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Demanding Occupations and the Retirement Age in the Netherlands

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Demanding occupations and the retirement age in the Netherlands

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Abstract

We use unique Dutch survey data to analyze the general public's opinions on what are demanding occupations, to what extent it is justified that someone with a demanding occupation can retire earlier, and on the willingness to contribute to the earlier retirement schemes of such occupations. Panel data models on vignette characters with different jobs are used to account for confounding factors affecting the evaluations of the jobs as well as the reasonable retirement age or willingness to pay. Occupations that are more demanding induce respondents to report lower retirement ages. There is some evidence that respondents whose own job is similar to the occupation they evaluate find this occupation more demanding than respondents who identify themselves with different occupations. For construction workers this matters less than for less demanding occupations, such as teachers. A less demanding occupation translates in a higher reasonable retirement age and a lower willingness to contribute to an early retirement scheme. We find a one standard deviation increase in demanding occupation translates into a 1 year decrease in reasonable retirement age and 30 to 40 percent points increase in the willingness to contribute to the early retirement scheme.

1. Introduction[1]

Nowadays many governments are reforming pension schemes to tackle concerns about fiscal sustainability. A widely employed and highly visible reform is to increase the statutory retirement age (OECD, 2011). This institutional feature determines at what age individuals are entitled to 'full' retirement benefits.

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Concerns have been raised about the heterogeneous effects of the increase in the statutory retirement age. An increase in the statutory retirement age is equivalent to a reduction in total retirement benefits. State pensions are in general a larger fraction of total retirement wealth for lower income than for higher income individuals. This implies that an increase in the statutory retirement age leads to a larger reduction of retirement benefits for lower income individuals than for higher income individuals.

This fact is further exacerbated by differences in life expectancies. From the literature it is known that life expectancy differs across social-economic groups. In general, higher income individuals tend to live longer. For instance, Kalwij et al. (2013) find that low-income individuals have an approximately 2.5 years shorter remaining life expectancy at 65 years of age than high-income individuals.

The link between disability insurance and early retirement makes this even more relevant. Older workers with severe health issues could in principle be eligible for both early retirement as disability insurance benefits. In the past reforms in disability insurance programs were implemented. For instance, since the 1990's entry into disability insurance programs is more strict in the Netherlands (García-Gómez et al., 2011). They also show that inflow rates into disability insurance decreased strongly between 2001 and 2006 as a consequence. As access to disability insurance became more strict, early retirement may have become more relevant for older individuals with demanding occupations.

To account for this heterogeneity the statutory retirement age could be differentiated among individuals. For instance, Bovenberg et al. (2006) argues to link this age to the (remaining) life expectancy of various socio-economic groups. Ravesteijn et al. (2013) considers a broader measure that not only includes lifetime income but also wealth, educational attainment and occupational class. At the same time policy concerns arise when whole categories were to be exempted by increases in the retirement age, as this could lead to self-selection problems. This paper examines the role of occupation in relation to retirement arrangements in more detail.

Perceptions about occupations may play a central role in reforming retirement schemes. In practice, individuals may not have an outspoken opinion on the relation between income and the appropriate timing for retirement. Instead, they may be more inclined to differentiate between various occupations on other grounds. For example, they may think that it is justified that workers with physically demanding occupations or with occupations with long working hours retire earlier than others. These thoughts have been also often translated in public statements by politicians and social partners. In other words, do individuals think construction workers are entitled to earlier retirement than librarians, even if both receive the same life time wage and other benefits? Consequently, the

policy discussion addresses the possibility to exempt health-deteriorating occupations from increases in the retirement age. This would imply redistribution of life-time income from occupations with higher retirement ages to occupations with lower retirement ages. The political feasibility of such measures is therefore linked to the willingness to accept such a differentiation in the statutory retirement age and the willingness to accept the income redistribution that these entitlements imply.

The willingness to contribute to such retirement schemes can be given two different interpretations. The first is self-interest. Individuals holding occupations that are eligible for earlier retirement might expect to benefit from such early retirement schemes. This can be interpreted more broadly. If individuals expect to switch occupations in the future, they may still support early pensions for a particular occupation even though they are not currently employed in the receiving profession. This might even function as an insurance device. Another explanation may be non-standard preferences. Dellavigna (2009) distinguishes three groups.[2] Social preferences are relevant for this paper: individuals not only care about their own obtained resources but also about resources obtained by other individuals. The possible consequence is that individuals may be willing to contribute to early retirement schemes, even if they do not expect to gain from these arrangements themselves. Perception of occupations as paying a low wage and being physically demanding may magnify the effects of these mechanisms.

First, this paper analyses whether individuals are willing to contribute to retirement schemes for certain occupations. Perceived characteristics of occupations might make individuals more willing to contribute to such retirement schemes. This paper therefore examines the effect of the perceived burden of occupations on the reasonable retirement ages and the willingness to contribute to such schemes.

Second, we investigate the distinction between self-interested individuals and altruistic individuals. For this distinction self-identification is crucial: in case of self-interest, the contribution to a retirement scheme for a certain occupation will be higher if the occupation is similar to the individual's own occupation.

Our findings indicate a persistent ranking of the demanding nature of the occupations that are considered. Respondents seem to attach a large weight to the physical effort required by the occupations. Construction worker is regarded as a burdensome occupation, while for desk jobs this is not the case. This also implies a lower reasonable retirement age and a higher willingness to contribute to an early retirement scheme for construction workers than for other occupations. The data shows that people are willing to contribute to early retirement schemes of construction

[2] The other two groups of non-standard preferences are time preferences and risk preferences.

workers even if they do not identify themselves with this occupation. For other occupations, such as desk jobs or teachers, this is much less the case.

2. Literature

Different factors determine retirement behavior. The relation between financial incentives and retirement is widely studied. For instance, Gruber and Wise (1999, 2004) analyzed the interplay between retirement benefits and exit rates from the labor market in various countries. Another determinant of retirement behavior is the health of the individual. Individuals could find themselves unable to continue working. Indeed, structural modeling of retirement behavior often controls for the health status of the individual (see for instance, Gustman and Steinmeier (2005) and Rust and Phelan (1997)).

But what determines health and how does it relate to retirement behavior? Grossman (1972) argues health takes the form of a capital stock that depreciates over time. To keep the health stock at a certain level investments are needed. In his life cycle model the individual divides his earned wages between such investments and consumption. In this model, education directly influences the efficiency of health investments on the stock of health. In other words, it influences the shadow price of health, where the higher educated probably face lower prices since they are more efficient producers of health. This model implies that the determinants of health are income and education. Case and Deaton (2005) add a link between occupation and health, aside from the effect of income on health. If workers have the possibility to generate earnings from their health capital or human capital, lower-educated workers may find it optimal to let their health stock depreciate more quickly as they do not have access to a large stock of human capital. Examples could be stressful or physically demanding occupations.

This causal link from occupation to health is difficult to examine. The relation between health and occupation is not straightforward. In addition, the influence of income and education on health was already discussed, and establishing a causal link between occupation and health requires controlling for the correlations between occupations, education, income and health. Case and Deaton (2005) examine how health changes over the life-cycle and find that health depreciates faster for individuals in manual occupations. Sindelar et al. (2007) study the link between first occupation and health at later ages. In this way they attempt to alleviate concerns about causality and they find an influence from the first occupation on later health. Other contributions on this topic include the longitudinal study of Fletcher et al. (2011). The impact of occupations on the health of workers is split between physical demands and poor working conditions. They find a detrimental impact of job conditions on health, but this effect varies over different subgroups. For instance, the effects are larger for females and older workers. Their findings rely on control for time dependent variables like lagged health and initial conditions like initial health. But it may be that this initial health may in fact be correlated with early life conditions (e.g. Gupta, 2010), while early life conditions may also impact the level of attained education, for instance.

Do compensating wage differentials between demanding and less demanding occupations exist? The previous section discussed the possibility that lower educated workers may find it optimal to let their health stock depreciate more quickly to compensate for their smaller human capital stock. In return, a worker would demand a higher wage to compensate for this health loss. The literature does not find definitive evidence for the existence of such compensating wage differentials. In additional estimations Fletcher et al. (2010) include the cumulative number of hours worked and cumulative labor income to their main estimation and find that these measures of income cushion the effect of physical demands of occupations on health a little. The impact of poor working conditions is much more limited. The authors themselves stress that these results are only suggestive.

In literature broader than physically demanding occupations the evidence is mixed. In a study with Finnish data Böckerman et al. (2006) find that job disamenities have a negative effect on job satisfaction but much less on individual wages. On the other hand, Böckerman et al. (2011) find that a higher uncertainty to lose a job provides a higher individual wage in Finland, while having no effect on job satisfaction. The authors conclude that the higher wage compensates this job disamenity. Bryson et al. (2012) find with British data that a higher wages is related to higher job anxiety but also with higher job satisfaction. This is inconsistent with an explanation of compensating wage differentials as a higher wage would then compensate for the lower job satisfaction and higher job anxiety.

A possible absence of wage differentials creates scope for potential policy interventions. This paper examines the willingness of individuals to contribute to early retirement schemes of demanding occupations. The provision of earlier retirement is one way of compensating individuals with demanding occupations. It could also take other forms (e.g. higher wages, ...). Such a policy intervention must also be feasible to implement.

Why would individuals display a willingness to contribute to early retirement schemes? This can have two causes: self-interest or social preferences. Individuals may contribute because they know they will benefit from such a retirement scheme themselves in the future. This is especially true if contributions are small compared to the benefits. Other reasons involve social preferences. For instance, individuals may be altruistic. Fehr et al. (2006) define altruism as kindness unconditional on payoffs received by others. This means that individuals will care for the payoff of others without regard for the final distribution of outcomes.[3] On the other hand, inequity averse individuals take the distribution of outcomes into account. They will increase the payoff of the other individual if it decreases inequity but not if the other individual already has the highest payoff. Tyran et al. (2006)

[3] Altruism is a broad notion. It can also contain 'impure' altruism: the warm-glow effect (Andreoni, 2006). For instance, individuals may donate money to charity because it makes them feel better about themselves. Put this way giving to charity can be considered as a selfish act.

find that a model with inequality averse individuals better predicts the voting outcomes in a redistribution experiment than a model with rational and self-interested individuals.

This willingness can have two causes: self-interest or social preferences. Following Fehr et al. (2006), we distinguish between altruism or inequity aversion for this kind of preferences. Altruism is unconditional kindness, while inequity aversion is conditional. Altruistic individuals will increase the payoff of other individuals regardless of the distribution of outcomes. Inequity averse individuals take the distribution of outcomes into account. For instance, they will increase the payoff of the other individual if it decreases inequity but not if the other individual already has the highest payoff. This impacts the redistribution. Charness et al. (2002) show with lab experiments that individuals are willing to sacrifice own resources to increase the pay-offs of other participants, especially the least well-off participants. Tyran et al. (2006) find that a model with inequality averse individuals better predicts the voting outcomes in a redistribution experiment than a model with rational and self-interested individuals.

