

Increasing retirement age and mental health of older workers: the role of working conditions

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Abstract

In this paper we investigate the effect of delaying retirement age on late-career mental health. We contribute to the recent literature on this issue by examining how this effect varies depending on workers' working conditions, exploiting exogenous data on job quality. Using pension reforms in several European countries, longitudinal data from the Survey of Health, Ageing and Retirement in Europe (SHARE) and the European Working Conditions Survey, we find that extending work horizon increases depression among older workers overall, but this effect is very dependent on working conditions. In particular, both female and male workers employed in lower-skilled jobs with less autonomy and decision-making power experience a greater increase in depression symptoms. Moreover, certain working conditions are more conducive to an increase in depression symptoms among men (e.g. high job intensity, poor social environment), while others play a greater role among women (e.g. poor physical conditions).

Keywords: mental health, older workers, pension reforms, working conditions

JEL Classification: I1, J26

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1. Introduction

The ageing population poses a significant challenge, threatening the long-term viability of pension systems across the EU. Over the last decades, many countries have introduced reforms extending the working lifespan, thereby decreasing the financial burden on pension systems. However, an often-overlooked aspect is the well-being of senior workers, whose mental and physical health can deteriorate towards the end of their careers, linked to the strenuousness and quality of their jobs (Miranti & Li, 2020). Delaying retirement age would, therefore, allow more time for workers' health to decline, placing an additional burden on social protection systems (health insurance, unemployment insurance) (Serrano-Alarcón, et al., 2023; Li, 2018), although the long-term positive effect on government income may still outweigh a short to medium-term rise in expenditures (Hagen, 2018). Moreover, these reforms underscore the societal value placed on preserving retirement years, implying that retirement is eagerly anticipated by a significant portion of the population.

Several studies have attempted to analyze the effects of pension reforms on the mental health of older workers, with most suggesting adverse effects that escalate with a greater work horizon increase (Bertoni, Brunello, & Da Re, 2023; Serrano-Alarcón, et al., 2023; Carrino, Glaser, & Avendano, 2020; de Grip, Lindeboom, & Montizaan, 2009). Reducing the work horizon may also lead to a deterioration in mental health, as shown by Bauer & Eichenberger (2021) on the example of a Swiss reform that lowered the legal retirement age in the construction sector from 65 to 60 leading to a 33% increase in sick leave between ages 56 and 60. Conversely, an extended retirement horizon may encourage employers to invest in skills of senior workers to retain them in employment (Hairault, Sopraseuth, & Langot, 2010) and adapt jobs to their skills (Miranti & Li, 2020), potentially benefiting their mental health. Older workers may also adopt healthier behaviors anticipating a longer work horizon, as found by Bertoni et al. (2018) for the 2004 Italian pension reform.

The literature debate on well-being and mental health throughout the life cycle reveals diverse patterns – U-shape, inverse U-shape, and other relationships (Bell, 2014; Frijters & Beatton, 2012; Blanchflower & Oswald, 2008), suggesting that the end of the career is not universally understood across countries, depending on retirement systems and senior employment policies. However, to the best of our knowledge, multi-country studies on the effects of pension reforms on mental health are scarce, with Bertoni, Brunello, & Da Re (2023) being a notable exception.

Notably, many authors find heterogeneous effects depending on working conditions, such as elevated depression for women in lower-skilled high-strain jobs (Carrino, Glaser, & Avendano, 2020) and a decline in mental health caused by job insecurity in occupations with a high risk of automation (Bertoni, Brunello, & Da Re, 2023). Other authors have also demonstrated this relationship between working conditions and mental health, highlighting lower-skilled high-strain, and physically demanding occupations as at-risk groups (Belloni, Carrino, & Meschi, 2022; Shai, 2018; Henseke, 2018).

