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Do good working conditions make you work longer? Evidence on retirement decisions using linked survey and register data*

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Tiivistelmä

Tutkimuksessa tarkastellaan epämukavien työolojen ja johtamiskäytäntöjen vaikutuksia työntekijöiden eläköitymiskäyttäytymiseen Suomessa. Yhdistetty tutkimusaineisto sisältää tietoja työoloista, työtyytyväisyydestä, ja eläkeaikeista Tilastokeskuksen työolotutkimuksista sekä toteutuneista eläkkeelle siirtymisistä Eläketurvakeskuksen rekistereistä. Useamman yhtälön mallin tulokset osoittavat, että epämukavien työolojen aiheuttama tyytymättömyys työhön on yhteydessä eläkeaikeisiin, jotka seurantajakson aikana ilmenevät puolestaan aikaisempana eläkkeelle siirtymisenä. Uudet johtamiskäytännöt taas parantavat työtyytyväisyyttä ja eläkeaikomusten vähenemisen kautta pidentävät työuria.

Abstract

We analyze the potential role of adverse working conditions and management practices in the determination of employees' retirement behavior. Our data contain both comprehensive information regarding perceived job disamenities, job satisfaction, and intentions to retire from nationally representative cross-sectional surveys and information on employees' actual retirement decisions from longitudinal register data that can be linked to the surveys. Using a trivariate ordered probit model, we observe that job dissatisfaction arising from adverse working conditions is significantly related to intentions to retire, and this in turn is related to actual retirement during the follow-up period.

Keywords: working conditions, job satisfaction, retirement, new management practices

1. Introduction

Populations in industrialized countries are aging rapidly. This structural change puts substantial pressure on public finances and social support programs targeted to retired persons. The prospect of an aging population leads specifically to pressure on the sustainability of pension systems. In the policy discussion, two broad approaches to mitigating these challenges have been proposed. First, there are "hard" measures. A popular policy measure to improve the sustainability of the pension systems is to increase the mandatory retirement age and force people to retire later in life. Second, there are also a variety of "soft" measures, which refer to improvements in perceived working conditions. The goal of these policy tools is to encourage people to lengthen their working careers voluntarily without changing regulations.

Perceived well-being at work is obviously important for employees, because job satisfaction is a key domain of employees' overall well-being in life (Oswald, 2010). Job satisfaction and productivity at the firm level are also positively related (Böckerman and Ilmakunnas, 2012). Consequently, investments in better working conditions and improvements in employee well-being can be mutually beneficial for both employees and employers.

This paper examines the connections between various measures of working conditions and new management practices (the so-called "high involvement management") regarding actual retirement decisions. Workers' satisfaction with their work and subsequent retirement decisions are likely to have a connection not only with physical working conditions but also with how they are treated by management. Therefore, it is important to consider both aspects of work. We contribute to the literature by modeling the complete chain between perceived

working conditions and management practices to job satisfaction, retirement intentions, and actual retirement. To accomplish this, we use both comprehensive survey data on perceived well-being at work and administrative data on actual retirement during an extensive follow-up period. Our survey data contain very detailed information on working conditions (perceived harms and hazards) at the individual level, and the linked survey and register data are nationally representative for the working age population in Finland.

Section 2 briefly reviews the earlier literature on working conditions and retirement. Sections 3 and 4 describe the linked survey and register data and our modeling approaches. Section 5 present the estimation results and section 6 concludes.

2. Literature

There are multiple theoretical approaches to understanding retirement decisions. In an early contribution to the theoretical literature in industrial and organizational psychology, Beehr (1986) examined the process of retirement. The basic idea is that personal characteristics and the work environment, including perceived working conditions, influence a person's preference for retirement. Preferences determine the decision (or intention) to retire, which is then realized as an actual retirement behavior.

Karasek (1979) presented the seminal conceptual model about the determinants of employee well-being at work. Karasek (1979) stressed the balance between job demands and job control. According to the model, the combination of job demands and job control affects employees' intentions to quit. It also affects actual retirement decisions, as retirement is an

"extreme form" of employee quitting behavior. In particular, high job demands coupled with poor job control increase both the intention to quit and actual retirement.