3. Dutch retirement institutions

The retirement system in the Netherlands is relevant as Dutch respondents answer the questions of the survey with these institutions in mind. The retirement system in the Netherlands is organized in three pillars.

The first pillar consists of state pension benefits. These are organized at the national level. Every resident of the Netherlands is entitled to these benefits at the statutory age. Since 2009 a public policy debate revolved around an increase in this age. In spring of 2012 it was decided that this age will increase starting in 2013. Consequently, this age is currently increasing, depending on birth cohort. Until 2013 the age of eligibility was 65 years of age. It will amount 67 years of age in 2021. After that, the statutory age will be linked to life-expectancy. The height of the benefits depends on the number of years one has lived in the Netherlands and is independent of (life-time) income. It is a basic income for the elderly. This pillar is funded on the basis of Pay-As-You-Go (PAYGO).

Company or sector-level retirement schemes represent the second pillar. Participation in these schemes is generally mandatory for employees in the Netherlands. Employment in a particular sector or company means automatic enrollment in the relevant pension fund or insurer. These schemes can be either Defined Contribution (DC) or Defined Benefit (DB). The level of the salary and the number of years of contribution mainly determine the height of the retirement benefits. Earlier/later take-up of pension benefits is possible in this pillar and can differ from the statutory retirement age of the state pension benefits.

Finally, voluntary contributions are possible in the third pillar. Additional individual retirement savings are possible in this pillar. These savings are tax-deductible under certain conditions. This means that the accumulation of savings and their returns are untaxed, while in the pay-out phase the benefits are taxed.

The first pillar implies transfers among various occupations, whereas in the second pillar this is less the case. As stated before, the first pillar is at the national level and contributions are paid on the basis of PAYGO. This implies that individuals with various backgrounds and occupations contribute to each other retirement schemes. On the other hand, the second pillar is capital-funded and at the company or the sectoral level. So transfers from one job to the other are much smaller in this pillar.

4. Data and study design

We have filed a one-time survey on demanding occupations (DO) in the CentERpanel, a representative panel of the Dutch adult population. The same panel also incorporates the DNB Household Survey (DHS), an annual panel survey in which respondents answer questions related to different aspects of their financial situation, like income and wealth. 2,840 household members above the age of 15 were asked to participate in the DO survey. 1,845 took part in our DO survey, giving a participation rate of 65%. Data collection was in the week of May 11th through May 16th 2012. So respondents answered the questions at a time an increase of the statutory retirement age was contemplated (see section 3). The descriptive statistics we present have been weighted with regard to age, gender, education and individual yearly income to correct for unit-non response and to obtain a representative view of the Dutch population.

In the DO survey respondents were directly asked what they think about the demanding nature of specific occupations and reasonable retirement ages for these occupations. They were also asked whether they were willing to contribute to an early retirement scheme for such occupations. Respondents were first given an introduction into five fictive vignette persons with various occupations. We emphasized that the fictive persons all had the same income and age and the same work experience. The only dimension, in which the five hypothetical persons differ, is the occupation. These specific occupations are construction worker, teacher, nurse, person with a desk job, and fireman. All respondents answer questions about all these five occupations. Appendix A shows the exact wording of the questions. The order of the questions and the gender of the vignette persons are randomized over the respondents, with the exception of construction worker and fireman. For these two occupations all respondents get male names.

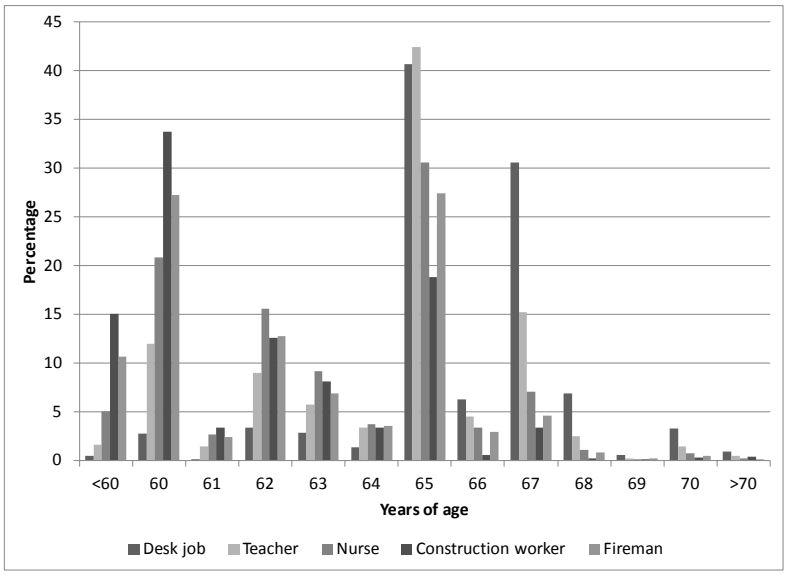
First, the respondents were asked what they think is a reasonable retirement age for the various occupations. An example of such a question (desk job) is the following:

John has worked for 30 years at a desk job. What do you think is a reasonable retirement age for John?

Respondents could answer ranging from 'younger than 60', '60', '61', …, '70', 'older than 70'.

Figure 1 presents the answers of the respondents. There is ample variation in the answers across occupations. These differences are plausible and raise confidence that respondents understood the questions. The answers indicate that for construction workers early retirement seems reasonable, whereas people with desk jobs are expected to retire later.

Figure 1 Construction workers and firemen have a lower reasonable retirement age than desk jobs and teachers

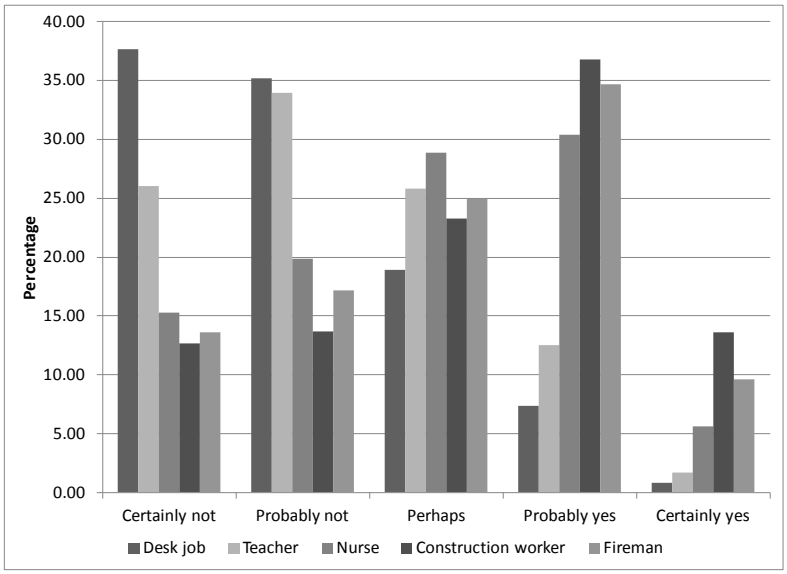


Legend: elicited answers to the question: 'What do you think is a reasonable retirement age for … (fictive name with listed occupation)?' N=1,840. Source DO, own computations

After answering some other questions, the respondents indicated whether they were willing to contribute, through income tax payments, to an early retirement scheme for the various fictive persons with the different occupations. Respondents answered on a five point scale with possible answers ranging from 'certainly not' to 'certainly yes'.

Figure 2 shows the willingness to contribute to the retirement schemes for the five occupations. Construction workers are not only considered as reasonable early retirees but respondents also report a willingness to contribute to their early retirement schemes. Almost 15% of the respondents indicate they certainly are willing to contribute to an early retirement scheme for construction workers. It is possible that respondents show high willingness to pay, because they expect themselves to be able to benefit of such schemes. Actually, the data shows that only 9% of the respondents identify themselves with the profession of 'construction worker', suggesting that many respondents are also willing to contribute even if they do not expect to benefit directly from these schemes.

Figure 2 Respondents more willing to contribute to retirement schemes of certain occupations



Legend: answers to the question: 'Are you willing to contribute as a tax payer to an early retirement scheme for … (fictive name with listed occupation)?' N=1,835. Source DO, own computations

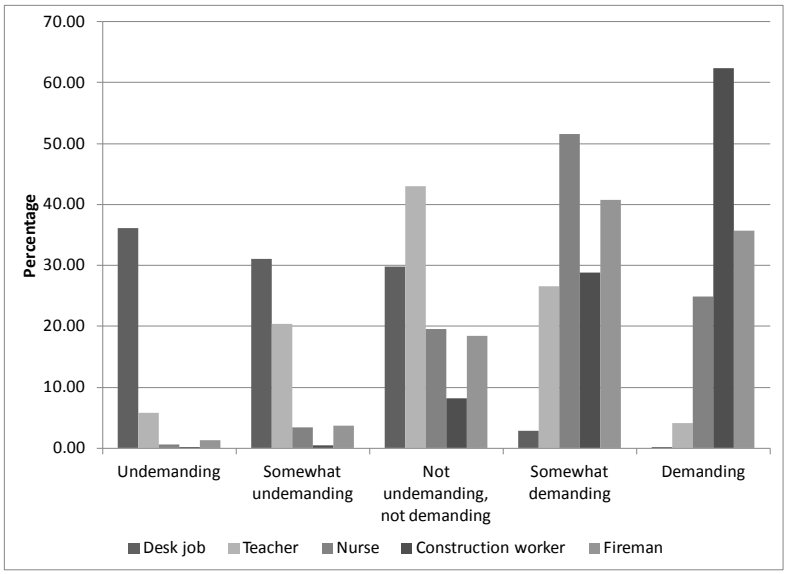
In the last vignette-related question we asked the opinion of the respondents regarding how demanding they think the occupation of the fictive person is:

'Do you think that the occupation of John (has a desk job) is demanding?'

This question was asked for each of the five professions. Respondents answered on a five point scale ranging from 'undemanding' to 'demanding'.

Figure 3 shows that respondents think that construction workers have the most demanding of the five occupations, followed by nurses and firemen. Teachers and especially individuals with desk jobs are thought to have less demanding occupations.