Building upon the work of Bertoni et al. (2023) and Carrino et al. (2020), we explore heterogeneous effects of reforms delaying the retirement age on late-career mental health as a function of working conditions. By combining repeated cross-sectional data on working conditions from the European Working Conditions Survey (EWCS), aggregated at the level of 4-digit ISCO codes, with microdata from 12 EU countries from the Survey of Health, Ageing and Retirement in Europe (SHARE), we control for endogeneity of job quality data and provide a comprehensive analysis of the relationship between retirement policies and mental health depending on diverse job quality dimensions.

The remainder of the paper is organized as follows. Section 2 describes the different data used and defines the variables of interest. We explain the empirical approach in Section 3 and we present the main results in Section 4. Section 5 concludes.

2. Data

Our study uses release 8.0.0 of SHARE. The survey provides comprehensive longitudinal information on socio-economic status, health, and social and family networks for nationally representative samples of individuals aged 50 and above residing in 28 European countries and Israel. We extract individual-level demographic and health data for 2011 and 2015 for 12 European countries that participated in the corresponding waves 4 and 6 of the survey, and add data on employment history from the retrospective module of wave 7 (Sharelife).

We use data on working conditions from waves 5 and 6 (2010 and 2015) of EWCS. The survey covers diverse occupations, sectors, and age groups of 35 countries, describing the work landscape in the form of 7 comprehensive job quality indices - skills and discretion, working time quality, physical environment, social environment, intensity, prospects, and monthly earnings – that we aggregate by country, year, and 4-digit ISCO codes. We don't use the

monthly earnings index as SHARE provides the information on household income. To ensure the concordance between the two surveys, we approximate job quality indices for 2011 with the values available for 2010.

Merging SHARE data with job quality indices from EWCS requires the identification of the occupation of each individual in the form of a 4-digit ISCO code. These codes were gradually recorded by the SHARE working groups since 2015. The majority of codes, covering around 47 000 individuals, were registered during the Sharelife module of wave 7, and the remaining 2 000 during the regular SHARE modules of waves 6,7, and 8. We recover all the available codes, which leaves us with a sample of around 49 000 individuals.

Finally, we turn to the Mutual Information System on Social Protection (MISSOC) to identify detailed information on pension systems and their reforms across European Union countries. This information allows us to estimate the statutory retirement age and its changes induced by reforms for each individual within our dataset.

3. Method

Sample selection

Our study covers data from 12 European countries that participated in waves 4 and 6 of SHARE: Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Italy, Slovenia, Spain, Sweden, and Switzerland. To ensure our sample is representative of individuals potentially impacted by pension reforms, we implement several filters. We narrow our focus to individuals aged 50 or above, having continuous employment status between 2011 and 2015, and not working beyond the statutory retirement age. Using retrospective employment data from Sharelife, we further exclude individuals with less than 10 years of social security contributions, as they are likely to be detached from work. Finally, some observations are lost due to missing values.

The resulting sample is a balanced panel of 3,922 workers observed both in 2011 and 2015. 58% of these workers are female, with an average age of 56.84. On average, they have 1.91 children. 74% work in the private sector, 17% in the public sector, and the remainder are self-employed. Detailed descriptive statistics are presented in Appendix 1.

Work horizon change

We define work horizon (YTR) as the residual number of years before an individual achieves the statutory retirement age, and work horizon change (ΔYTR), as the change in this work horizon induced by pension system reforms. The latter is the treatment variable in our setting.

Based on the MISSOC database, we use old age pension eligibility criteria in concerned countries, including age, gender, number of children (for the Czech Republic), sector of employment (for Italy) and years of contribution to social security to define cells, and calculate statutory retirement age for each individual (see Appendix 2 for a detailed summary of rules), under the assumption of continuous employment in the future. The average calculated statutory retirement age in our sample is 63.44 years, and the average residual work horizon is 6.60 years.

The MISSOC database also allows us to identify pension system reforms introduced between 2011 and 2015 and calculate the induced changes in the work horizon. 7 out of 12 countries tightened old age pension eligibility criteria, leading to an increase in residual work horizon of up to 5 years over the study period. In total, 42% of individuals in the sample experienced an increase in work horizon with an average of 0.7 years.