The economic literature stresses that retirement is a rational decision in which the benefits and costs influence the outcome. The personal preference for leisure time and consumption opportunities provided by disposable income determines labor supply decisions at the far margin. Retirement implies an increase in leisure time but at the same time opportunities to consume decrease because a pension is lower than the prior wage. Thus, workers face a tradeoff. In the standard model based on rational choice, adverse working conditions reinforce the preference for retirement if all else is equal. However, if there is a compensating wage differential for perceived adverse working conditions, the higher pay may lead to longer working careers (Filer and Petri, 1988). In practice, the compensation for adverse working conditions in terms of higher pay is complete only in very rare settings (e.g., Böckerman and Ilmakunnas, 2006, 2009). This implies that perceived working conditions could have an economically significant influence on retirement decisions.

The focus of empirical research has so far been narrow. Earlier literature focused on some parts of the "whole chain" from perceived working conditions to actual retirement decisions. Some empirical studies exploited cross-sectional data and used retirement intentions as the outcome (see Topa et al., 2009, for a survey of research in organizational psychology). Using a longitudinal research design, it is possible to use actual retirement choices as the outcome variable of interest. An important gap in the existing empirical literature is that it seldom studies retirement intentions and actual retirement choices together. However, deeper understanding of these connections is necessary to draw policy-relevant insights about the pertinent mechanisms.

Retirement intentions and realizations have been studied in economics. Studies focused on the rationality of retirement expectations and the influence on the decision to retire of new relevant information about its benefits and costs (e.g., Bernhein, 1989; Benitez-Silva and Dwyer, 2005). However, this research has only very rarely examined the potential role of perceived working conditions and management practices in the decision process.

Our paper is most closely related to recent empirical studies that examine the connection of working conditions to retirement or anticipated retirement using longitudinal survey data or survey data combined with register data. Such longitudinal surveys include SHARE (e.g., Schnalzenberger et al., 2014; dal Bianco et al., 2015), ELSA (e.g., Hintsa et al., 2015; Carr et al., 2016), and HRS (e.g., Angrisani et al., 2015; Sonnega et al., forthcoming). Combined survey and register data have mainly been used in the Nordic countries (e.g., Lund and Villadsen, 2005; Blekesaune and Solem, 2005). However, working conditions data in some studies are not derived from individual employees' workplaces, but rather rely on the typical work attributes of different occupations (e.g., Angrisani et al., 2015; Filer and Petri, 1988). The use of aggregate information on working conditions eliminates much of the variation in workplace working conditions that affect employees' perceived well-being and quit or retirement behavior.

An important gap in the prior literature in terms of modeling approaches is the fact that unobservable characteristics, such as personality traits, are rarely accounted for. However, unobservable traits are potentially important drivers of actual retirement decisions. Furthermore, even with longitudinal data, estimation is based mostly on cross-sectional variation because actual retirement occurs only once. This makes it impossible to use fixed effects estimation to wipe out unobservable time-invariant data.

3. Data

Our empirical analysis uses linked survey and register data. The data on perceived working conditions and intention to retire originates from the 2003 and 2008 Quality of Working Life Surveys (QWLS) of Statistics Finland (Lehto and Sutela, 2004, 2009). The initial sample for QWLS is from the Labour Force Survey, where a random sample of the working age population is selected for a telephone interview. The respondents are wage and salary earners between 15 to 64 years old with a normal weekly working time of at least 5 hours. The sample sizes are 4101 in the 2003 survey and 4392 in the 2008 survey.

The QWLS is a repeated cross-sectional data set that does not contain any information on actual retirement choices. However, we link the QWLS data to comprehensive longitudinal register data for the same persons. These include Finnish Longitudinal Employer–Employee Data (FLEED) from Statistics Finland and the pension records of the Central Pension Institute. FLEED records each employee's employer during the last week of each year. FLEED contains rich background information on both employees and their employers. Central Pension Institute keeps comprehensive administrative records of actual retirement for the payment of pensions. We link the data using unique personal identifiers, i.e., ID codes for persons. We can follow *all* employees in the QWLS data up to 2013. Using information from the Central Pension Institute, we observe actual retirement choices during the follow-up period (2004-2013 for QWLS 2003 and 2009-2013 for QWLS 2008).