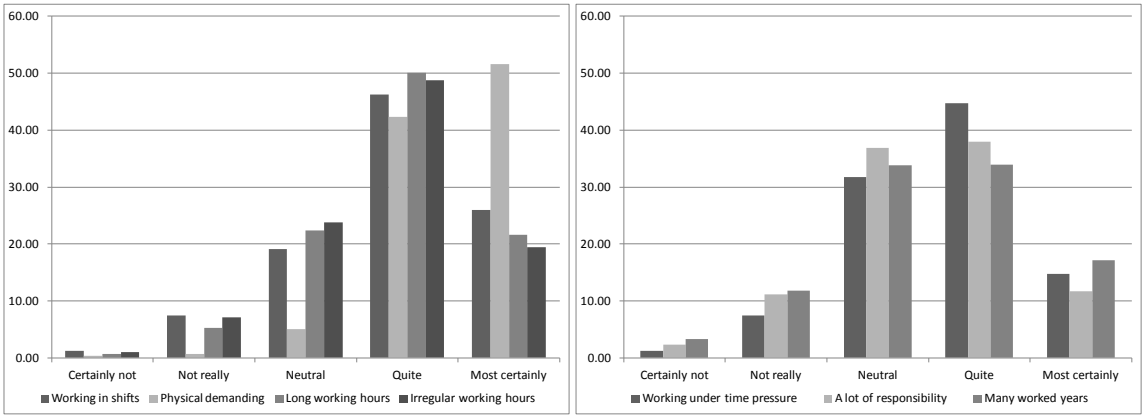
Figure 3 What are considered demanding occupations?



Legend: answer to the question: ”Do you think that the occupation of … (fictive name with listed occupation) is demanding?” N=1,835. Source: DO, own computations

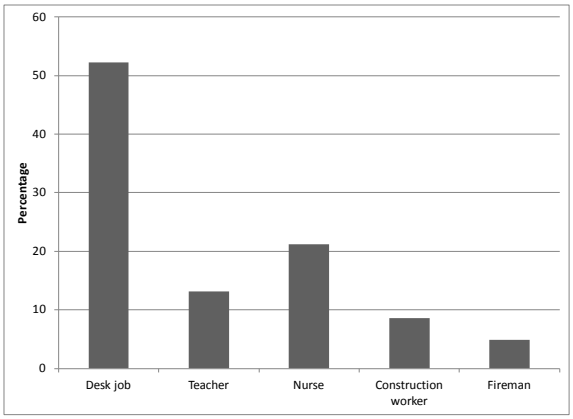
Lastly, respondents were asked to what extent certain job properties make an occupation demanding and with what occupations they identify themselves most. The properties range from physically demanding work to working under time pressure. Figure 4 shows that occupations are primarily considered demanding due to the physical workload, followed by working in shifts and working long hours or in an irregular manner. Figure 5 shows that the most respondents identify themselves with working in a desk job.

Figure 4 What properties make an occupation demanding?



Legend: answer to the question: ”What attribute makes an occupation demanding in your view?” N=1,834. Source: DO, own computations

Figure 5 Respondents indicate that their occupation compares the most to a desk job.



Legend: answer to the question: "With which person does your occupation most closely compare?" N=1,787. Source: DO, own computations

The descriptive statistics above suggest that most respondents find it reasonable that workers with demanding occupations retire earlier than others, and are also willing to contribute (by paying taxes) to this purpose. Several competing explanations, however, could explain these findings. We have already mentioned the possibility of self-interest, stemming from those who expect to benefits themselves. Others may actually be biased by their own retirement scheme (as older workers for instance are typically allowed earlier retirement than younger due to cohort-related shifts in pension rules) or because they identify with some attributes of the vignette (being a woman, or a young employee etc…). Accounting for these different explanations with simple descriptive statistics is not possible. In the next section we model respondents' answers using an econometric model.

5. Model and results

5.1 Demanding occupations and reasonable retirement age

The following model estimates the relationship between the extent certain occupations are perceived to be demanding and the associated reasonable retirement age. Respondents evaluate how demanding certain occupations are according to equation (1):

(1) $$y_{ij}^{*} = X_i'\delta_j + Z_i\alpha_j + W_i'\lambda_j + \vartheta_i + u_{ij}$$

The latent dependent variable y_{ij}^{*} increases in the extent that respondent *i (i=1,…,N)* thinks that occupation *j (j=1,…,5)* is demanding. This depends on respondent background characteristics (X_i), on with jobs respondents most strongly identify (Z_i) and on job characteristics that make jobs demanding in the view of the respondent W_i. Unobserved heterogeneity across the respondents is included via ϑ_i. Finally, there is an idiosyncratic error term assumed to be standard normally distributed: $u_{ij} \sim N(0,1)$, independent of the other terms in the right hand side of equation (1). The latent dependent variable is not observed. Instead, a respondent answers in five distinct categories (from 'undemanding' to 'demanding'):

(2) $$Y_{ij} = k \; if \; c_{k-1} < y_{ij}^{*} \leq c_k$$

$$with\ 1 \leq k \leq\ 5, c_0 = -\infty\ and\ c_5 = \infty$$

The respondents also indicate what they think are reasonable retirement ages for the different occupations:

(3) $$R_{ij} = \gamma_j y_{ij}^* + X_i'\eta_j + Z_i\beta_j + \rho_i + \varepsilon_{ij}$$

The reasonable retirement age R_{ij} for respondent *i* and occupation *j* depends on the same variables as in equation (1), with the exception of the effect of what job characteristics make an occupation demanding. Unobserved heterogeneity is also incorporated and denoted by ρ_i. The idiosyncratic error ε_{ij} is assumed to be normally distributed as $N(0, \sigma_\varepsilon^2)$, independent of the other terms on the right hand side of (1) and (3). Combining equations (1) and (3) leads to:

(4) $$R_{ij} = W_{ij}'\gamma_j\lambda_j + X_i'(\gamma_j\delta_j + \eta_j) + Z_i(\beta_j + \alpha_j\gamma_j) + \rho_i + \gamma_j\vartheta_i + \varepsilon_{ij} + \gamma_j u_{ij}$$

Equation (4) shows that with the identifying assumption that job characteristics do not influence the reasonable retirement age directly, *γ* can be identified. The unobserved heterogeneity terms in equations (1) and (3) are assumed to be bivariate normally distributed, independent of the error terms and all the explanatory variables in (4): $\binom{\vartheta_i}{\rho_i} = N\left(\binom{0}{0}, \begin{pmatrix} \sigma_\vartheta^2 & \tau\sigma_\rho\sigma_\vartheta \\ \tau\sigma_\rho\sigma_\vartheta & \sigma_\rho^2 \end{pmatrix}\right)$. This implies that the unobservable parts of equations (1) and (3) are correlated if the parameter τ is not equal to zero. The parameters of this model are estimated using maximum simulated likelihood. We used 100 Halton draws.[4] Appendix B presents details of the (simulated) likelihood for this model.

Table 1 presents the estimates of equation (1). The bottom part shows that self-identification matters in the evaluation of which occupations are demanding, keeping perceived job characteristics constant. Especially respondents who identify themselves with teachers and firemen consider these jobs as more demanding than other respondents. But all respondents, regardless of their own job, think that construction worker is a demanding occupation. Interestingly, teachers consider the job of nurses as more demanding than nurses themselves do. Teachers, nurses, construction workers and firemen consider the job of office clerk less demanding. Gender differences also appear present: regardless of the occupation, jobs of female fictive persons are evaluated as demanding.[5]

Table 1 Key estimation results for evaluation how demanding occupations are (equation (1))

	Evaluation how demanding occupations are				
	(1) Desk job	(2) Teacher	(3) Nurse	(4) Construction worker	(5) Fireman
Shifts: Quite	0.166**	0.119	0.191**	0.026	0.234***
	(0.079)	(0.077)	(0.078)	(0.087)	(0.079)

[4] For Halton draws mdraws is used (also see Cappellari and Jenkins, 2006). A higher number of draws does not affect the results.

[5] For the construction worker and fireman female fictive persons were not used. All respondents answered these questions with male names. The other three occupations vary in a male and female name, but only across respondents.

Shifts: Certainly yes	0.051	0.164*	0.373***	0.045	0.324***
	(0.100)	(0.096)	(0.099)	(0.114)	(0.099)
Physical: Quite	-0.662***	-0.194	0.196	0.989***	0.600***
	(0.133)	(0.130)	(0.132)	(0.134)	(0.131)
Physical: Certainly yes	-0.928***	-0.189	0.504***	2.198***	1.067***
	(0.136)	(0.132)	(0.134)	(0.143)	(0.134)
Time Pressure: Quite	0.382***	0.267***	-0.002	-0.219***	-0.185**
	(0.075)	(0.072)	(0.074)	(0.084)	(0.074)
Time Pressure: Certainly yes	0.475***	0.485***	0.275**	-0.338**	-0.301**
	(0.117)	(0.113)	(0.118)	(0.135)	(0.117)
Responsibility: Quite	0.285***	0.277***	0.247***	0.026	0.107
	(0.074)	(0.071)	(0.073)	(0.083)	(0.073)
Responsibility: Certainly yes	0.571***	0.444***	0.415***	0.074	0.278**
	(0.127)	(0.124)	(0.130)	(0.148)	(0.129)
Irregular working hours: Quite	-0.007	0.161**	0.219***	0.083	0.159**
	(0.079)	(0.077)	(0.079)	(0.088)	(0.079)
Irregular working hours: Certainly yes	0.016	0.121	0.496***	0.071	0.418***
	(0.121)	(0.118)	(0.122)	(0.140)	(0.122)
Long working hours: Quite	0.113	0.086	0.097	0.034	0.124
	(0.077)	(0.074)	(0.076)	(0.084)	(0.076)
Long working hours: Certainly yes	-0.151	0.047	-0.069	0.310**	0.305***
	(0.111)	(0.107)	(0.110)	(0.129)	(0.111)
Many worked years: Quite	0.026	0.151**	0.248***	0.202***	0.138**
	(0.070)	(0.068)	(0.070)	(0.078)	(0.070)
Many worked years: Certainly yes	0.004	0.217**	0.545***	0.453***	0.108
	(0.095)	(0.091)	(0.096)	(0.115)	(0.095)
Gender of fictive person (=1 if female)	0.127**	0.126**	0.214***	0.063	-0.052
	(0.060)	(0.058)	(0.060)	(0.070)	(0.060)
Teacher	-0.214**	0.427***	0.194**	0.114	0.003
	(0.089)	(0.087)	(0.090)	(0.104)	(0.090)
Nurse	-0.417***	-0.188**	0.010	-0.062	-0.066
	(0.082)	(0.079)	(0.082)	(0.095)	(0.082)
Construction worker	-0.268**	-0.283***	-0.345***	0.014	-0.194*
	(0.110)	(0.105)	(0.108)	(0.128)	(0.108)
Fireman	-0.243*	-0.140	-0.226	0.047	0.312**
	(0.143)	(0.138)	(0.142)	(0.166)	(0.145)
Constant	-	0.661	1.863***	2.646***	3.051***
		(0.480)	(0.491)	(0.536)	(0.491)
σ_ϑ			0.607***		
			(0.021)		
Log likelihood			-26492		
Number of observations			1771		

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Background controls (gender, education, age, age squared, employment status and household income) are included. For full set of results (including background controls), see Appendix C.