Mental health

We measure the mental health of individuals using the Euro-D scale (Beekman, et al., 1999), a clinical measure of depression introduced in 1999 to harmonize data on late-life depression in Europe. This scale measures depression on a 0-12 scale with the score corresponding to the number of depression symptoms revealed. It covers such aspects of depression as depressed mood, pessimism, wishing death, guilt, lack of sleep, lack of interest, irritability, lack of appetite, fatigue, lack of concentration, lack of enjoyment, and tearfulness. Generally, clinical depression is confirmed if the individual has 4 or more symptoms of the scale (Beekman, et al., 1999; Beekman, et al., 2005). In our sample, the average Euro-D score is 2.26 with 24% of individuals showing evidence of clinical depression.

Job quality indices

Our study explores 6 job quality indices provided by EWCS: skills and discretion, working time quality, physical environment, social environment, intensity, and prospects. These indices reflect the multidimensional nature of job quality, and each dimension has an independent influence on the health and well-being of workers (Fishta & Backé, 2015; Theorell, et al., 2015). Each index consists of a set of indicators covering different aspects of the corresponding job

quality dimension. These indices are measured on a scale from 0 to 100, where the higher the index score, the better the job quality.

As the structure of surveys slightly varies across waves, we had to recalculate some of these indices to achieve the maximum concordance between the editions of 2010 and 2015. We also reverse the intensity index, originally indicating worse job quality with higher values, to ensure the same interpretation of the scale for all indices. We aggregate the indices by 4-digit ISCO codes, country, and year. In addition, we calculate an overall index of job quality by summing the six individual indices. Detailed compositions and descriptive statistics for obtained indices are presented in Appendix 3.

Empirical approach

To assess the effect of reforms extending the work horizon on mental health of older workers, we use a difference-in-differences design. Our treatment variable is ΔYTR , the reforms-induced work horizon change. Within cells, defined by old age pension eligibility criteria in a given country, we consider this change exogenous. Our outcome variable is the Euro-D score on a 0-12 scale, representing the number of depression symptoms. We control the validity of the parallel trend assumption, by comparing the trends in mental health using data from previous waves of SHARE. We compare changes in Euro-D score between 2011 and 2015 across individuals with different values of ΔYTR by estimating the following model by ordinary least squares:

$$Y_{icw} = \alpha_w POST_w + \beta_c + \gamma \Delta YTR_c \times POST_w + \delta X_{icw} + \varepsilon_{icw} \quad (1)$$

In Equation (1), i , c , and w stand for individual, cell, and wave, respectively. Y is the Euro-D score. $POST$ is a dummy indicator for 2015. We isolate the effect of pension reforms by including fixed effects at the cell level (β_c). Singleton cells are removed from our sample (12 observations). The coefficient of interest is γ , which represents the difference-in-differences effect of a 1-year increase in work horizon on mental health. X_{icw} represents a vector of individual-level control variables, including respondents' gender, residual work horizon, number of children and grandchildren, years of full-time education, household income (in log), perceived general health level on a 5-point Likert scale, number of chronic diseases, job quality indices, and binary indicators for living as a couple, having life insurance and having savings, as well as fixed effects for the industry of employment. ε_{icw} is an error term. Standard errors are clustered at the cell level.

To explore the effects of reforms on depression based on different working conditions, we run a series of models on reduced samples. Specifically, we focus on each of the six job quality indices by splitting our sample into two groups — those above and below the median of each respective index.

Moreover, to account for gender dynamics found in the literature on the effects of reforms extending working life (Bertoni, Brunello, & Mazzarella, 2018; Carrino, Glaser, & Avendano, 2020; Serrano-Alarcón, et al., 2023), as well as on the relationship between working conditions and mental health (Belloni, Carrino, & Meschi, 2022; Bratberg, Holmås, & Holmås, 2020; Hiesinger & Tophoven, 2019), we explore potential gender-specific variations by running separate analyses for females and males.

