = 0)$, partially retired $(D_P(L) = 1; D_R(L) = 0)$, or fully retired $(D_P(L) = 0; D_R(L) = 1)$. Y denotes income as a percentage of pre-retirement earnings, varying from 50 to 100 (see Table 5). The coefficient a_{Pit} indicates how respondent *i* values the additional leisure associated with partial retirement at age *t* (compared to preretirement, the omitted labor force status). We expect this to be positive in most cases but do not impose this, since there may be people who do not prefer, for example, part-time work to full-time work, even when income is kept constant. Similarly, a_{Rit} indicates how respondent *i* values the additional leisure associated with complete retirement at age *t* compared to pre-retirement and is also expected to be positive. This also applies to a_{Yit}, the coefficient that indicates how much the respondent appreciates additional income at age *t*. The final preference coefficient, a_{0i}, determines the level of all evaluations of respondent *i*, irrespective of income or labor force status.[7]

The preference parameters of respondent *i* are allowed to depend on the respondent's observed and unobserved characteristics as follows:

$$a_{0i} = X_i' b_0 + h_{0i};$$
$$a_{Ait} = X_i' b_A + g_A(t-60) + h_{Ai}; A = P, R, Y; t = 60,61,....$$

Here X_i is a vector of taste shifters, including educational dummies, gender, age at the time of the survey (a cohort effect), and, as explained before, pre-retirement (and pre partial retirement) log hours worked and log earnings. The parameters g_P and g_R are expected to be positive, since respondents' disutility of working is expected to increase when they age. One reason for this may be deteriorating health; in X_i, we can control for health at the time of the survey but not expected future health (for the younger age groups) or past health (for the elderly). There is no a priori expectation of the sign of g_Y.

The terms h_0, h_P, h_R, and h_Y reflect unobserved characteristics driving preferences (and, for h_0, the tendency to give higher or lower evaluations). They are

[7] In principle this could also vary with age but the age effect is not identified (since everyone evaluates over the same age range).

the analogs of the random coefficients in SP studies of consumer choice, cf., e.g., Revelt and Train (1998). These unobserved heterogeneity terms are assumed to follow independent normal distributions with mean zero and variances to be estimated, independent of the characteristics X_i.[8]

Reported evaluations will be based on total utility over the life cycle, given by

$$U(L,Y,X_i) = \sum_{t=60}^{100} d^{\,t-60} u_i(L_t, Y_t)$$

Here $(L,Y) = (L_{60}, Y_{60}, \ldots L_{100}, Y_{100})$ denotes the complete scenario of labor force status and income from earnings and/or retirement benefits described in the SP question. The time horizon is somewhat arbitrarily fixed at 100 years of age; the discount rate d also captures mortality risk. Identification of d appears to be hard in this model with the data at hand. Instead, we set d equal to 0.95.

Allowing for "reporting error" in each of the reported evaluations, the observed reports on the discrete 1 to 10 scale will be modeled as follows:[9]

$$E^* = U(L, Y, X) + e$$
$$E = k \text{ if } m_{k-1} < E^* \le m_k; k = 1,\ldots,10$$

Error terms e are assumed to be i.i.d. normal with mean zero, independent of the random coefficients (i.e., independent of X, h_0, h_P, h_R, and h_Y. Threshold parameters $-\infty = m_0 < m_1 < \ldots < m_9 < m_{10} = \infty$ are the same for all respondents. By means of normalization, m_1 is set to 1.5 and m_9 is set to 9.5.

This model is obviously not a complete structural life cycle model. For example, there is no saving and no uncertainty in this model. The latter seems reasonable since the scenarios sketched in the SP questions do not leave room for uncertainty. Uncertainty about, for example, future health may play a role when respondents make their evaluations, but cannot be incorporated explicitly due to lack of data. The no savings assumption may be harder to defend, although the framing of the SP questions does not suggest to the respondents that savings should be taken into account.