Individuals relate demanding occupations to physical demanding. Calculations with the estimation results of Table 1 show that construction workers have the most demanding occupation, followed by

fireman, nurse, teacher and desk job (in this order).[6] Moreover, Table 1 shows that the physical burden makes construction work demanding. Other attributes also play a role, like working in shifts, many worked years and irregular working hours in the case of nurses. A lot of responsibility makes desk jobs demanding.

The estimations for the reasonable retirement age (equation(2)) show the same picture (Table 2). Keeping all other variables constant, including the perceived demanding or less demanding nature of the job, construction workers are allowed to retire at the earliest age. The reasonable retirement ages of the other occupations are roughly two years higher. But the self-identification with the fictive persons seems to be a smaller issue here as none of the coefficients are significant at the 5% level. But there still is an indirect effect. Self-identification influences how demanding occupations are. In turn, this impacts the reasonable retirement age of an occupation as indicated by the significant γ-coefficients. Female fictive persons are allowed to retire earlier, although the effect is modest. Respondents indicate roughly that they are allowed to retire four months earlier.

Table 2 Key estimation results for evaluation of the reasonable retirement age

	Evaluation of reasonable retirement age				
	(1) Desk job	(2) Teacher	(3) Nurse	(4) Construction worker	(5) Fireman
γ_j	-0.551***	-0.815***	-0.836***	-0.738***	-0.960***
	(0.037)	(0.031)	(0.032)	(0.032)	(0.030)
Gender of fictive person (=1 if female)	-0.322***	-0.312***	-0.305***	-0.068	-0.112
	(0.099)	(0.100)	(0.101)	(0.103)	(0.101)
Teacher	-0.095	-0.065	0.049	0.027	0.016
	(0.145)	(0.147)	(0.148)	(0.152)	(0.148)
Nurse	-0.129	-0.175	-0.211	-0.142	-0.102
	(0.133)	(0.133)	(0.134)	(0.138)	(0.135)
Construction Worker	-0.052	0.032	-0.106	0.232	-0.098
	(0.184)	(0.186)	(0.187)	(0.193)	(0.188)
Fireman	0.052	-0.282	-0.253	0.011	0.034
	(0.241)	(0.243)	(0.244)	(0.252)	(0.248)
Constant	66.508***	66.408***	66.126***	64.107***	66.309***
	(0.604)	(0.670)	(0.683)	(0.688)	(0.715)
standard deviation *(sd)* increase in demanding occupation $(= \gamma_j * sd)$	-0.691***	-1.037***	-1.112***	-1.066***	-1.255***
	(0.046)	(0.039)	(0.042)	(0.046)	(0.040)
σ_ε			1.365***		
			(0.011)		
σ_ρ			1.587***		
			(0.030)		
τ (correlation coefficient)			0.051		

[6] The calculation involves computation of the mean of the predicted values for the latent variable of equation (1). Fireman and nurse are close to each other for the second place in this ranking.

	(0.033)
Log likelihood	-26492
Number of observations	1771

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Background controls (gender, education, age, age squared, employment status and household income) are included. For full set of results (including background controls), see Appendix C.

If occupations are regarded to be more demanding, this has a large effect on the reasonable retirement age of the same occupation. For instance, consider the occupation of construction worker and the perception that physical work makes a job demanding. The estimated coefficients state that the reasonable retirement age for a construction worker decreases 1.6 years if physical work certainly makes an occupation demanding compared to when respondents are neutral or disagree about this case. An alternative way is to consider the impact of an increase of one standard deviation in how demanding occupations are on the reasonable retirement age. This increase would reduces the reasonable retirement on average with one year (also see table 2).

Unobserved heterogeneity is present and sizeable. The order of magnitude can be compared to the standard deviation of the idiosyncratic error term. The standard deviation of the idiosyncratic error term amounts to 1 (by normalization), whereas the standard deviation of the unobserved heterogeneity amounts 0.61 in the evaluation of the demanding occupations. In the evaluation of the reasonable retirement age the standard deviation of the idiosyncratic error term amounts 1.37 (see table 2), while the standard deviation of the unobserved heterogeneity term amounts 1.59. The unobserved heterogeneity terms are slightly positively correlated, although this is not statistically significant.

Self-identification has no significant effect on the assessment of the reasonable retirement age. The evaluation of teachers by teachers form an exception. Table 3 shows the marginal effects of self-identification on the reasonable retirement age. This consists of a direct and an indirect part. The indirect effect works through the effect of self-identification on how demanding occupations are. Except for the cases of the construction worker and fireman, individuals, who self-identify with their occupation, indicate a lower reasonable retirement age. The effect is 5 months at most, in the evaluation of and by teachers.

Table 3 Marginal effects of self-identification on the reasonable retirement age

Evaluation of:	**Scale of** Teacher	Nurse	Construction worker	Fireman
Desk job	0.023	0.100	0.096	0.186
	(0.147)	(0.135)	(0.188)	(0.245)
Teacher	-0.412***	-0.022	0.263	-0.168
	(0.155)	(0.143)	(0.198)	(0.257)

Nurse	-0.114	-0.219	0.183	-0.064
	(0.156)	(0.142)	(0.199)	(0.258)
Construction worker	-0.057	-0.096	0.222	-0.024
	(0.153)	(0.140)	(0.195)	(0.253)
Fireman	0.0128	-0.039	0.088	-0.266
	(0.161)	(0.147)	(0.204)	(0.265)

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. The magnitude of the marginal effect is in years of age. The baseline is the occupation of desk job.

5.2 Demanding occupations and contribution to early retirement scheme

This model resembles the model of the previous section very closely. The extent to which certain occupations are perceived to be demanding and the associated willingness to contribute to the retirement schemes are central in this model. Respondents (*i=1,…,N*) evaluate how demanding certain occupations (*j=1,…,5*) are according to equations (1) and (2).

The respondents also indicate whether they are willing to contribute to an early retirement scheme for certain professions:

(5) $$C_{ij}^{*} = \kappa_j y_{ij}^{*} + X_i'\mu_j + Z_i\eta_j + \phi_i + \psi_{ij}$$

The willingness to contribute to an early retirement scheme C_{ij}^{*} for respondent *i* and occupation *j* depends on the same variables as in equation (3) and the perception how demanding certain professions are. Unobserved heterogeneity is denoted by ϕ_i. The idiosyncratic error ψ_{ij} is assumed to be standard normally distributed. The respondents answer in five distinct answer categories to what extent they want to contribute to (early) retirement schemes of certain professions:

(6) $$C_{ij} = l \; if \; d_{l-1} < C_{ij}^{*} \leq d_l$$

$$with \; 1 \leq l \leq 5, d_0 = -\infty \; and \; d_5 = \infty$$

The unobservable individual characteristics explaining the opinion about demanding occupations could be related to those determining the willingness to contribute to retirement of the vignette character. The assumptions on the unobserved heterogeneity terms is that these terms are bivariate normally distributed: $\begin{pmatrix}\vartheta_i \\ \phi_i\end{pmatrix} = N\left(\begin{pmatrix}0\\0\end{pmatrix}, \begin{pmatrix}\sigma_\vartheta^2 & \tau\sigma_\phi\sigma_\vartheta \\ \tau\sigma_\phi\sigma_\vartheta & \sigma_\phi^2\end{pmatrix}\right)$. This implies additional correlation between the error terms of equations (1) and (5). This equation implies that the correlation between the extent that occupations are demanding and the willingness to contribute is captured by the parameter τ. Equations (1), (2), (5) and (6) are estimated simultaneously using Simulated Maximum Likelihood with 100 Halton draws (see Cappelari and Jenkins, 2006).[7] Appendix C provides details of the likelihood for this model.

[7] A higher number of draws does not affect the magnitude of the estimated parameters.

If respondents identify the occupation as more demanding, they are also willing to contribute more. Table 4 shows the positive effect of the perception of how demanding an occupation is on the willingness to contribute to an (early) retirement scheme for such an occupation. The estimates of the coefficients in equation (1) are very similar to the estimates in Table 1 (also see appendix E) and are therefore omitted. The positive κ-coefficients indicate that individuals are more willing to contribute to the retirement scheme of demanding occupations. The magnitudes of these coefficients determine the marginal effects on the probability of evaluating a given occupation as (very) demanding. Table 5 shows that this effect varies between around 30 and 40% depending on the occupation. In other words, individuals are 30 through 40 percentage points more likely to contribute to (early) retirement schemes when the occupation is considered more demanding.

Table 4 Key estimation results for the willingness to contribute to (early) retirement schemes

	Evaluation of willingness to contribute				
	(1) Desk job	(2) Teacher	(3) Nurse	(4) Construction worker	(5) Fireman
κ_j	1.491***	1.292***	0.767***	0.565***	0.654***
	(0.073)	(0.060)	(0.042)	(0.037)	(0.035)
Gender of fictive person (=1 if female)	-0.225*	-0.118	0.016	-0.147	-0.126
	(0.130)	(0.126)	(0.126)	(0.129)	(0.126)
Teacher	0.132	-0.077	-0.037	-0.075	-0.049
	(0.189)	(0.185)	(0.183)	(0.188)	(0.185)
Nurse	0.709***	0.326*	0.369**	0.414**	0.364**
	(0.175)	(0.167)	(0.168)	(0.173)	(0.169)
Construction Worker	0.363	0.345	0.527**	0.637***	0.573**
	(0.242)	(0.235)	(0.234)	(0.240)	(0.236)
Fireman	0.550*	0.233	0.461	0.196	0.467
	(0.305)	(0.295)	(0.292)	(0.300)	(0.295)
Constant	-	-0.746	-0.964	-0.279	0.009
		(0.578)	(0.606)	(0.653)	(0.630)
σ_ρ			2.729***		
			(0.076)		
τ (correlation coefficient)			0.516***		
			(0.020)		
Log likelihood			-18094		
Number of observations			1771		

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Background controls (gender, education, age, age squared, employment status and household income) are included. For full set of results (including background controls), see Appendix D.

Unobserved heterogeneity is significantly present. Table 4 shows that the standard deviation of the willingness to contribute amounts to 2.73, while the standard deviation of the idiosyncratic error term amounts to 1. Moreover, a sizeable and significant correlation between the two unobserved

heterogeneity terms of 0.52 is found. Respondents with a higher willingness to contribute in general typically also tend to evaluate occupations as more demanding.