The QWLS contains information about intention to retire. In particular, it includes a question about having thoughts of retirement before the official retirement age with the alternatives:

'often' (coded as 3), 'sometimes' (2) or 'never' (1). Because this is ordered qualitative information, we form a similar variable for the timing of retirement. Actual retirement may occur after (coded as 3), at (2) or before (1) the official retirement age.

Pension reform occurred in Finland in 2005, before which normal retirement age in the private sector was 65 years, although it was possible to retire earlier at ages 60 to 64 with a lower pension. Most state or municipal employees and some special occupations have had a lower retirement age. Pension reform made old-age retirement flexible between ages 63 to 68, with earlier retirement with lower pension possible only for those 62 years old. The retirement ages in the private and public sectors were harmonized for new employees, but existing public sector employees were given a personal retirement age based on age and tenure. The pension reform led to an increase in the average retirement age and to the concentration of retirement around the age of 63. We treat 63 as the official retirement age referred to by retirement intention and actual retirement variables. However, for public sector employees we use personal retirement ages when they are below 63.

In addition to old-age pension, there are other early exit routes: disability, part-time retirement, and unemployment. Disability pensions require medical verification but have no particular age limit. Part-time pensions can be granted to an employed person at least 61 years old who continues working part-time. In addition, disability retirement is possible on a part-time basis. Older employees who become unemployed can use extended unemployment benefits to bridge the time until old-age pension age. The lower age limit for this system has gradually increased to 59 years. In our study, we concentrate on full-time retirement, either old age or full disability. Some of the QWLS survey participants are actually already on part-

time retirement. We leave out the unemployment route, as it is a separate system and not officially retirement.

In the estimations, we concentrate on those who were 54 or older in the 2003 survey and those who were 59 or older in the 2008 survey. These employees reach age 64 by the end of the follow-up period and we see whether they retire at age 63. In addition, we require participants be below 63 years old during the survey, since for them the choice to retire before, at, or after age 63 is still relevant. During the 2003 survey, the pension reform was not yet in force but the upcoming changes were public information. In fact, the survey respondents were explicitly reminded of the reform. However, to take into account the fact that some of the 2003 survey participants could retire with lower pensions before the new rules came into force, we included an indicator variable for the 2003 survey. Furthermore, we left out those who were already fully retired but still doing some work, persons who died in the follow-up period before reaching official retirement age, and a few inconsistent answers (high retirement intentions although already above retirement age). The sample size in the estimations is 1253.

Figure 1 provides an illustration of the structure of the linked data using the so-called Lexis diagram. Each line in the figure depicts the increasing age of a birth cohort in the data. The horizontal line is at age 63, which is the official retirement age in Finland for most of the persons in the dataset. The lowest upward-sloping line in both parts of the figure shows the youngest birth cohort in the analysis, or those born in 1949. The highest upward-sloping lines are the oldest cohorts, or those born in 1941 (in the 2003 survey) or 1946 (in the 2008 survey).

Figure 1 here

Our interest is in retirement intention and actual retirement and their background factors, especially job satisfaction, working conditions and management practices. The question about job satisfaction contains alternatives: are ’very satisfied’, ’quite satisfied’, ’rather unsatisfied’, ’very unsatisfied’, and (in the 2008 survey) ’difficult to say’. Most respondents are satisfied with their work. We combine the lowest satisfaction levels (rather unsatisfied, very unsatisfied or difficult to say) into a group called ’unsatisfied’. We therefore have three groups, ’very satisfied’ (coded as 3), ‘quite satisfied’ (2), and ‘unsatisfied’ (1).

The key working condition variables capture perceived harms and hazards. For perceived harms, the highest category corresponds to the perception by a worker that a certain feature of working conditions is ‘very much’ (on a five-point scale) an adverse workplace factor. Harms include 19 detailed aspects such as heat, cold and dust, among other things. For perceived hazards, the highest category among three possibilities is the one in which the respondent considers a certain feature at the workplace to be ‘a distinct hazard’. Hazards include 10 aspects, such as accident risk, risk of strain injuries and risk of grave work exhaustion, among other things. We aggregate the responses to the questions about adverse working conditions by forming a dummy variable that equals one if there is at least one clearly adverse factor (variable Harms) and a dummy that equals one if there is at least one distinct hazard (variable Hazards).