[8] It seems natural to allow for a (positive) correlation between h_P and h_R, since both relate to the preference for leisure. We extended the model with such a correlation but found that it was insignificant and did not change any of the results.

[9] The indices of the respondent and the scenario are omitted for notational convenience.

Estimation

This model can be estimated by simulated maximum likelihood. This is very similar to the estimation procedure for mixed logit models or other random coefficient models, cf., e.g., Revelt and Train (1998). Conditional on the unobserved heterogeneity terms $h_0, h_P, h_R,$ and h_Y, an individual's likelihood contribution can be written as the product of all the probabilities of observed answers to the SP questions. This is a product of independent univariate normal probabilities. The unconditional likelihood is the four-dimensional integral over possible realizations of $h_0, h_P, h_R,$ and h_Y, which is approximated using simulated values based upon Halton draws.[10]

Estimation Results

Estimation results are presented in Table 8. The estimates of *ß0* determine how the levels of the ratings vary with individual characteristics, irrespective of leisure and income. This determines the ratings but not the choices between different retirement scenarios and can also be interpreted as how response scales vary with individual characteristics. Separately interpreting these coefficients is not useful, since if characteristics change, the terms $a_{Pit}D_P(L), a_{Rit}D_R(L)$ and $a_{Yit}\ln Y$ will change as well.

The coefficients in b_P and b_R represent how the utility of working part-time or of not working at all, compared to the utility of working full-time, varies with the characteristics. We find significant cohort effects, with maximum utility of working part-time for birth cohort 1953 and maximum utility of not working at all for birth cohort 1951. Lower education levels lead to higher appreciation for less work, possibly reflecting better job characteristics of jobs of the highly educated. On the other hand, keeping education level (and other characteristics) constant, the people with the higher pre-retirement earnings seem to have the largest preference for not working. The effects of health seem somewhat counter-intuitive. In particular, those with poor or fair health at the time of the survey seem to attach less value to not working than those in good, very good, or excellent health. The people who work

[10] See Train (2003). Halton draws can achieve much larger precision than random draws for a given number of draws. Here we used 30 draws per respondent. Results with 20 draws per respondent were virtually identical.

more hours before (partial) retirement have the largest preference for partial retirement (keeping earnings, income percentage, and other factors constant). Finally, preferences for partial or full retirement increase significantly with age, and the effect on full retirement is much larger than that on partial retirement. This may, for example, be due to reference group effects or social norms, or expected health deterioration.

Table 8. Estimation Results Preferences Model

	$ß_0$		$ß_P$		$ß_R$		$ß_Y$	
	Coeff.	T-val.	Coeff.	T-val.	Coeff.	T-val.	Coeff.	T-val.
constant	0.8323	0.44	-1.7800	-5.70	-2.3492	-4.15	-0.0635	-0.18
female	0.0770	0.31	0.0393	0.92	0.0486	0.66	-0.0249	-0.55
age/10	0.0754	0.15	0.3792	4.61	0.4179	2.91	-0.1256	-1.38
(age/10)^2	-0.0144	-0.31	-0.0373	-4.88	-0.0394	-2.93	0.0135	1.58
partner	-0.1603	-0.67	0.0751	1.68	0.0668	0.94	0.0196	0.45
low educ	-0.5482	-2.11	0.0957	2.10	0.1277	1.68	0.1044	2.21
medium edu	-0.5204	-2.26	0.1043	2.47	0.1610	2.34	0.0923	2.21
home owner	-0.0006	0.00	-0.0099	-0.23	0.0690	0.96	-0.0108	-0.25
fair/pr hl	0.4178	1.13	-0.0599	-0.93	-0.2189	-1.99	-0.0571	-0.85
good hlth	-0.3734	-1.83	0.0654	1.83	0.0912	1.50	0.0725	1.96
log earn	-0.3742	-2.72	0.0235	1.07	0.1111	2.72	0.0691	2.76
d earn mis	-2.9604	-2.17	0.0601	0.28	0.8673	2.14	0.5480	2.21
log hours	-0.1537	-0.54	0.2392	4.99	0.0442	0.53	0.0234	0.45
trd prt tm			0.0677	7.54	0.1654	11.51	-0.0055	-0.67
sigma eta	0.0052	1.03	0.1523	5.92	0.0280	3.51	0.0274	39.61