Table 5 Impact of one standard deviation increase in demanding occupation on willingness to contribute to (early) retirement scheme

Office clerk	Teacher	Nurse	Construction worker	Fire man
28.41***	39.48***	38.11***	33.03***	33.63***
(1.39)	(1.84)	(2.08)	(2.18)	(1.78)

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. The magnitude of the marginal effect is evaluated for the proportion of the sample that considers the occupation in the column to be demanding or very demanding. Numbers are in percentage points.

Direct effects of self-identification are found. Table 4 shows that self-identification of respondents with teachers and firemen does not lead to a higher willingness to contribute for any occupation than self-identification with office clerk. Nurses are the other extreme case: if respondents identify themselves with nurses, they are willing to contribute to retirement schemes of every occupation. Construction workers are willing to contribute to retirement schemes of nurses, construction workers and firemen. In combination with the indirect effects respondents are willing to contribute to retirement schemes of their own occupations (table 6). They probably expect to benefit themselves from such arrangements.

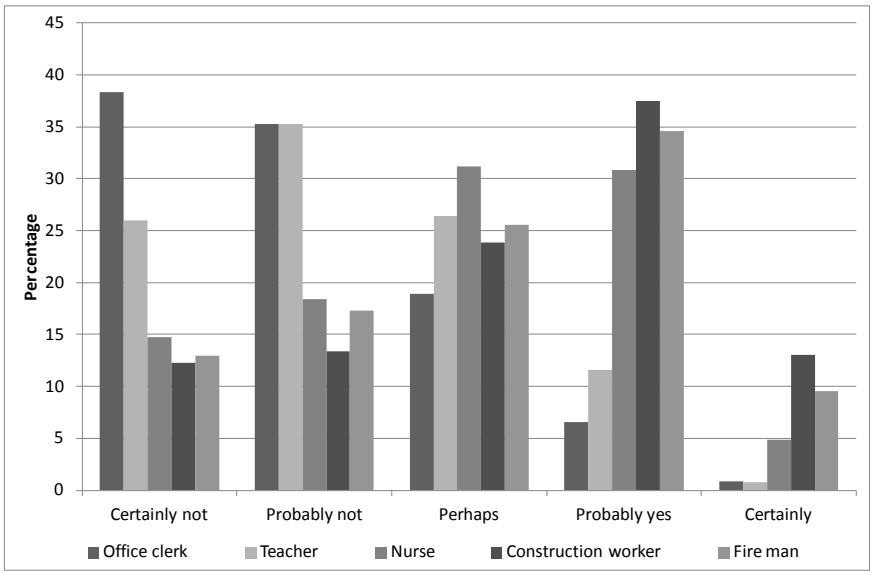
Table 6 Marginal effects of self-identification on the willingness to contribute to (early) retirement schemes

			Scale of	
Evaluation of:	Teacher	Nurse	Construction worker	Fireman
Office clerk	-2.27	2.33	-0.30	4.70
	(3.27)	(3.01)	(4.12)	(5.26)
Teacher	12.33**	3.16	0.62	3.91
	(4.99)	(4.69)	(6.40)	(8.08)
Nurse	4.92	15.50**	10.49	12.73
	(7.45)	(6.85)	(9.49)	(11.94)
Construction worker	-0.22	15.96**	26.54***	9.77
	(7.82)	(7.18)	(9.89)	(12.45)
Fireman	-1.26	13.27*	18.32*	28.52**
	(7.74)	(7.13)	(9.84)	(12.40)

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. The magnitude of the marginal effect is evaluated for the proportion of the sample that considers the occupation in the row to be demanding or very demanding. Numbers are in percentage points. Benchmark: respondents who self-identify with office clerk.

But respondents indicate that they are willing to contribute to retirement schemes of other occupations than their own occupation. The data shows both the willingness to contribute as the self-identification. This allows an examination into whether people are willing to contribute to retirement schemes of occupations that are not their own. Figure 6 shows that almost half of the respondents *not identifying themselves with construction worker* indicate to contribute probably or certainly to the retirement scheme of construction workers. This is followed by firemen, nurses, teachers and finally office clerks. More than 75 percent of the respondents not in a desk job indicate to contribute probably or certainly not to the retirement scheme of office clerks. Respondents indicate they are willing to contribute to the retirement schemes of other occupations but the extent relies on the perception how demanding the occupation in question is.

Figure 6 Respondents willing to contribute to retirement schemes of occupations other than their own



For the evaluation of the willingness to contribute for the occupations, the respondents with the same occupation are omitted. For instance, in the evaluation of office clerk the respondents, who self-identify with office clerks, are left out. Source: descriptive statistics (DO), own computations

6. Conclusion

This paper relates the perception about how demanding occupations are to what people consider a reasonable retirement age and to the willingness to contribute to retirement schemes for such occupations. We find that individuals consistently rank the various occupations. For instance, individuals with desk jobs are regarded to have a less demanding occupation, while also being attributed a higher reasonable retirement age. Individuals are also less willing to contribute to the retirement scheme of people with desk jobs. For construction workers the opposite is the case. This is likely related to the view that physical burden makes for a demanding occupation.

Furthermore, the role of self-identification is studied. In general, opinions about how demanding occupations are differ between individuals with different occupations. Our model studies the influence of the self-identified occupation on the opinion of the respondents. They indicate the importance of self-identification. For instance, individuals consider teachers to have a demanding occupation more strongly when they identify themselves with that occupation. Consequently, they are more supportive of contributing to their retirement schemes and assign a lower reasonable retirement age.

On the other hand, individuals are willing to contribute to the retirement schemes of demanding occupations. The construction worker is a case in point. For instance, almost half of the respondents who do not identify themselves with construction worker indicate to probably or certainly contribute to a retirement scheme for construction workers and regard construction workers to have a demanding occupation. So individuals seem to be willing to contribute to retirement schemes other than arrangements from which they themselves expect to benefit. This effect is stronger if individuals consider the occupation (physical) demanding. This might also mean that individuals regard retirement as a favorable alternative to disability.

In this study we studied the role of self-identification and we speculate that our results would be in line with findings of Fong et al. (2005). They argue that there is support for policies that rely on reciprocation. For instance, individuals are willing to support others financially if the less-off individuals are struck by strings of bad luck instead of unwillingness to work. In our study it could be that the respondents are of the opinion that all people with occupations contribute to society but some occupations require certain tasks that exert a toll on individual health. Individuals could be willing to compensate for this by supporting more generous early retirement schemes for such occupations. In their view individuals in demanding occupations may find it difficult to work until the (increased) statutory retirement age. Also, people with demanding occupations may consider this an appropriate reward. Van Solinge et al. (2008) find that retirement from a physically demanding job is related to a higher level of retirement satisfaction.

Policy makers could differentiate the retirement age over various occupations. A possible policy option includes differentiation of the statutory retirement age in the first pillar. The first pillar is nation wide and thus contains every occupation. This differentiation would need to keep track of the various attributes, which make occupations demanding. Such a reform may prove somewhat difficult to implement as every occupation must be classified according to its attributes. Individuals may engage in strategic behavior by switching occupations at a later age to be eligible for earlier retirement (Ravesteijn et al, 2013).

Alternatively, policy could use the life time number of worked years instead. Such a measure addresses concerns about implementation and about strategic behavior. Individuals with physically demanding occupations often start working at a relative early age. Such a policy uses the observed

correlation between income, education and having a physically demanding occupation. Such policies could also use other proxies, such as (life-time) income.

But it is important to note that such policies could also entail costs. Earlier retirement for individuals with demanding occupations may entail a shift in costs from employers to society. For instance, a lower retirement age for demanding occupations may lead to a shift from disability at the end of working life to early retirement. This could diminish incentives for the employer to make occupations less demanding, for example by reducing heavy lifting or hazardous or stressful activities, as they might find it easier to redirect their employees into early retirement. It is up to policy makers to strike a balance in this trade-off.

Literature

Andreoni, J., 2006, Philanthropy, In Handbook of the Economics of Giving, Altruism and Reciprocity, Volume 2, Elsevier,1201 - 1269

Böckerman, P. and P. Ilmakunnas, 2006, Do job disamenities raise wages or ruin job satisfaction?, International Journal of Manpower, 27(3), 290-302

Böckerman, P., P. Ilmakunnas and E. Johansson, 2011, Job security and employee well-being: Evidence from matched survey and register data, Labour Economics, 18, 547 - 554

Bovenberg, H., J. Mackenbach and R. Mehlkopf, 2006, Een eerlijk en vergrijzingbestendig ouderdomspensioen, Economisch-Statistische Berichten, 15 december 2006, 648 - 651

Bryson, A., E. Barth and H. Dale-Olsen, 2012, Do higher wages come at a price?, Journal of Economic Psychology, 33, 251 - 263

Cappellari, L. and S. Jenkins, 2006, Calculation of Multivariate Normal Probabilities by Simulation, with Applications to Maximum Simulated Likelihood Estimation, IZA Discussion Paper No. 2112

Case, A. and A.S. Deaton, 2005, Broken Down by Work and Sex: How Our Health Declines, Analysis in the Economics of Aging, University of Chicago Press, 185 - 212

Charness, G. and M. Rabin, 2002, Understanding social preferences with simple tests, The Quarterly Journal of Economics, 117(3), 817-869

DellaVigna, S., 2009, Psychology and Economics: Evidence from the field, Journal of Economic Literature, 47:2, 315 - 372

Fehr, E. and K.M. Schmidt, 2006, The economics of fairness, reciprocity and altruism–experimental evidence and new theories, Handbook of the economics of giving, altruism and reciprocity, 1, 615-691

Fletcher, J. M., J.L. Sindelar and S. Yamaguchi, 2011, Cumulative effects of job characteristics on health, Health Economics, 20(5), 553-570

Fong, C. M., S. Bowles and H. Gintis, 2005, Behavioural motives for income redistribution, Australian Economic Review, 38(3), 285-297

García-Gómez, P, H.M. von Gaudecker and M. Lindeboom, 2011, Health, disability and work: patterns for the working age population, International Tax Public Finance, 18, 146 - 165

Grossman, M., 1972, On the Concept of Health Capital and the Demand for Health, Journal of Political Economy, Vol. 80, No. 2, 223 - 255

Gruber, J. en D. A. Wise, 1999, Social Security and Retirement around the World, University of Chicago Press

Gruber, J., D. Wise, 2004, Social Security Programs around the World: Micro Estimation, University of Chicago Press.