We also foresee several additional steps of the analysis that are not yet presented in the results section, as this study is still a work in progress. First, in addition to the continuous specification of the outcome variable, we will estimate the likelihood of passing above the threshold of clinical depression ($\text{Euro-D} > 3$) with a linear probability model. Following the approach of (Banerjee, et al., 2007), we will also analyze the effects on two distinct orthogonal factors from the set of twelve depression symptoms that we obtained with a principal component analysis and identified as affective suffering and lack of motivation.

Moreover, for both specifications of the outcome variable, we will consider a binary treatment variable, equal to 1 if $\Delta YTR > 0$, and a non-linear specification that compares respondents having $\Delta YTR = 0$ with those having $0 < \Delta YTR \leq 1$, $1 < \Delta YTR \leq 2$, and $\Delta YTR > 2$, allowing an exploration of the effects contingent upon the dose of treatment or, in other words, the scope of the reform. Finally, we anticipate conducting a series of sensitivity tests, such as extending our analysis to the early retirement schemes, focusing only on individuals who remain in the same occupation (to address the potential endogeneity of occupational change over time), iterative dropping out of countries from the sample (to account for the heterogeneity of pension systems and labor markets), and a random permutation of ΔYTR .

4. Results

Our results show that the overall effect of an increased work horizon on depression symptoms is positive across all individuals ($\beta = 0.350$, $p < 0.001$). A closer examination of gender differences reveals that the impact is more pronounced among females ($\beta = 0.390$, $p < 0.01$) than among males ($\beta = 0.310$, $p < 0.05$), with greater inequalities found between sub-samples constituted according to the job quality indices.

In general, our results indicate that the changes in the mental health of older workers induced by pension reforms vary significantly depending on working conditions. . Figure 1 compares the effects of an extended work horizon on the Euro-D score depending on different working conditions. A detailed summary of results, including gender dynamics, can be found in Appendix 4.