We also exploit detailed self-reported information on the quality of management practices from the QWLS as an additional aspect of perceived working conditions. We use a binary indicator to signify having more than one of the following new management practices: incentive pay, employer-provided training, self-managed teams and information sharing with employees (Böckerman et al. 2012, 2013). Incentive pay is an indicator for those who are

personally subject to performance-related pay; training is relevant for employees who have participated in employer-provided training during the past 12 months; self-managed teams refer to individuals who work in a team that selects its own leader and decides on the internal division of responsibilities; and information sharing corresponds to employees who are informed about changes at work at the planning stage rather than shortly before the change or at its implementation. These measures correspond to the crucial pieces of a high-performance workplace from the point of view of employees, as outlined in Appelbaum et al. (2000). Becker and Gerhart (1996) maintain that the four most common components of high involvement management systems are self-managed teams, quality circles, employer-provided training, and contingent pay. We capture all of these, except quality circles, in our measurement using QWLS.

We use individual characteristics from QWLS and FLEED, measured during the survey year, as the standard control variables. These include age (in years), gender (an indicator for females), education (indicators for secondary and tertiary education, with basic education as the reference group), and income level (log of annual earnings) as indicators of person's socioeconomic status. Income theoretically has an opposing effect on retirement. Higher income increases the cost of retiring (substitution effect), but it also makes it more affordable to retire earlier (income effect). The income variable also takes into account the fact that the pension level depends on pre-retirement earnings. QWLS also contains information on self-assessed working capacity on a scale from 0 to 10. We expect those with good working capacity to be more inclined to stay working longer. We also control for the size of the employer (indicators for size classes in terms of the number of employees: 10-49, 50-249, and 250-, with below 10 as the reference category).

Using information from the comprehensive registers of the Central Pension Institute, we also control for some key retirement-related covariates that include an indicator for being on part-time retirement, an indicator for whether the person has a retired spouse, and the (age-dependent) pension accrual rate. These are measured during the survey year (the accrual rate is the average of two years following the survey). Those already on partial retirement may be more inclined to enter full time retirement earlier than those who have not taken the part-time option. It is important to take into account the spouse's labor market status because it affects the utility of leisure time. Thus, the return on a person's leisure time is higher if the spouse is also retired and they can spend the leisure time together. The accrual rate creates incentives to stay longer at work. After the pension reform, there was a higher accrual rate for those at age 63 or higher. The accrual rate before year 2005 was 1.5% until age 60 and 2.5% at higher ages; in years 2005-2016 it was 1.5% until age 52, 1.9% at ages 53 to 62, and 4.5% at ages 63 to 68. We include an indicator of experiencing unemployment during the post-2013 period as an additional variable from FLEED. Those who become unemployed at older ages may have difficulty returning to work and are therefore more likely to retire at the (minimum) official retirement age. Descriptive statistics on the variables are reported in the Appendix (Table A1).

4. Modeling approach

Our empirical application has three endogenous variables (job satisfaction, intention to retire and actual retirement) with an ordinal scale (1, 2, or 3). We assume there are latent continuous variables behind the observed ordinal variables. We model the relationships as a trivariate ordered probit model. This implies there are some unobservable variables, such as personality traits, that may affect all three dependent variables. Thus, the equations' errors are correlated

with each other. We use the extended regression model framework in Stata (StataCorp, 2017; Roodman, 2011) to estimate the parameters of the model.

The identification of the parameters of the model is based on the idea that there is a triangular structure between the variables of interest. Thus, we assume that job satisfaction affects the intention to retire and that retirement intentions affect the timing of actual retirement, but there are no backward effects. On the right-hand side of the estimated equations, these variables appear as observations or indicators for categories 2 and 3 (using the category 1 as the reference) of the job satisfaction and retirement intentions variables. In addition, we use exclusion restrictions on the explanatory variables. Research using equation systems with binary dependent variables and endogenous dummy regressors has shown that exclusion restrictions are required to correctly identify the parameters (Mourifié and Méango, 2014; Han and Vytlacil, 2017). There are no corresponding results for ordered variables, but presumably a similar principle holds.