Gupta, S., 2010, The Study of the Impact of Early Life Conditions on Later Life Events: A Look Across the Individuals's Life Course, No. 477, Rozenberg Publishers

Gustman, A., Th. Steinmeier, 2005, The social security early retirement age in a structural model of retirement and wealth, Journal of Public Economics, 89, 441-463

Kalwij, A. S., R.J. Alessie and M.G. Knoef, 2013, The association between individual income and remaining life expectancy at the age of 65 in the Netherlands, Demography, 50(1), 181-206

OECD, 2011, Pensions at a Glance 2011: Retirement-income Systems in OECD and G20 Countries, OECD Publishing, http://dx.doi.org/10.1787/pension_glance-2011-en

Ravesteijn, B., H. van Kippersluis en E. van Doorslaer, 2013, Long and healthy careers? The relationship between occupation and health and its implications for the statutory retirement age, Netspar Panel paper 36

Rust, J., C. Phelan, 1997, How Social Security and Medicare affect retirement behavior in a world of incomplete markets, Econometrica, 65(4), 781-831

Sindelar, J. L., J. Fletcher, T. Falba, P. Keenan and W.T. Gallo, 2007, Impact of first occupation on health at older ages, National Bureau of Economic Research Working Paper 13715

Tyran, J. R. and R. Sausgruber, 2006, A little fairness may induce a lot of redistribution in democracy, European Economic Review, 50(2), 469-485

Van Solinge, H. and K. Henkens, 2008, Adjustment to and satisfaction with retirement: Two of a kind?, Psychology and Aging, 23(2), 422 - 434

Appendix A Questions of the survey

This appendix lists the questions of the survey. First the respondents were asked what they thought was a reasonable retirement age for the various fictive persons with different occupations:

We would like to ask you a number of hypothetical questions about the retirement age for various occupations. These questions are not about you, but about a fictive person with a number of characteristics. We would like to hear your opinion this person. John, Henry, Tim, Klaas and Stijn [in case of female names: Joan, Maria, Ann, Klaas and Stijn] *are all 55 years of age. They have worked full-time for the last 30 years. Before that they went to school. Their salaries are all equal.*

John [or Joan] *has worked for 30 years at a desk job. What do you think is a reasonable retirement age for John* [or Joan]*?*

Younger than 60 years of age

60 years of age

61 years of age

62 years of age

63 years of age

64 years of age

65 years of age

66 years of age

67 years of age

68 years of age

69 years of age

70 years of age

Older than 70 years of age

Henry [or Maria] *has taught for 30 years at an elementary school. What do you think is a reasonable retirement age for Henry* [or Maria]*?*

[Respondents see the same answer categories as the previous question]

Tim [or Ann] *has worked as a nurse for the last 30 years. What do you think is a reasonable retirement age for Tim* [or Ann]*?*

[Respondents see the same answer categories as the previous question]

Klaas has worked for 30 years in the construction sector. What do you think is an is a reasonable retirement age for Klaas?

[Respondents see the same answer categories as the previous question]

Stijn has worked for 30 years as a fireman. What do you think is an is a reasonable retirement age for Stijn?

[Respondents see the same answer categories as the previous question]

We would now like to ask you some questions about your willingness to contribute to early retirement schemes for certain occupations. This means that people with certain occupations will have the opportunity to retire earlier than people with other occupations.

Are you willing to contribute as a tax payer to an early retirement scheme for the persons we just described?

John [or Joan] *(has a desk job)*

Certainly not

Probably not

Perhaps

Probably yes

Certainly yes

Henry [or Maria] *(teacher at an elementary school)*

[Respondents see the same answer categories as the previous question]

Tim [or Ann] *(nurse)*

[Respondents see the same answer categories as the previous question]

Klaas (Construction worker)

[Respondents see the same answer categories as the previous question]

Stijn (Fireman)

[Respondents see the same answer categories as the previous question]

Do you think that the following persons have a demanding occupation?

John [or Joan] *(has a desk job)*

Undemanding

Somewhat undemanding

Not undemanding, not demanding

Somewhat demanding

Demanding

Henry [or Maria] *(teacher at an elementary school)*

[Respondents see the same answer categories as the previous question]

Tim [or Ann] *(nurse)*

[Respondents see the same answer categories as the previous question]

Klaas (Construction worker)

[Respondents see the same answer categories as the previous question]

Stijn (Fireman)

[Respondents see the same answer categories as the previous question]

What attributes makes an occupation demanding in your view?

- Working in shifts

certainly not

not really

neutral

quite

Most certainly

- Physical demanding

[Respondents see the same answer categories as the previous question]

- Working under time pressure (work has to be finished within a certain period)

[Respondents see the same answer categories as the previous question]

- *A lot of responsibility*

[Respondents see the same answer categories as the previous question]

- *Irregular working hours*

[Respondents see the same answer categories as the previous question]

- *Long working days*

[Respondents see the same answer categories as the previous question]

- *Many worked years (in some occupations it is common to have started working at 16 or 18 years of age)*

[Respondents see the same answer categories as the previous question]

To the persons, that indicated they have a job or had a job before, the following question was asked:

With which person does your occupation most closely compare?

John [or Joan] *(has a desk job)*

Henry [or Maria] *(teacher at an elementary school)*

Tim [or Ann] *(nurse)*

Klaas (Construction worker)

Stijn (Fireman)

Appendix B Derivation likelihood function for demanding occupations and reasonable retirement age

This appendix derives the likelihood function of the model in section 4.1. The associated probability density of equation (4) is:

$$(B.1) \qquad g\left(R_{ij} = r_{ij} | W_{ij}, X_i, Z_i, \rho_i, \vartheta_i\right) = \frac{1}{\sqrt{\sigma_\varepsilon^2 + {\gamma_j}^2}} \varphi\left(\frac{r_{ij} - W_{ij}'\gamma_j\lambda_j - X_i'(\gamma_j\delta_j + \eta_j) - Z_i(\beta_j + \alpha_j\gamma_j) - \rho_i - \gamma_j\vartheta_i}{\sqrt{\sigma_\varepsilon^2 + {\gamma_j}^2}}\right)$$

Equations (1) and (2) combine into:

$$Y_{ij} = 1 \; if \; Y_{ij}^* \leq c_1 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i$$

$$Y_{ij} = 2\ if\ c_1 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i < Y_{ij}^* \leq c_2 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i$$

$$Y_{ij} = 3\ if\ c_2 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i < Y_{ij}^* \leq c_3 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i$$

$$Y_{ij} = 4\ if\ c_3 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i < Y_{ij}^* \leq c_4 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i$$

$$Y_{ij} = 5\ if\ Y_{ij}^* > c_4 - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i$$

For the construction of the individual likelihood contribution the associated probability of equation (1) is conditioned on $\varepsilon_{ij} + \gamma_j u_{ij}$. This conditional distribution follows a normal distribution with mean and variance: $u_{ij}|(\varepsilon_{ij} + \gamma_j u_{ij}) \sim N\left(\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(\varepsilon_{ij} + \gamma_j u_{ij}), 1 - \frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}\right)$ and leads to the following equation:

(B.2)

$$P\left(Y_{ij} = k|W_{ij}, X_i, Z_i, \vartheta_i, \varepsilon_{ij} + \gamma_j u_{ij}\right)$$
$$= \Phi\left(\frac{c_k - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i - \frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(\varepsilon_{ij} + \gamma_j u_{ij})}{\sqrt{1 - \frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)$$
$$- \Phi\left(\frac{c_{k-1} - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j - \vartheta_i - \frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}(\varepsilon_{ij} + \gamma_j u_{ij})}{\sqrt{1 - \frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)$$

for k = 1, …, 5

As before, we define for notational purposes: $c_0 = -\infty$ and $c_5 = \infty$

Equation (4) can be rewritten to give an expression for the residuals and inserted in equation (B.2), leading to equation (B.3):

(B.3)

$$P\left(Y_{ij}=k|W_{ij},X_i,Z_i,\vartheta_i,\varepsilon_{ij}+\gamma_j u_{ij}\right)$$

$$=\Phi\left(\frac{c_k-X_i'\delta_j-Z_i\alpha_j-W_{ij}'\lambda_j-\vartheta_i-\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}\left(r_{ij}-W_{ij}'\gamma_j\lambda_j-X_i'\left(\gamma_j\delta_j+\eta_j\right)-Z_i\left(\beta_j+\alpha_j\gamma_j\right)-\rho_i-\gamma_j\vartheta_i\right)}{\sqrt{1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)$$

$$-\Phi\left(\frac{c_{k-1}-X_i'\delta_j-Z_i\alpha_j-W_{ij}'\lambda_j-\vartheta_i-\frac{1}{\sigma_\varepsilon}\frac{\gamma_j}{\sqrt{\sigma_\varepsilon^2+\gamma_j^2}}\left(r_{ij}-W_{ij}'\gamma_j\lambda_j-X_i'\left(\gamma_j\delta_j+\eta_j\right)-Z_i\left(\beta_j+\alpha_j\gamma_j\right)-\rho_i-\gamma_j\vartheta_i\right)}{\sqrt{1-\frac{\gamma_j^2}{\sigma_\varepsilon^2+\gamma_j^2}}}\right)$$

The assumptions on the unobserved heterogeneity is that these terms are bivariate normally distributed: $\binom{\vartheta_i}{\rho_i}=N(\binom{0}{0},\begin{pmatrix}\sigma_\vartheta^2 & \tau\sigma_\rho\sigma_\vartheta\\ \tau\sigma_\rho\sigma_\vartheta & \sigma_\rho^2\end{pmatrix})$.