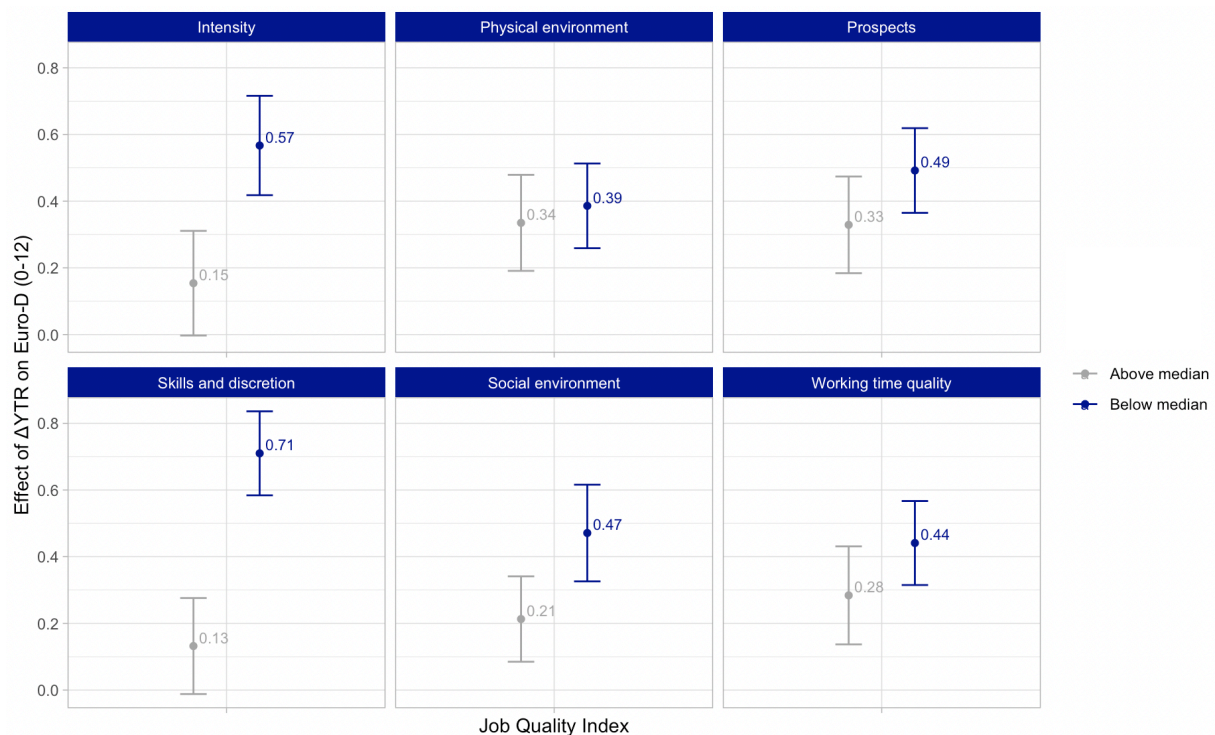


Figure 1 - Heterogeneous effects of work horizon increase (ΔYTR) on depression (Euro-D (0-12)) depending on working conditions

Individuals in lower-skilled jobs with less autonomy and decision-making power experienced a greater increase in depression symptoms ($\beta = 0.710$, $p < 0.001$) compared to those in higher-skilled jobs ($\beta = 0.384$, $p < 0.1$). This job quality dimension is more important for females with an increase of 1.067 ($p < 0.001$) in Euro-D score among those in lower-skilled occupations. The intensity of the job, including high and dependent pace of work, tight deadlines, and emotional

strain, plays a role only for males; those employed in high-intensity jobs experiencing a significant increase in depression symptoms ($\beta = 0.698$, $p < 0.001$). Females employed in these jobs do not display a significant change in depression symptoms.

Among workers employed in jobs with poor physical conditions, the impact of an extended work horizon on depression is significantly greater only for females ($\beta = 0.701$, $p < 0.001$). In contrast, the aspects of the social environment are more important for males, with an increase in Euro-D score of 0.578 ($p < 0.05$) for those with the social environment index below the median, while not creating any significant difference for females.

Finally, we find no significant inequalities in the effect of pension reforms on workers' mental health for the dimensions of working time quality, including long, irregular, and inflexible working hours, and job prospects, including opportunities for career growth and job insecurity. The latter can probably be explained by the age of targeted individuals, approaching retirement.

5. Conclusion

By combining data for 2011 and 2015 from 12 EU countries from the Survey of Health, Ageing and Retirement in Europe and the European Working Conditions Survey, we explore heterogeneous effects of reforms delaying the retirement age on late-career mental health as a function of working conditions. Similarly to Bertoni et al. (2023), Serrano-Alarcón et al. (2023), Carrino et al. (2020), and De Grip et al. (2012), we find that extending work horizon increases depression among older workers. We also confirm the presence of gender dynamics, with women being more sensitive to a prolonged work horizon, as shown previously by Serrano-Alarcón et al. (2023) and Carrino et al. (2020). We contribute to this recent literature by investigating the heterogeneity of these effects depending on working conditions using exogenous job quality data.

In line with the findings of Carrino et al. (2020) for the UK pension reform, we show that older workers suffer a greater increase in depression symptoms when employed in lower-skilled jobs with less autonomy and decision-making power, with females more affected than males. In contrast, we find that the intensity of the job is more decisive for males than for females. Only males employed in high-intensity jobs display a significant increase in depression symptoms in response to longer work horizon.

Unlike Bertoni et al. (2023), who find that the effects of pension reforms are stronger for individuals employed in jobs with high automation risk due to greater job insecurity, we find no significant heterogeneity of the effects for individuals employed in jobs with a job prospects index below the median. Although this index does not include specifically the presence of the automation risk, one of its two components refers to the risk of losing the job within the next 6 months.

In addition, our results bring to light new relationships. First, women are more negatively affected in their mental health by an increase in retirement age when working in poor physical environments. Second, men are significantly more impacted by the prolonged work horizon when they are working in poor social environments.