We assume that individual characteristics such as age, gender and education, all affect outcomes. Earnings is a measure of socioeconomic status and is included in all models. Perceived working conditions and management practices influence job satisfaction, but we assume they have an effect on intentions to retire only through job satisfaction. Working capacity and firm size influence both job satisfaction and intentions to retire, but they do not directly influence actual retirement choices because working capacity and the firm in which a person is employed could have been changed after the QWLS survey. We assume part-time retirement and a spouse's retirement status influence the intention to retire and actual retirement timing, but not job satisfaction. Finally, unemployment measured after the QWLS has an influence only on actual retirement decisions.

There are potential biases that are relevant for the interpretation of the estimation results. First, there may be unobserved heterogeneity that is correlated with the dependent variables and not captured by modeling of the correlation structure between the equations. Therefore, we are cautious to interpret estimated relationships as causal effects. Second, there are issues related to sample selection. As the data includes only people who are (still) working in 2003 or 2008, those who have particularly good working conditions are likely to be overrepresented in the estimation sample. On the other hand, the timing of retirement is more likely observed for those who are exposed to adverse working conditions and, consequently, retire early. These two sample selection biases have opposite effects on the estimates. In an ideal situation, they cancel each other out.

5. Results

Tables 1-2 present cross-tabulations of the variables of interest. They show expected relationships between the variables. Job satisfaction is negatively related to having retirement intentions. Of those who are unsatisfied with their work, 61.8% often think about retirement before the statutory retirement age and 20.2% never do. Of those who are very satisfied, only 20.9% think often about retirement and 50% never do. Retirement intention is, on the other hand, negatively related to the timing of retirement. Among those who never think about early retirement, 61.63% retire after the statutory retirement age and only 7.4% before it. Among those who often think about retirement, the distribution of early exits and late retirements is even, greater: 28.9% delay retirement to an age above the statutory age, and 23.7% retire before it. The rank correlations are -0.291 for retirement age and retirement intentions and -0.253 for retirement intentions and job satisfaction. The rank correlation of

retirement age and job satisfaction is only 0.076, which supports the assumption that job satisfaction is related to retirement age via retirement intentions, but not directly.

Tables 1 and 2 here

The estimation results of the trivariate ordered probit model are presented in Table 3. Perceived harms and hazards are negatively related to job satisfaction, while new management practices are positively related to job satisfaction. These results are consistent with earlier findings in the relevant literature. Job satisfaction is negatively related to retirement intentions, and retirement intentions are negatively related with actual retirement age, as is expected based on cross-tabulations. Furthermore, the correlations of the equation errors are consistent with the view that, on one hand, the unobservables behind actual retirement decisions and retirement intentions are related and, on the other hand, the unobservables behind retirement intentions and job satisfaction are related.

Table 3 here

The estimates of the control variables show that self-assessed working capacity is positively related to job satisfaction and negatively related with retirement intentions. The level of education is negatively related to retirement intentions, and the highest levels of education are negatively related with job satisfaction. The pension accrual rate (at the time of the survey) is negatively related to retirement intention, supporting the idea that higher accrual at higher ages encourages delayed retirement. Being already on part-time pension during the survey is positively related to having retirement intentions, as expected. However, neither pension accrual, nor part-time pensions are significantly related to actual retirement, which

may follow from the fact that actual retirement can occur several years after the survey. Earnings are not significantly related to any of the dependent variables, possibly because the models include several controls that are likely to be correlated with earnings. Experiencing unemployment in the follow-up period has a negative connection with retirement age.

Among the demographic variables, age obtains a positive coefficient in the equation for actual retirement. This is natural, since those who have already stayed at work until an old age may be more likely to stay until the official retirement age. Females have less frequent retirement intentions, but in actual retirement there are no gender differences. Finally, having a retired spouse is negatively related to continuing to work but is insignificant in the equation for retirement intentions.