The individual contribution to the likelihood function is:

(B.4)

$$L_i=\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\prod_{j=1}^{5}P\left(Y_{ij}=k|W_{ij},X_i,Z_i,\vartheta_i,\varepsilon_{ij}+\gamma_j u_{ij}\right)\ g\left(R_{ij}=r_{ij}|W_{ij},X_i,Z_i,\rho_i,\vartheta_i\right)f(\rho_i,\vartheta_i)d\rho_i d\vartheta_i$$

where the function $f(\rho_i,\vartheta_i)$ is the density function of the bivariate normal distribution:

(B.5)
$$f(\rho_i,\vartheta_i)=\frac{1}{2\pi\sigma_\rho\sigma_\vartheta\sqrt{1-\tau^2}}\exp(-\frac{1}{2}\binom{\rho_i}{\vartheta_i}^{\mathrm{T}}\begin{pmatrix}\sigma_\rho^2 & \tau\sigma_\rho\sigma_\vartheta\\ \tau\sigma_\rho\sigma_\vartheta & \sigma_\vartheta^2\end{pmatrix}^{-1}\binom{\rho_i}{\vartheta_i})$$

Appendix C Derivation likelihood function for demanding occupations and the willingness to contribute to (early) retirement scheme

This appendix derives the likelihood function of the model in section 4.2. Equation (C.1) shows the probability for a given respondent *i* answering the questions about demanding occupations and the willingness to contribute of occupation *j*:

(C.1)
$$P\left(Y_{ij}=k,C_{ij}=l\right)=P\left(c_{k-1}<y_{ij}^*\le c_k,d_{l-1}<C_{ij}^*\le d_l\right)$$
$$=P\left(y_{ij}^*\le c_k,C_{ij}^*\le d_l\right)-P\left(y_{ij}^*\le c_k,C_{ij}^*\le d_{l-1}\right)$$
$$-P\left(y_{ij}^*\le c_{k-1},C_{ij}^*\le d_l\right)+P\left(y_{ij}^*\le c_{k-1},C_{ij}^*\le d_{l-1}\right)$$

The probabilities have the form of a bivariate normal distribution:

$$P\left(y_{ij}^{*} \le c_{k+x}, C_{ij}^{*} \le d_{l+x}\right)$$
$$= \Phi_2(\mathrm{c}_{k+x} - X_i'\delta_j - Z_i\alpha_j - W_{ij}'\lambda_j$$
$$- \vartheta_i, \frac{\mathrm{d}_{l+x} - W_{ij}'\kappa_j\lambda_j - X_i'(\kappa_j\delta_j + \mu_j) - Z_i(\eta_j + \kappa_j\alpha_j) - \phi_i - \kappa_j\vartheta_i}{\sqrt{1+\kappa_j^2}}, \frac{\gamma_j}{\sqrt{1+\kappa_j^2}})$$

where x∈ $\{0, -1\}$

The individual contribution to the likelihood is:

(C.2) $$L_i = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\prod_{j=1}^{5} P\left(Y_{ij} = k, C_{ij} = l|\phi_i, \vartheta_i, X_i, Z_i, W_{ij}\right) f(\phi_i, \vartheta_i) d\phi_i d\vartheta_i$$

If the particular values of *k* and *l* are observed and zero otherwise. The function $f(\rho_i, \vartheta_i)$ is the density function of the bivariate normal distribution:

(C.3) $$f(\phi_i, \vartheta_i) = \frac{1}{2\pi\sigma_\phi\sigma_\vartheta\sqrt{1-\tau^2}} \exp\left(-\frac{1}{2}\begin{pmatrix}\phi_i \\ \vartheta_i\end{pmatrix}^{\mathrm{T}}\begin{pmatrix}\sigma_\phi^2 & \tau\sigma_\phi\sigma_\vartheta \\ \tau\sigma_\phi\sigma_\vartheta & \sigma_\vartheta^2\end{pmatrix}^{-1}\begin{pmatrix}\phi_i \\ \vartheta_i\end{pmatrix}\right)$$

Appendix D: All estimation results for the model linking the extent of how demanding occupations are to the reasonable retirement age

This appendix shows all estimation results for the model of section 4.1.

Table D.1Estimation of model

	Office clerk	Teacher	Nurse	Construction worker	Fire man
How demanding are said occupations?					
Shifts: Quite	0.166**	0.119	0.191**	0.026	0.234***
	(0.079)	(0.077)	(0.078)	(0.087)	(0.079)
Shifts: Certainly yes	0.051	0.164*	0.373***	0.045	0.324***
	(0.100)	(0.096)	(0.099)	(0.114)	(0.099)
Physical: Quite	-0.662***	-0.194	0.196	0.989***	0.600***
	(0.133)	(0.130)	(0.132)	(0.134)	(0.131)
Physical: Certainly yes	-0.928***	-0.189	0.504***	2.198***	1.067***
	(0.136)	(0.132)	(0.134)	(0.143)	(0.134)
Time Pressure: Quite	0.382***	0.267***	-0.002	-0.219***	-0.185**
	(0.075)	(0.072)	(0.074)	(0.084)	(0.074)
Time Pressure: Certainly yes	0.475***	0.485***	0.275**	-0.338**	-0.301**
	(0.117)	(0.113)	(0.118)	(0.135)	(0.117)
Responsibility: Quite	0.285***	0.277***	0.247***	0.026	0.107
	(0.074)	(0.071)	(0.073)	(0.083)	(0.073)
Responsibility: Certainly yes	0.571***	0.444***	0.415***	0.074	0.278**
	(0.127)	(0.124)	(0.130)	(0.148)	(0.129)
Irregular working hours: Quite	-0.007	0.161**	0.219***	0.083	0.159**
	(0.079)	(0.077)	(0.079)	(0.088)	(0.079)

Irregular working hours: Certainly yes	0.016	0.121	0.496***	0.071	0.418***
	(0.121)	(0.118)	(0.122)	(0.140)	(0.122)
Long working hours: Quite	0.113	0.086	0.097	0.034	0.124
	(0.077)	(0.074)	(0.076)	(0.084)	(0.076)
Long working hours: Certainly yes	-0.151	0.047	-0.069	0.310**	0.305***
	(0.111)	(0.107)	(0.110)	(0.129)	(0.111)
Many worked years: Quite	0.026	0.151**	0.248***	0.202***	0.138**
	(0.070)	(0.068)	(0.070)	(0.078)	(0.070)
Many worked years: Certainly yes	0.004	0.217**	0.545***	0.453***	0.108
	(0.095)	(0.091)	(0.096)	(0.115)	(0.095)
Female name of vignette person	0.127**	0.126**	0.214***	0.063	-0.052
	(0.060)	(0.058)	(0.060)	(0.070)	(0.060)
gender respondent	0.129*	0.098	0.131*	0.150*	0.301***
	(0.067)	(0.065)	(0.067)	(0.078)	(0.067)
age	0.023*	0.024*	0.015	0.010	-0.031**
	(0.013)	(0.013)	(0.013)	(0.016)	(0.013)
age squared	-0.000	-0.000	-0.000	-0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income between 1151 and 1800 Euro	-0.043	0.091	0.124	0.037	0.064
	(0.142)	(0.137)	(0.141)	(0.170)	(0.143)
Family income between 1801 and 2600 Euro	-0.065	0.114	0.090	0.029	0.041
	(0.133)	(0.128)	(0.132)	(0.158)	(0.134)
Family income more than 2600 Euro	0.014	-0.019	0.041	-0.105	-0.119
	(0.130)	(0.125)	(0.129)	(0.154)	(0.130)
vmbo	0.200	0.082	0.124	0.103	0.106
	(0.155)	(0.149)	(0.155)	(0.183)	(0.154)
mbo+havo/vwo	0.218	0.113	0.110	0.004	0.199
	(0.155)	(0.149)	(0.154)	(0.181)	(0.154)
hbo+wo	0.304**	0.192	-0.072	-0.165	0.038
	(0.154)	(0.149)	(0.154)	(0.180)	(0.153)
Region North	-0.065	-0.285***	-0.257***	-0.097	0.044
	(0.095)	(0.092)	(0.095)	(0.109)	(0.096)
Region East	0.123	-0.148*	-0.076	0.016	-0.025
	(0.079)	(0.077)	(0.080)	(0.093)	(0.080)
Region South	0.041	-0.186**	-0.164**	-0.007	-0.054
	(0.077)	(0.074)	(0.077)	(0.089)	(0.077)
Not in a job now, but worked before	-0.098	0.021	-0.024	0.136	0.084
	(0.098)	(0.095)	(0.099)	(0.118)	(0.099)
(Early) retirement	-0.160	0.022	0.025	0.136	0.140
	(0.105)	(0.102)	(0.106)	(0.124)	(0.105)
Teacher	-0.214**	0.427***	0.194**	0.114	0.003
	(0.089)	(0.087)	(0.090)	(0.104)	(0.090)
Nurse	-0.417***	-0.188**	0.010	-0.062	-0.066
	(0.082)	(0.079)	(0.082)	(0.095)	(0.082)
Construction Worker	-0.268**	-0.283***	-0.345***	0.014	-0.194*
	(0.110)	(0.105)	(0.108)	(0.128)	(0.108)

Fireman	-0.243*	-0.140	-0.226	0.047	0.312**
	(0.143)	(0.138)	(0.142)	(0.166)	(0.145)
Constant		0.661	1.863***	2.646***	3.051***
		(0.480)	(0.491)	(0.536)	(0.491)
What is a reasonable retirement age					
γ_j	-0.551***	-0.815***	-0.836***	-0.738***	-0.960***
	(0.037)	(0.031)	(0.032)	(0.032)	(0.030)
Female name of vignette person	-0.322***	-0.312***	-0.305***	-0.068	-0.112
	(0.099)	(0.100)	(0.101)	(0.103)	(0.101)
gender respondent	-0.201*	-0.376***	-0.244**	-0.339***	0.019
	(0.109)	(0.110)	(0.111)	(0.114)	(0.112)
age	-0.012	-0.016	-0.002	0.045**	-0.013
	(0.021)	(0.021)	(0.022)	(0.022)	(0.022)
age squared	0.000	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income between 1151 and 1800 Euro	0.267	-0.040	0.243	-0.082	-0.219
	(0.233)	(0.236)	(0.237)	(0.246)	(0.239)
Family income between 1801 and 2600 Euro	-0.011	-0.081	0.193	-0.080	-0.311
	(0.219)	(0.221)	(0.223)	(0.231)	(0.224)
Family income more than 2600 Euro	0.020	-0.106	0.232	0.052	-0.360*
	(0.213)	(0.215)	(0.217)	(0.225)	(0.219)
vmbo	-0.187	-0.011	-0.234	-0.157	0.217
	(0.243)	(0.245)	(0.248)	(0.257)	(0.249)
mbo+havo/vwo	0.066	0.257	0.113	-0.163	0.111
	(0.243)	(0.245)	(0.247)	(0.255)	(0.248)
hbo+wo	0.372	0.775***	0.265	-0.061	0.437*
	(0.242)	(0.244)	(0.246)	(0.254)	(0.247)
Region North	-0.203	-0.073	-0.079	0.065	0.032
	(0.160)	(0.162)	(0.163)	(0.167)	(0.164)
Region East	0.049	0.097	0.153	0.037	0.297**
	(0.132)	(0.133)	(0.134)	(0.138)	(0.135)
Region South	-0.279**	-0.137	-0.179	-0.205	-0.053
	(0.126)	(0.128)	(0.129)	(0.132)	(0.129)
Not in a job now, but worked before	-0.070	-0.266	-0.367**	-0.284*	-0.245
	(0.161)	(0.163)	(0.164)	(0.170)	(0.165)
(Early) retirement	-0.045	-0.354**	-0.084	-0.349*	-0.157
	(0.173)	(0.174)	(0.176)	(0.181)	(0.177)
Teacher	-0.095	-0.065	0.049	0.027	0.016
	(0.145)	(0.147)	(0.148)	(0.152)	(0.148)
Nurse	-0.129	-0.175	-0.211	-0.142	-0.102
	(0.133)	(0.133)	(0.134)	(0.138)	(0.135)
Construction Worker	-0.052	0.032	-0.106	0.232	-0.098
	(0.184)	(0.186)	(0.187)	(0.193)	(0.188)
Fireman	0.052	-0.282	-0.253	0.011	0.034
	(0.241)	(0.243)	(0.244)	(0.252)	(0.248)
Constant	66.508***	66.408***	66.126***	64.107***	66.309***

	(0.604)	(0.670)	(0.683)	(0.688)	-0.112
c_1			0.177		
			(0.389)		
c_2			1.240***		
			(0.390)		
c_3			2.727***		
			(0.391)		
c_4			4.339***		
			(0.392)		
σ_ε			0.311***		
			(0.008)		
σ_ϑ			-0.500***		
			(0.034)		
σ_ρ			0.462***		
			(0.019)		
$\tau\ (correlation\ coefficient)$			0.051		
			(0.033)		
Number of observations			1771		
Log likelihood			-26492		

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Reference person has primary education, a household income lower than 1150 Euros, is a male, lives in the West of the Netherlands, has an undemanding desk job. Furthermore, he answers the questions with a male name. Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.