The potential adverse consequences of pension reforms on late-career mental health go beyond the loss of individual well-being, impacting labor market productivity (Bubonya, Cobb-Clark, & Wooden, 2017) and public budgets (Prince, et al., 2007) due to increased absenteeism, healthcare and disability costs, and decreased job retention. The mental health implications, including gender inequalities, should, therefore, be carefully considered when implementing policies aimed at extending working life. Flexible early retirement options, coupled with initiatives promoting lifelong learning, could serve as preventive measures to mitigate the negative effects on productivity. Policies extending state pension ages should also account for occupational inequalities, especially in demanding occupations, and consider inclusive labor market strategies, such as partial and gradual retirement schemes, to facilitate smoother transitions to retirement for individuals in lower-skilled jobs with poor environments.

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Appendix 1 - Summary descriptive statistics for the final SHARE sample

	Mean	SD
<i>Outcome</i>		
Euro-D score (from 0=no depression to 12=very depressed)	2.26	2.08
Euro-D score > 3 (yes/no)	0.24	0.43
Motivation lack (yes/no)	0.12	0.33
Affective suffering (yes/no)	0.29	0.45
<i>Treatment</i>		
ΔYTR	0.70	1.10
$\Delta YTR > 0$ (yes/no)	0.42	0.49
<i>Covariates determining cell</i>		
Gender (1=female, 0=male)	0.58	0.49
Age	56.84	3.81
Number of children	1.91	1.35
Years of contribution to social security	36.37	6.14
Sector of employment		
Private (yes/no)	0.74	0.44
Public (yes/no)	0.17	0.38
Self-employed (yes/no)	0.09	0.28
<i>Additional covariates</i>		
Number of grandchildren	1.25	2.01
Living as a couple (yes/no)	0.77	0.42
Years of full-time education	11.84	4.69
Net household income	56,526.85	98,813.05
Savings (yes/no)	0.50	0.50
Life insurance (yes/no)	0.31	0.46
Self-perceived general health (from 0=excellent to 5=poor)	3.10	1.05
Number of chronic diseases	1.25	1.32
Residual work horizon	6.60	3.44
Observations	7,675	

Appendix 2 – Statutory retirement age and full pension eligibility rules

Country	2011	2015
Austria	<i>Age:</i> 65 for males and 60 for females <i>Contributions:</i> 45 years	<i>Age:</i> 65 for males and 60 for females <i>Contributions:</i> 45 years
Belgium	<i>Age:</i> 65 <i>Contributions:</i> 45 years	<i>Age:</i> 65 <i>Contributions:</i> 45 years
Czech Republic*	<i>Age:</i> 62 and 2 months for males, depends upon the number of children for females (61 if no children, 60 if 1 child, 59 if 2 children, 58 if 3 or 4 children, 57 if 5 or more children) <i>Contributions:</i> 27 years (17 years if age of 65)	<i>Age:</i> 62 and 10 months for males, depends upon the number of children for females (62 if no children, 61 if 1 child, 60 if 2 children, 59 if 3 or 4 children, 58 if 5 or more children) <i>Contributions:</i> 31 years (20 years if age of 67 and 10 months)
Denmark	<i>Age:</i> 65 (67 for those who had reached the age of 60 on 1.7.1999) <i>Contributions:</i> -	<i>Age:</i> 65 (67 for those who had reached the age of 60 on 1.7.1999) <i>Contributions:</i> -
Estonia*	<i>Age:</i> 63 for males and 61 for females <i>Contributions:</i> 15 years	<i>Age:</i> 63 for males and 62 and 6 months for females <i>Contributions:</i> 15 years
France*	<i>Age:</i> If minimum period of contributions completed: 60 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by four months per birth year to reach 62 for persons born in 1956 or later. If minimum period of contributions not completed: 65 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by 4 month per birth year to reach 67 for persons born in 1956 or later. <i>Contributions:</i> Determined according to the birth year of the person concerned - 1949: 160 quarters, 1952: 164 quarters	<i>Age:</i> If minimum period of contributions completed: 60 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by four months per birth year to reach 62 for persons born in 1955 or later. If minimum period of contributions not completed: 65 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by 5 month per birth year to reach 67 for persons born in 1955 or later. <i>Contributions:</i> Determined according to the birth year of the person concerned - 1952: 164 quarters; 1953 and 1954: 165 quarters, 1955 and 1956: 166 quarters
Germany*	<i>Age:</i> 65 <i>Contributions:</i> 5 years	<i>Age:</i> 67 if born after 1963; 65 and 2 months if born after 1947 <i>Contributions:</i> 5 years
Italy*	<i>Age:</i> 66 for males, 61 only for females working in the public sector, 60 for the other females <i>Contributions:</i> 40 years (5 if retiring at age of 70 for those first insured after 1996)	<i>Age:</i> 66 and 3 months for males, 66 and 3 months for females working in the public sector, 64 and 9 months for self-employed females, 63 and 9 months for other females