Table 4 shows the average marginal effects of these variables on the three dependent variables. A variable can have a marginal effect on the dependent variable of the equation where it appears and on the dependent variables of subsequent equations, but not on those of previous equations. Further, a working condition variable, for example, which appears in the job satisfaction equation, has a marginal effect on retirement timing through a channel of effects. Working conditions affect job satisfaction, job satisfaction affects retirement intentions, and intentions affect retirement timing. Therefore, the marginal effects tend to decrease the later the dependent variable is in the system. Table 4 presents the marginal effects on the highest categories (i.e., those coded as 3) of the ordered variables, i.e., high job satisfaction, frequent thoughts about early retirement, and retirement after the official retirement age.

Table 4 here

Negative work aspects, harms and hazards decrease the probability of being very satisfied with work by over 8 percent and increases the probability of thinking often about retirement before the official age by 2 percent. Likewise, they decrease the probability of retiring after the official age by 0.6 percent. Being exposed to new management practices increases the probability of high job satisfaction by over 13 percent, decreases the probability of frequent early retirement intentions by 3 percent and increases the probability of late retirement by 1 percent.

Among the control variables, an age increase of one year increases the probability of late retirement by 1.4 percent, while females are 5 percent less likely to have frequent early retirement thoughts. Those with tertiary education have 7 percent lower probability of high job satisfaction, 8 percent lower probability of early retirement intentions, and 6 percent higher probability of late retirement than those with basic education. Variables related to pension and unemployment have relatively high marginal effects. A one percent increase in the accrual rate decreases the probability of frequent early retirement thoughts by 12 percent and being on part-time pension by 15 percent, but its effect on actual retirement is insignificant. Having a retired spouse decreases the probability of late retirement by 7 percent and experiencing unemployment by 25 percent.

6. Conclusions

People spend much time at work. Therefore, it is not surprising that working conditions are an important aspect of overall well-being. Using nationally representative linked survey and

register data from Finland, we find that perceived working conditions and management practices are important for retirement intentions and decisions.

Most of the empirical literature focuses on a narrow set of industries and firms. A key problem is that the motives of retirement are most likely significantly heterogeneous across organizations. Thus, the specific organizations that have garnered researchers' focus may be those in which the effects are anticipated and/or occur according to prior theoretical considerations.

Interpreted from a broader perspective, our results support the idea that inequality in perceived working conditions leads to inequality in retirement choices. Adverse working conditions are statistically significantly related to early retirement. Early retirement, on the other hand, leads to lower pensions. Our results support the idea that "soft" measures may be effective in delaying retirement and may thereby indirectly equalize post-retirement incomes.

There are some caveats that are relevant for the interpretation of our results. First, the estimates are not necessarily causal. Our analysis reveals links between the variables of interest. Second, it is difficult to quantify the estimated relationships. To provide quantitative estimates, validated quantitative rather than qualitative measures of perceived working conditions are needed. Third, there may be practical challenges to implementing the "soft" measures, i.e., decreasing the level of perceived harms and hazards at work by investing resources in better working environments. Fourth, the cost-effectiveness of investments in better working conditions remains an open issue from the firms' point of view. Future research should address these issues.