Appendix E: Estimation results for the model linking the extent of how demanding occupations are to the willingness to contribute to early retirement schemes for certain professions

This appendix shows the complete table with the estimation results for the model of section 4.2.

Table E.1

	Office clerk	Teacher	Nurse	Construction worker	Fire man
How demanding are said occupations?					
Shifts: Quite	0.171**	0.139*	0.185**	0.001	0.282***
	(0.075)	(0.075)	(0.078)	(0.091)	(0.079)
Shifts: Certainly yes	0.024	0.163*	0.387***	0.076	0.350***
	(0.094)	(0.094)	(0.100)	(0.120)	(0.101)
Physical: Quite	-0.627***	-0.254**	0.155	0.964***	0.528***
	(0.129)	(0.128)	(0.132)	(0.136)	(0.133)
Physical: Certainly yes	-0.944***	-0.332**	0.396***	2.198***	0.973***
	(0.132)	(0.131)	(0.136)	(0.145)	(0.137)
Time Pressure: Quite	0.320***	0.244***	-0.026	-0.272***	-0.214***
	(0.071)	(0.070)	(0.074)	(0.088)	(0.075)
Time Pressure: Certainly yes	0.428***	0.455***	0.257**	-0.503***	-0.400***

	(0.110)	(0.110)	(0.119)	(0.144)	(0.120)
Responsibility: Quite	0.289***	0.279***	0.255***	-0.013	0.142*
	(0.070)	(0.069)	(0.073)	(0.087)	(0.074)
Responsibility: Certainly yes	0.511***	0.440***	0.492***	0.187	0.348***
	(0.121)	(0.121)	(0.131)	(0.158)	(0.132)
Irregular working hours: Quite	0.035	0.182**	0.245***	0.101	0.153*
	(0.075)	(0.075)	(0.078)	(0.091)	(0.079)
Irregular working hours: Certainly yes	-0.067	0.045	0.388***	-0.062	0.362***
	(0.115)	(0.115)	(0.123)	(0.148)	(0.124)
Long working hours: Quite	0.126*	0.109	0.108	0.076	0.161**
	(0.073)	(0.072)	(0.076)	(0.087)	(0.076)
Long working hours: Certainly yes	-0.052	0.100	0.017	0.485***	0.409***
	(0.105)	(0.103)	(0.110)	(0.138)	(0.112)
Many worked years: Quite	-0.050	0.064	0.162**	0.144*	0.055
	(0.066)	(0.066)	(0.070)	(0.082)	(0.071)
Many worked years: Certainly yes	-0.092	0.106	0.443***	0.513***	0.057
	(0.089)	(0.089)	(0.096)	(0.125)	(0.097)
Female name of vignette person	0.149**	0.139**	0.226***	0.081	-0.042
	(0.060)	(0.059)	(0.061)	(0.072)	(0.062)
gender respondent	0.127*	0.103	0.129*	0.132*	0.301***
	(0.067)	(0.066)	(0.069)	(0.080)	(0.069)
age	0.022	0.023*	0.015	0.003	-0.037***
	(0.014)	(0.013)	(0.014)	(0.016)	(0.014)
age squared	-0.000	-0.000	-0.000	0.000	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	-0.038	-0.002	-0.046	0.121	0.117
	(0.131)	(0.128)	(0.132)	(0.159)	(0.134)
Family income between 1151 and 1800 Euro	-0.078	0.099	0.077	0.149	0.162*
	(0.093)	(0.091)	(0.095)	(0.111)	(0.096)
Family income between 1801 and 2600 Euro	-0.074	0.141**	0.068	0.178**	0.153**
	(0.073)	(0.072)	(0.075)	(0.089)	(0.075)
basisonderwijs	-0.240	-0.151	0.115	0.110	0.016
	(0.157)	(0.153)	(0.158)	(0.184)	(0.159)
vmbo	-0.069	-0.092	0.215**	0.297***	0.099
	(0.082)	(0.080)	(0.084)	(0.099)	(0.084)
mbo+havo/vwo	-0.072	-0.085	0.168**	0.132	0.155**
	(0.076)	(0.075)	(0.078)	(0.089)	(0.078)
Region North	-0.083	-0.307***	-0.276***	-0.138	0.037
	(0.096)	(0.094)	(0.098)	(0.113)	(0.099)
Region East	0.092	-0.168**	-0.091	-0.006	-0.044
	(0.080)	(0.079)	(0.082)	(0.096)	(0.082)
Region South	0.022	-0.204***	-0.180**	-0.031	-0.074
	(0.077)	(0.076)	(0.079)	(0.092)	(0.079)
Not in a job now, but worked before	-0.103	0.031	-0.031	0.206*	0.089

	(0.099)	(0.098)	(0.101)	(0.122)	(0.102)
(Early) retirement	-0.144	0.028	0.018	0.150	0.131
	(0.106)	(0.104)	(0.108)	(0.128)	(0.108)
Teacher	-0.188**	0.454***	0.218**	0.124	0.026
	(0.089)	(0.088)	(0.092)	(0.106)	(0.092)
Nurse	-0.373***	-0.151*	0.053	-0.022	-0.042
	(0.082)	(0.080)	(0.084)	(0.098)	(0.084)
Construction Worker	-0.256**	-0.247**	-0.326***	0.054	-0.166
	(0.110)	(0.107)	(0.110)	(0.132)	(0.111)
Fireman	-0.162	-0.056	-0.162	0.088	0.391***
	(0.143)	(0.140)	(0.143)	(0.169)	(0.149)
Constant	-	0.579	1.497***	2.221***	2.790***
		(0.461)	(0.470)	(0.517)	(0.477)
Willingness to contribute					
κ_j	1.491***	1.292***	0.767***	0.565***	0.654***
	(0.073)	(0.060)	(0.042)	(0.037)	(0.035)
Female name of vignette person	-0.225*	-0.118	0.016	-0.147	-0.126
	(0.130)	(0.126)	(0.126)	(0.129)	(0.126)
gender respondent	-0.199	-0.157	0.092	0.099	0.016
	(0.141)	(0.137)	(0.137)	(0.141)	(0.139)
age	-0.070**	-0.061**	-0.016	-0.016	-0.025
	(0.029)	(0.029)	(0.029)	(0.030)	(0.029)
age squared	0.001**	0.001**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family income less than 1150 Euro	0.342	0.447*	0.241	0.248	0.177
	(0.264)	(0.253)	(0.252)	(0.259)	(0.254)
Family income between 1151 and 1800 Euro	0.242	0.153	0.116	-0.001	0.203
	(0.198)	(0.192)	(0.192)	(0.197)	(0.194)
Family income between 1801 and 2600 Euro	0.193	-0.051	0.141	0.228	0.235
	(0.155)	(0.152)	(0.151)	(0.155)	(0.152)
basisonderwijs	0.553*	0.133	-0.162	-0.237	-0.277
	(0.319)	(0.309)	(0.311)	(0.321)	(0.316)
vmbo	0.309*	-0.164	-0.296*	-0.388**	-0.186
	(0.178)	(0.174)	(0.175)	(0.180)	(0.175)
mbo+havo/vwo	0.128	-0.034	-0.214	-0.176	-0.113
	(0.162)	(0.158)	(0.159)	(0.162)	(0.160)
Region North	0.491**	0.305	0.345*	0.359*	0.161
	(0.205)	(0.200)	(0.203)	(0.208)	(0.204)
Region East	0.156	0.223	0.161	0.168	0.002
	(0.178)	(0.174)	(0.175)	(0.179)	(0.176)
Region South	0.059	-0.055	-0.102	-0.046	-0.195
	(0.163)	(0.159)	(0.158)	(0.161)	(0.158)
Not in a job now, but worked before	0.620***	0.307	0.334*	0.156	0.264
	(0.207)	(0.200)	(0.200)	(0.206)	(0.201)
(Early) retirement	-0.068	-0.110	0.069	0.236	0.292
	(0.218)	(0.213)	(0.214)	(0.220)	(0.216)

Teacher	0.132	-0.077	-0.037	-0.075	-0.049
	(0.189)	(0.185)	(0.183)	(0.188)	(0.185)
Nurse	0.709***	0.326*	0.369**	0.414**	0.364**
	(0.175)	(0.167)	(0.168)	(0.173)	(0.169)
Construction Worker	0.363	0.345	0.527**	0.637***	0.573**
	(0.242)	(0.235)	(0.234)	(0.240)	(0.236)
Fireman	0.550*	0.233	0.461	0.196	0.467
	(0.305)	(0.295)	(0.292)	(0.300)	(0.295)
Constant	-	-0.746	-0.964	-0.279	0.009
		(0.578)	(0.606)	(0.653)	(0.630)
c_1			-0.135		
			(0.372)		
c_2			0.862**		
			(0.373)		
c_3			2.318***		
			(0.374)		
c_4			3.948***		
			(0.375)		
d_1			-1.479		
			(0.915)		
d_2			0.714		
			(0.913)		
d_3			2.596***		
			(0.913)		
d_4			5.340***		
			(0.915)		
σ_ϑ			0.607***		
			(0.018)		
σ_ϕ			2.729***		
			(0.076)		
$\tau\ (correlation\ coefficient)$			0.516***		
			(0.020)		
number of observations			1771		
Log likelihood			-18094		

Standard errors in parentheses, *** Statistical significance at 1%, ** Statistical significance at 5%, * Statistical significance at 10%. Reference person has tertiary education degree ('HBO or WO'), a household income higher than 2600 Euros, is a male, lives in the West of the Netherlands, has a undemanding desk job. Furthermore, he answers the questions with a male name. Region of the Netherlands: West = Noord- and Zuid-Holland, Utrecht and Zeeland; North = Groningen, Friesland and Drenthe; East = Overijssel, Flevoland and Gelderland; South = Noord-Brabant and Limburg.