Auxiliary parameters:

	Coeff.	S.e.	T-val.
Sigma epsilon	2.2746	0.0174	131.06
Thresholds			
1	1.5000		
2	2.4658	0.0212	116.16
3	3.3838	0.0287	118.05
4	4.1724	0.0332	125.49
5	5.1560	0.0385	133.87
6	6.0588	0.0434	139.56
7	7.1438	0.0482	148.10
8	8.4699	0.0488	173.58
9	9.5000		

The final columns present the estimates of the marginal utility of log income. Lower educated respondents attach more value to a higher replacement rate in partial or full retirement, conditional on pre-retirement earnings and hours. Conditional on education level, however, the high income respondents attach more value to a higher replacement rate. Again, the effect of health is not so clear, with the intermediate group (good health) giving the highest value to income. Those for whom no earnings information is available are similar to those with average log earnings. Other variables are insignificant, including age and birth cohort.

There is no evidence of unobserved heterogeneity in a_0, but there is significant heterogeneity in a_P, a_R, and a_Y. Unobserved heterogeneity seems particularly important for preferences for partial retirement, where a one standard deviation change in the unobserved heterogeneity term has a larger effect than any of the explanatory variables.

Allowing for the unobserved heterogeneity terms, we find that the fraction with negative marginal utility of a higher replacement rate is virtually zero, which seems supportive of the quality of the data and the specification of the model. Similarly, we find that at higher ages, everyone prefers working reduced hours or not working at all to working full-time. This is not the case in the age range 60-65, where a minority of respondents would like to work part-time (17.1% at age 60 and 6.9% at age 62, for example) or full-time (41.2% at age 60 and 4.5% at age 62), keeping income constant.

5. Simulations

The results of some simulations based upon the estimates in Table 8 are presented in Table 9. The table presents the choice probabilities for alternative retirement scenarios, assuming there are only two alternatives: the benchmark of retiring at age 65 with a pension equal to 70% of last earnings, or the scenario that is described. Choice probabilities are averaged over the sample, accounting for observed and unobserved individual heterogeneity. The first probability in the table takes full account of the noise in the utility evaluations. That is, we assume that the individual chooses the option that gives the largest value of E*, with independent errors ε across the two alternatives. The assumption that RP data on actual decisions contain the same amount of optimization or reporting error as stated preference data is criticized in the literature, where it is found that preference parameters based upon RP data and SP data are usually in line with each other, but that the noise levels can differ (cf. Louviere et al, 2002). Therefore we also present the aggregate choice probabilities under the assumption that people make no optimization errors, in the final column of the table. In this case every individual chooses either the benchmark or the alternative without any noise, but due to observed and unobserved heterogeneity, the fractions choosing the alternative are not equal to zero or one.

The first four scenarios are traditional retirement scenarios, without gradual retirement. The first two scenarios involve postponing retirement to age 70, with financial compensation in the form of a higher pension. In the first scenario, the replacement rate is raised from 70% to 90%, in the second case to 100%. Although the latter is approximately actuarially fair, this is still not enough to convince many people to postpone retirement to age 70. Only 0.1% of all respondents would choose this alternative if no optimization errors are made. This corresponds to the relatively low evaluations of the late retirement scenarios in the raw data.