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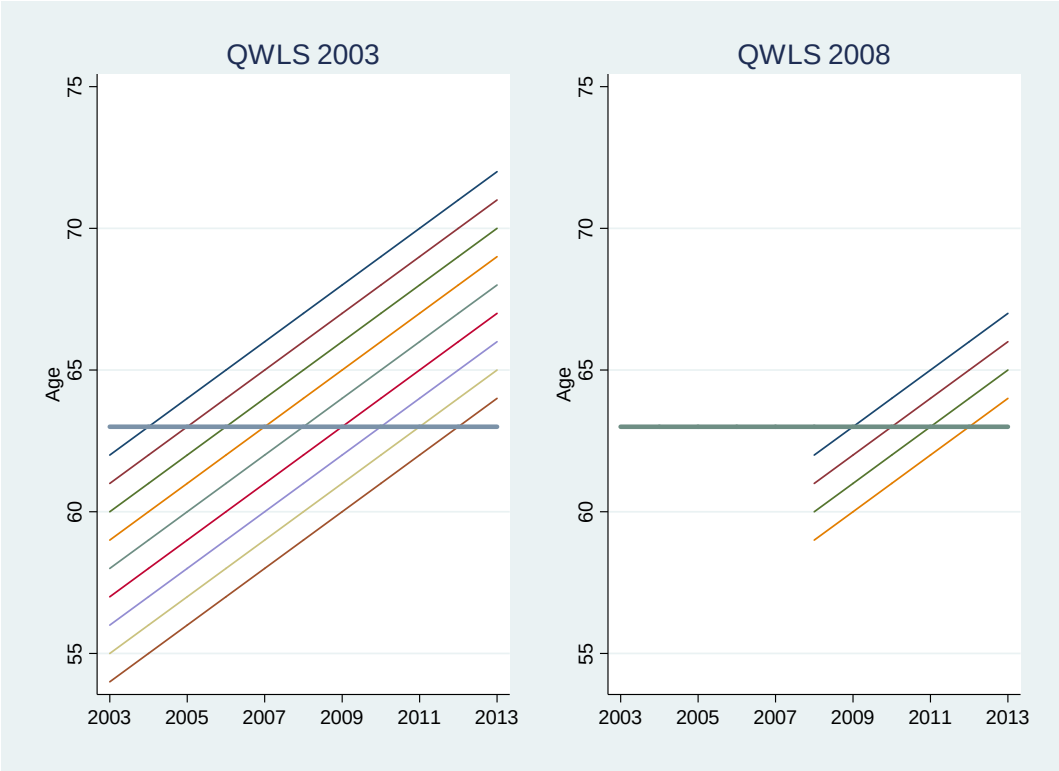
Figure 1. Lexis diagram of birth cohorts included in the estimations.



Notes: The horizontal line is at the age of 63 that is the lowest official retirement age in Finland.

Table 1. Job satisfaction and retirement intentions.

	Job satisfaction			
Retirement intention	1 Unsatisfied	2 Rather satisfied	3 Very satisfied	Total
1 Never	18	210	220	448
	4.02	46.88	49.11	100.00
	20.22	29.01	50.00	35.75
2 Sometimes	16	252	128	396
	4.04	63.64	32.32	100.00
	17.98	34.81	29.09	31.60
3 Often	55	262	92	409
	13.45	64.06	22.49	100.00
	61.80	36.19	20.91	32.64
Total	89	724	440	1253
	7.10	57.78	35.12	100.00
	100.00	100.00	100.00	100.00

Notes: In each cell, the first entry is the number of observations, the second is the percentage share of the row total and the third is the percentage share of the column total.

Table 2. Retirement intentions and actual retirement.

	Retirement intention			
Actual retirement	1 Never	2 Sometimes	3 Often	Total
1 Before statutory retirement age	33	41	97	171
	19.30	23.98	56.73	100.00
	7.37	10.35	23.72	13.65
2 At statutory retirement age	139	181	194	514
	27.04	35.21	37.74	100.00
	31.03	45.71	47.43	41.02
3 After statutory retirement age	276	174	118	568
	48.59	30.63	20.77	100.00
	61.61	43.94	28.85	45.33
Total	448	396	409	1253
	35.75	31.60	32.64	100.00
	100.00	100.00	100.00	100.00

Notes: In each cell, the first entry is the number of observations, the second the percentage share of row total and the third the percentage share of column total.

Table 3. Three-equation ordered probit model.

