Tobias Wiß, Lisa Schmidthuber, Valeria Bordone*

Quality of Working Conditions, Sector of Employment and Age at Retirement**

Abstract

Prolonging employment and postponing retirement are seen as promising solutions to make labour markets and pension systems sustainable in ageing Europe with low employment rates of older people and widespread early retirement. The aim of the paper is to identify to what extent quality of working conditions and sector of employment affect the actual age at retirement. Based on SHARELIFE data on 13 European countries, we investigate the association between age at retirement on the one hand and 12 quality of working conditions attributes and six economic sectors on the other using linear regression models. Our results show that freedom to decide how to do the work is significantly associated with a higher age at retirement and adequate salary with a lower age at retirement among both men and women, while working in a comfortable environment, without emotional demands, and where employees experienced fair treatment is positively related to age at retirement only for men. Furthermore, our analysis provides evidence that quality of working conditions attributes are more important for age at retirement in the service, manufacturing and industry sectors than in the finance, trade, and primary sectors. A stronger focus on improving quality of working conditions is likely to promote a higher age at retirement among both men and women.

Keywords: Age at retirement, working conditions, ageing society, SHARELIFE, pension systems, comparative analysis
(JEL: J18, J26, J28, J38, J81)

Introduction

In several European countries, ageing and low employment rates of older people challenge the sustainability of pension systems. Public pension systems financed through social contributions or taxes of the active working population are affected by low fertility rates, increasing life expectancy, low levels of labour market partici-

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pation of older people and early retirement (e.g., Debroux, 2016; Hess, 2016; Hess, 2018; König et al., 2016; Schmidthuber et al., 2016). Therefore, incentivising to work longer and raising actual retirement ages are seen as promising solutions. In order to design adequate policies on extending working lives, it is important to know which factors contribute to higher ages at retirement.

Most of the studies on this topic have dealt with either institutional factors (e.g., pension system and labour market regulation) (Börsch-Supan et al., 2009; Ebbinghaus, 2006) or individual factors (e.g., health and education) (Hank & Korbmacher, 2013; Hochman & Lewin-Epstein, 2013; Schröder et al., 2016) affecting retirement intentions or behaviour. Complementing the existing literature, we aim to identify to what extent quality of working conditions and sector of employment are related to the actual age at retirement. Only a few studies have recently started investigating the effect of quality of working conditions and of sector of employment on retirement. They identified poor quality of working conditions as a determinant of premature departure from working life (König, 2017; Schnalzenberger et al., 2014; Siegrist & Wahrendorf, 2010) and of intentions to retire earlier (Carr et al., 2016; Dal Bianco et al., 2015). Sectors tend to vary in employment and pension regulations as well as in job quality (Eurofound, 2014; Wiß, 2015) which may result in different ages at retirement. While Engelhardt (2012) did not find a significant association between sector of employment (she only distinguished between tertiary and non-tertiary sectors) and employment exit, other scholars provided some evidence of higher levels of early retirement in the industrial and the financial sectors compared with the service sector (Blöndal & Scarpetta, 1999; De Preter et al., 2012).

Yet, most of this literature has focused on retirement intentions or transition into retirement. We extend previous findings in three ways: 1) We look at the age at retirement rather than at the intention to retire. Although intentions to retire may serve as a strong predictor of actual retirement (Henkens & Tazelaar, 1994), they also may be largely affected by the perceived actual ability to retire at the time of interview (Hochman & Lewin-Epstein, 2013). 2) We use cross-country comparative data from the retrospective survey SHARELIFE instead of national surveys (Breinegaard et al., 2017; Büsch et al., 2012; Carr et al., 2016; Sejbaek et al., 2013) or the first two waves of SHARE (Fischer & Sousa-Poza, 2010; Schnalzenberger et al., 2014). So far in this field, its module on working conditions has only been used to study the probability of early retirement (Siegrist & Wahrendorf, 2010). While SHARELIFE data allow us to analyse the age at retirement of individuals in Europe and its relation to sector and quality of working conditions, we acknowledge that no causality can be inferred from the cross-sectional analyses. 3) We consider a varying effect of quality of working conditions for age at retirement by economic sector.

The remainder of this paper is structured as follows: first, we review the existing literature and argue why quality of working conditions and economic sector play an important role in explaining retirement behaviour; second, data and method used in the analysis are presented; finally, we report and discuss the results.

Quality of Working Conditions, Sector of Employment and Age at Retirement

The evidence for poor quality of working conditions as a key determinant of premature departure from working life is mixed. While some studies have shown that physical demands and chemical exposures at work increase the risk of early retirement (Blekesaune & Solem, 2005; MacKenzie et al., 1998) and early retirement intentions (Sejbaek et al., 2013), Schnalzenberger et al. (2014) did not find any significant relationships between physically demanding jobs and the intention to retire or the probability of working in later life.