		<i>Contributions:</i> 42 years and 6 months for males, 41 years and 6 months for females
Slovenia*	<i>Age and contributions:</i> 63 for males and females if 15 years of contributions, 63 for males and 61 for females if 20 years of contributions, 58 for males if 40 years of contributions, 58 for females if 38 years of contributions	<i>Age and contributions:</i> 65 if 15 years of contributions, 60 if 40 years of contributions
Spain*	<i>Age:</i> 65 <i>Contributions:</i> 35 years	<i>Age and contributions:</i> 65 if 35 years and 9 months of contributions, 65 years and 3 months if less contributions
Sweden	<i>Age:</i> 65	<i>Age:</i> 65
Switzerland	<i>Age:</i> 65 for males and 63 for females	<i>Age:</i> 65 for males and 63 for females

*Rules changed between 2011 and 2015

Appendix 3 – Composition and summary descriptive statistics of job quality indices for the final SHARE sample

Index	Dimension	Components	Mean (SD)	
			2010	2015
Physical environment	<i>Ambient</i>	Exposure to vibrations from hand tools, machinery		
		Exposure to noise so loud that you would have to raise your voice to talk to people		
		Exposure to high temperatures that make you perspire even when not working		
		Exposure to low temperatures whether indoors or outdoors	87.66	84.35
		Exposure to breathing in smoke, fumes, powder or dust	(20.91)	(17.54)
	<i>Posture related</i>	Posture-related painful or tiring positions		
		Carrying or moving heavy loads		
		Repetitive hand or arm movements		
	<i>Biological, chemical conditions</i>	Handling or being in direct contact with dangerous substances such as chemicals or infectious materials		
		<i>In the last month:</i>		
Social environment	<i>Adverse social behavior</i>	Exposure to verbal abuse		
		Exposure to unwanted sexual attention		
		Exposure to threats		
		<i>In the last year:</i>		
		Exposure to physical violence		
	<i>Social support</i>	Exposure to sexual harassment		
		Exposure to bullying/harassment		
		<i>Management quality:</i>	86.51	80.97
		Your immediate boss respects you as a person	(20.59)	(17.29)
		Your immediate boss provides useful feedback in your work		
Intensity	<i>Quantitative demands</i>	<i>Social support:</i>		
		Help and support from colleagues (most of the time/always)		
		Help and support from your manager (most of the time/always)		
		Working at very high speed (three-quarters of the time or more)		
		Working to tight deadlines (three-quarters of the time or more)	60.33	48.06
		Enough time to get the job done (never or rarely)	(16.28)	(13.22)
		Frequent disruptive interruptions		