Table 9. Simulated Choice Probabilities: Alternatives to the Benchmark

Scenario	Partial retirement Age	Partial retirement % Income	Full retirement Age	Full retirement %Income	Prob. with error	Prob. without error
1: Postponed retirement	--	--	70	85	18.59	0.04
2: Postponed retirement	--	--	70	95	21.19	0.10
3: Early retirement	--	--	62	60	52.13	70.21
4: Early retirement	--	--	62	50	40.47	4.61
5: Partial retirement	63	85	67	70	52.50	65.11
6: Partial retirement	63	100	67	70	54.98	76.41
7: Partial retirement	63	85	67	80	58.35	86.32
8: Late partial retirement	65	90	70	90	41.75	16.14
9: Late partial retirement	65	100	70	100	47.11	39.02
10: Early partial retirem.	60	75	65	60	54.14	66.57

Notes:

"Prob." is the probability that the given scenario is preferred to the benchmark, which is full retirement at age 65 for a 70% net pension.

"With error": probability allowing for optimization errors of the same size as the errors in the observed evaluations;

"Without error": probability assuming no optimization error.

Scenarios 3 and 4 involve complete retirement at age 62. In scenario 3, the price for early retirement is a 10%-points reduction in the replacement rate, less than actuarially fair. About 70% of all respondents would choose this option instead of the benchmark with retirement at age 65. Apparently, however, the utility difference with the benchmark scenario is often quite small, so that if optimization errors play a role, the number of respondents choosing this alternative would go down to only slightly more than 50%. Scenario 4 increases the price of early retirement beyond what is actuarially fair – a 20%-points reduction of the replacement rate. Respondents appear to be quite sensitive to this: for less than 5%, this scenario would be preferred to the benchmark.

The other scenarios involve gradual retirement. Scenarios 5, 6 and 7 have partial retirement two years before the benchmark retirement age of 65 years, and full retirement two years after the benchmark retirement age. Scenario 5 is close to "symmetric" compared to the benchmark plan with partial retirement income right in between full-time earnings and full retirement pension income. This scenario is more attractive than the benchmark for about 65% of all respondents. Increasing income during partial retirement (scenario 6) or full retirement (scenario 7) makes the scenario even more attractive. Income after full retirement is more important in this respect, due to the longer time period that this is received (and the fact that the marginal utility of income does not change much with age; this is the insignificant parameter g_Y in Table 8).

While we found that hardly anyone would want to work full-time until age 70, many more people would be willing to work part-time until that age. This is borne out by scenarios 8 and 9, which involve reduced working hours from age 65 till age 70 and full retirement at age 70. Scenario 8 gives a 20 %-points premium on income after age 65 compared to the benchmark, in return for working 60% of the pre-retirement working week for five years. This is an attractive alternative for 16% of all respondents, still a small minority, but many more than in scenarios 1 and 2. A higher compensation for the additional work as in scenario 9 raises the fraction of respondents for whom this is more attractive than the benchmark to 39%.

Finally, scenario 10 is a form of early gradual retirement at age 60. In spite of the lower replacement rates, this scenario would be preferred to the benchmark by a majority of the respondents. This scenario is almost as attractive as full-time retirement at age 60 with the same replacement rate (scenario 3).

In Table 10, the results of some simulations are presented that use the data on retirement flexibility and the opportunity of partial retirement described in Section 3. This only uses the respondents for whom the latest possible retirement age exceeds the earliest possible age (1007 observations). Reporting and optimization errors are not accounted for. Simulation 1 just takes two choice opportunities: full retirement at the earliest age and the latest age, with the reported pension percentages. We find that a large majority would prefer retirement at the earliest possible age to retirement at the latest possible age. This is not so surprising, given the fact that the difference between the average income percentages at the latest and earliest retirement age is 6.24%, for an average age difference of 4.77 years. Obviously, from the point of view of actuarial fairness, this will often imply that early retirement is a much better deal than late retirement.