	Job satisfaction	Retirement intentions	Actual retirement
Retirement intentions = 2			-0.528***
			(0.164)
Retirement intentions = 3			-1.188***
			(0.274)
Job satisfaction = 2		-0.931***	
		(0.277)	
Job satisfaction = 3		-1.780***	
		(0.511)	
Age	-0.003	0.030	0.044**
	(0.013)	(0.020)	(0.021)
Female	0.085	-0.141**	-0.083
	(0.070)	(0.069)	(0.070)
Secondary education	-0.084	-0.165**	0.009
	(0.084)	(0.083)	(0.082)
Tertiary education	-0.210**	-0.298***	0.140
	(0.088)	(0.085)	(0.092)
log(Earnings)	0.011	-0.039	-0.004
	(0.027)	(0.036)	(0.034)
Pension accrual rate		-0.365***	0.005
		(0.064)	(0.067)
Part-time retirement		0.457***	0.064
		(0.143)	(0.144)
Spouse retired		0.048	-0.194***
		(0.075)	(0.077)
Unemployment			-0.686***
			(0.090)
Working capacity	0.171***	-0.150***	
	(0.029)	(0.044)	
Harms	-0.259***		
	(0.082)		
Hazards	-0.243***		
	(0.077)		
New management practices	0.401***		
	(0.086)		
Establishment size 10-49	0.241***	0.123	
	(0.090)	(0.093)	
Establishment size 50-249	0.118	-0.029	
	(0.097)	(0.098)	
Establishment size 250-	0.164	0.344***	
	(0.119)	(0.119)	
Correlations of the errors			
		Retirement intentions	Actual retirement
Job satisfaction		0.312*	-0.036
		(0.180)	(0.045)
Retirement intentions			0.229*
			(0.128)

Notes: N = 1253.

Table 4. Average marginal effects.

	Average marginal effect on:		
	Job satisfaction = 3	Retirement intentions = 3	Actual retirement = 3
Age	-0.001	0.010	0.014*
	(0.005)	(0.006)	(0.008)
Female	0.029	-0.052**	-0.018
	(0.024)	(0.022)	(0.025)
Secondary education	-0.029	-0.048*	0.012
	(0.029)	(0.026)	(0.029)
Tertiary education	-0.072**	-0.082***	0.066**
	(0.030)	(0.027)	(0.033)
log(Earnings)	0.004	-0.013	0.002
	(0.009)	(0.011)	(0.013)
Pension accrual rate		-0.119***	0.027
		(0.021)	(0.024)
Part-time retirement		0.149***	-0.008
		(0.046)	(0.051)
Spouse retired		0.016	-0.074***
		(0.024)	(0.028)
Unemployment			-0.249***
			(0.033)
Working capacity	0.059***	-0.062***	0.015***
	(0.009)	(0.014)	(0.003)
Harms	-0.089***	0.019***	-0.006***
	(0.028)	(0.006)	(0.002)
Hazards	-0.083***	0.018***	-0.006***
	(0.026)	(0.006)	(0.002)
New management practices	0.138***	-0.029***	0.010***
	(0.029)	(0.006)	(0.002)
Establishment size 10-49	0.083***	0.022	-0.002
	(0.031)	(0.030)	(0.006)
Establishment size 50-249	0.041	-0.018	0.005
	(0.033)	(0.031)	(0.007)
Establishment size 250-	0.056	0.100***	-0.020**
	(0.041)	(0.038)	(0.008)

Appendix

Table A1. Descriptive statistics.

Variable	Mean	Std. dev.	Explanation
Actual retirement	2.317	0.700	Ordered indicator, values 1, 2, or 3
Retirement intention	1.969	0.827	Ordered indicator, values 1, 2, or 3
Job satisfaction	2.280	0.587	Ordered indicator, values 1, 2, or 3
Age	57.345	2.516	Age in full years
Female	0.574	0.495	Dummy
Basic education	0.291	0.454	Reference group
Secondary education	0.355	0.479	Dummy
Tertiary education	0.354	0.479	Dummy
log(Earnings)	10.250	1.142	Log of annual earnings in euros
Pension accrual rate	2.239	0.847	Rate as %
Part-time pension	0.075	0.264	Dummy
Spouse retired	0.275	0.446	Dummy
Unemployment	0.154	0.361	Dummy
Working capacity	8.064	1.463	Values from 0 to 10
Harms	0.272	0.445	Dummy
Hazards	0.395	0.489	Dummy
New management practices	0.392	0.488	Dummy
Plant size 0-9	0.218	0.413	Reference group
Plant size 10-49	0.371	0.483	Dummy
Plant size 50-249	0.266	0.442	Dummy
Plant size 250-	0.141	0.348	Dummy

Notes: N = 1253.