		Interdependency: three or more pace determinants		
		Work pace dependent on: the work done by colleagues		
	<i>Pace determinants and interdependency</i>	Work pace dependent on: direct demands from people such as customers, passengers, pupils, patients, etc		
		Work pace dependent on: numerical production targets or performance targets		
		Work pace dependent on: automatic speed of a machine or movement of a product		
		Work pace dependent on: the direct control of your boss		
		Hiding your feelings at work (most of the time or always)		
	<i>Emotional demands</i>	Handling angry clients, customers, patients, pupils, etc. (three-quarters of the time or more)		
		Long working hours (48 h or more a week)		
	<i>Duration</i>	Long working days (10h or more a day)		
		Night work		
	<i>Atypical working time</i>	Saturday work		
		Sunday work		
		Shift work		
Working time quality		Set by the company	91.98	87.11
		Can choose between different schedules	(22.95)	(18.03)
		Can adapt working hours		
		Entirely determined by self		
	<i>Working time arrangements</i>	Change in working time arrangements		
		No regular change		
		Change the same day		
		Change the day before		
		Change several days in advance		
		Change several weeks in advance		
Skills and discretion		Solving unforeseen problems		
		Carrying out complex tasks		
	<i>Cognitive dimension</i>	Learning new things		
		Working with computers, smartphones and laptops, etc. (at least a quarter of the time)		
		Ability to apply your own ideas in work		
		Ability to choose or change order of tasks		
	<i>Decision latitude</i>	Ability to choose or change speed or rate of work	61.37	60.23
		Ability to choose or change methods of work	(21.80)	(19.24)
		Having a say in choice of work colleagues		
		Consulted before objectives are set for own work ('always' or 'most of the time')		
	<i>Organizational participation</i>	Involved in improving the work organization or work processes of own department or organization ('always' or 'most of the time')		
		Ability to influence decisions that are important for your work ('always' or 'most of the time')		

Prospects	<i>Training</i>	Training paid for or provided by employer over the past 12 months (or paid by oneself if self-employed) On-the-job training over the past 12 months Trend index score (maximum 100)		
	<i>Career prospects</i>	Job offers good prospects for career advancement	60.47 (21.0)	62.41 (16.5)
	<i>Job security</i>	Might lose job in the next six months		
	Overall job quality (sum of indices)		451.83 (117.29)	430.75 (109.96)

Appendix 4 - Heterogeneous effects of work horizon increase (ΔYTR) on depression (Euro-D (0-12)) depending on working conditions

		All individuals	Males	Females
Full		0.350 *** (0.097)	0.310 * (0.146)	0.390 ** (0.127)
JQI skills and discretion	> median	0.132 (0.144)	0.384 . (0.191)	-0.111 (0.211)
	< median	0.710 *** (0.126)	0.450 ** (0.162)	1.067 *** (0.195)
	<i>p-value for equality</i>	0.000	0.000	0.000
JQI physical environment	> median	0.335 * (0.144)	0.147 (0.168)	0.190 (0.214)
	< median	0.386 ** (0.127)	0.445 * (0.191)	0.701 *** (0.194)
	<i>p-value for equality</i>	0.394	0.120	0.038
JQI social environment	> median	0.213 . (0.128)	0.069 (0.161)	0.377 . (0.201)
	< median	0.471 ** (0.145)	0.578 ** (0.204)	0.458 * (0.210)
	<i>p-value for equality</i>	0.091	0.025	0.390
JQI working time quality	> median	0.284 (0.147)	0.211 (0.199)	0.345 . (0.208)
	< median	0.441 *** (0.126)	0.403 * (0.167)	0.491 * (0.195)
	<i>p-value for equality</i>	0.208	0.230	0.305

JQI intensity	> median	0.154 (0.157)	-0.164 (0.185)	0.462 * (0.214)
	< median	0.567 *** (0.149)	0.698 *** (0.206)	0.592 * (0.280)
	<i>p-value for equality</i>	0.028	0.001	0.356
JQI prospects	> median	0.329 * (0.145)	0.254 (0.157)	0.086 *** (0.211)
	< median	0.492 *** (0.127)	0.492 * (0.206)	0.197 (0.202)
	<i>p-value for equality</i>	0.200	0.179	0.012

. p<0.1, * p < 0.05, **p < 0.01, *** p < 0.001