Table 10: Simulated Choice Probabilities: Retirement at Latest or Earliest Possible Age and Partial Retirement

	Prob. Earliest Age	Prob. Latest Age	Prob. Partial
1: No partial retirement	70.22	29.78	--
2: Partial retirement option for everyone	34.01	18.47	47.52
3: Partial retirement for those with access to partial retirement	32.47	19.25	48.28

Notes:

Prob. earliest age, prob. latest age: probabilities (in %) to choose full retirement at earliest and latest possible age (no period of partial retirement). Income percentage set equal to reported percentage if retiring at earliest or latest possible age (imputed if missing)

Prob. partial: probability (in %) to choose partial retirement, defined as full-time work until earliest possible retirement age, working 60% of pre-retirement hours from earliest to latest possible retirement age. Income after full retirement: 0.6 times reported percentage at latest age plus 0.4 times reported percentage at earliest age. Income during partial retirement: 0.4 times income after full retirement plus 0.6 times pre-retirement earnings.

1, 2: observations with earliest retirement age < late retirement age only

3: only the observations used in 1 and 2 who report that their employer offers/would have offered partial retirement (40.8% of the 1007 observations).

The second simulation in Table 10 introduces the possibility of partial retirement at the earliest possible age and full retirement at the latest possible age, with an income scheme that is a weighted average of the schemes of the options of full retirement at earliest and latest possible age (see notes to Table 10 for details). It assumes that each of the 1007 respondents considered here has this option. The option appears to be quite attractive. More than half of the 70.2% who would choose earliest possible retirement if the choice was between early and late, would now choose partial retirement. Moreover, more than one third of the 29.8% who would choose latest possible retirement would now also opt for partial retirement. In total, 47.5% of all respondents would choose partial retirement, and because most of this comes from the “early retirees” in the first simulation, total labor supply would increase substantially.

Finally, we do the same simulation but then only for those who report that their employer is expected to offer or would have offered some opportunity for partial retirement. Of this group with some flexibility in the data of retirement, 40.8% says there is such an option, 6.6%-points more than in the complete sample (due to the high correlation between flexibility in terms of retirement age and flexibility in terms of reducing hours). The questionnaire does not ask about the exact nature of this partial retirement opportunity, so we use the same partial retirement scenario as in simulation 2. The result is very similar as for simulation 2, with an even somewhat higher percentage of respondents choosing partial retirement. Apparently, the characteristics that make someone more likely to have the opportunity of partial retirement, makes him or her also somewhat more likely to have a preference for part-time work as a bridge to full retirement.

6. Conclusions

We have analyzed data on current and former employees‘ perception of retirement flexibility at their current or previous employer and preferences for early, late, and gradual retirement. We find that employees often (think they) have possibilities for retiring early, whereas it is less common that they can retire later than at the benchmark age or can retire in steps, first reducing their hours worked. Only 34% report that they have such an option. This makes clear that analyzing retirement preferences on the basis of actual behavior without accounting for restrictions imposed by the employers and the occupational pension plans may give biased estimates of employee preferences. Instead, we have asked respondents to rate how attractive they find hypothetical, simplified retirement trajectories. These ratings were used to estimate a stylized structural model of retirement behavior. The descriptive statistics suggest that people are reasonably satisfied with retiring at the benchmark age, possibly because deviations from that age were compensated in a less than actuarially fair way in the scenarios that were presented. The most salient descriptive statistic is a general aversion against working full time after the age of 65.

Simulations based upon a model explaining the stated choices confirm that it is quite hard to convince people to keep working full-time after age 65, at least in The

Netherlands, even with substantial financial incentives. On the other hand, many more people would be happy to keep working part-time after age 65, if given the option to gradually reduce hours worked by 40% before retiring completely. Increasing opportunities for partial retirement thus seems a potentially powerful tool to increase labor force participation and average hours worked of age groups around the retirement age. A remaining issue not addressed in this paper, is how offering partial retirement can be made more attractive for employers.

This paper can be seen as a pilot project for using subjective data on perceived restrictions and stated preferences to analyze retirement behavior. The preference specification is stylized and we cannot claim that it provides an accurate description of all features playing a role in the retirement decisions of employees. Still, the results are encouraging, and suggest that it would be worthwhile collecting richer data of a similar nature, creating opportunities for analyzing more realistic structural models, allowing, for example, for savings and uncertainty.

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