One reason for such mixed evidence is that quality of working conditions is a multidimensional concept and therefore is difficult to define. Studies in this field have mainly relied on two models: the demand-control model, which identifies stressful work as a combination of high demand and low control (Karasek et al., 1998), and the effort-reward imbalance model, which focuses on the imbalance between high efforts and low rewards (Siegrist et al., 2004).

The deriving empirical evidence has shown that people with stressful jobs are more likely to retire early (Blekesaune & Solem, 2005; Kubicek et al., 2010; König, 2017) or intend to retire early (Harkonmäki et al., 2006; Siegrist & Wahrendorf, 2010). However, inconsistencies exist when only a few components of the models are being studied (Karasek et al., 1998; Siegrist & Wahrendorf, 2010).

Nevertheless, previous findings generally indicated that retirement intentions (Siegrist & Wahrendorf, 2010) as well as continued employment after the age of 60 (Blekesaune & Solem, 2005; Dragano & Schneider, 2011) are strongly associated with a poor work environment. More in detail, high psychosocial demands, low decision authority, and low recognition were found to positively predict early retirement intentions and preferences as well as the exit from work into (early) retirement (Carr et al., 2016; Dal Bianco et al., 2015; Schnalzenberger et al., 2014). Adequate earnings have been found to increase the intention not to retire, but in terms of retirement decision they increased the probability to retire (at least among women, as found by Schnalzenberger et al., 2014). We, therefore, hypothesise that good quality of working conditions will be positively associated with age at retirement (Hypothesis 1).

Although early retirement may not differ between tertiary and non-tertiary sectors (Engelhardt, 2012), it varies across economic sectors. Research has shown that workers in the industry, manufacturing, and financial sectors tend to retire earlier

than their colleagues in the service sector (Blöndal & Scarpetta, 1999; De Preter et al., 2012). Hence, we also expect that the age at retirement is lower in the industry, manufacturing, and financial sectors than it is in the service and the primary (agriculture) sectors (Hypothesis 2).

Furthermore, we expect the effect of the working conditions attributes to vary across economic sectors (Hypothesis 3). To our knowledge, the roles played by specific quality of working conditions items for age at retirement in different sectors have not yet been examined. Therefore, this part of our analyses is rather exploratory. Depending on the sector of employment, employees may profit or suffer from certain working conditions to different degrees (Eurofound, 2014). We would expect, for example, that physical demands and health strains matter more in sectors such as manufacturing and industry with many manual blue-collar workers as compared to the service sector dominated by white-collar workers (similarly, see Radl, 2013). The former, indeed, perform more physical manual activities that are more likely to affect their timing of retirement. However, the opposite mechanism might also be the case: when people experience working conditions that are not typical for their sector, such as physical demanding work in the service sector or a comfortable working environment in the industry sector, this rather exceptional occurrence might affect retirement decisions. The findings from these analyses will open up the way to a new path of research in this field by uncovering important sectoral differences that are hidden in country-level analyses.

Data and Method

Data and sample selection

We use data from the Survey of Health, Ageing and Retirement in Europe (SHARE) (Börsch-Supan et al., 2013), which offers data on health as well as on the economic and social situation of older Europeans. The third wave, SHARELIFE (Börsch-Supan, 2018; Schröder, 2011), contains a module on work history including an assessment of the psychosocial environment of the last main job of the working career lasting longer than five years. As a result, the complete employment career and quality of working conditions of the last job, assessed retrospectively, can be related to retirement behaviour. Nearly 30,000 people in 13 European countries from Scandinavia (Denmark and Sweden), Central Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands), the Mediterranean (Spain, Italy, and Greece) and two transition countries from Eastern Europe (the Czech Republic and Poland) have participated in the data collection between autumn 2008 and summer 2009.

We acknowledge that retrospective data may suffer from recall bias (i.e. memories may blur over time). However, Havari and Mazzonna (2015) have shown that socio-demographic information, even regarding childhood, is relatively accurate in SHARELIFE.

This study focuses on former employees who were no longer working at the time of the interview (for more details on the definition of this variable, see the subsection below on *Measures*). We have excluded respondents who were self-employed in their main job before retirement because they tend to have more control over the own working conditions, which leads to a lower probability of employment exit than for their employed counterparts (Engelhardt, 2012; Hank & Korbmacher, 2013). Wherever possible, we have imputed missing information with data collected in the previous waves of SHARE. We have selected respondents aged at least 45 at retirement in order to avoid an over-representation of respondents with an early exit from the labour market most likely due to poor health conditions[1]. We have also excluded respondents who worked past the age of 75 (0.1 % of all cases).[2] Our final sample includes 9,008 respondents (4,115 women and 4,893 men). A robustness check (available on request) was carried out on the subsample with retirement age between 50 and 70, following Hofäcker et al. (2016), to exclude extreme cases of early/late withdrawal. As the results were similar to those presented here, we preferred to keep the larger sample.

Measures

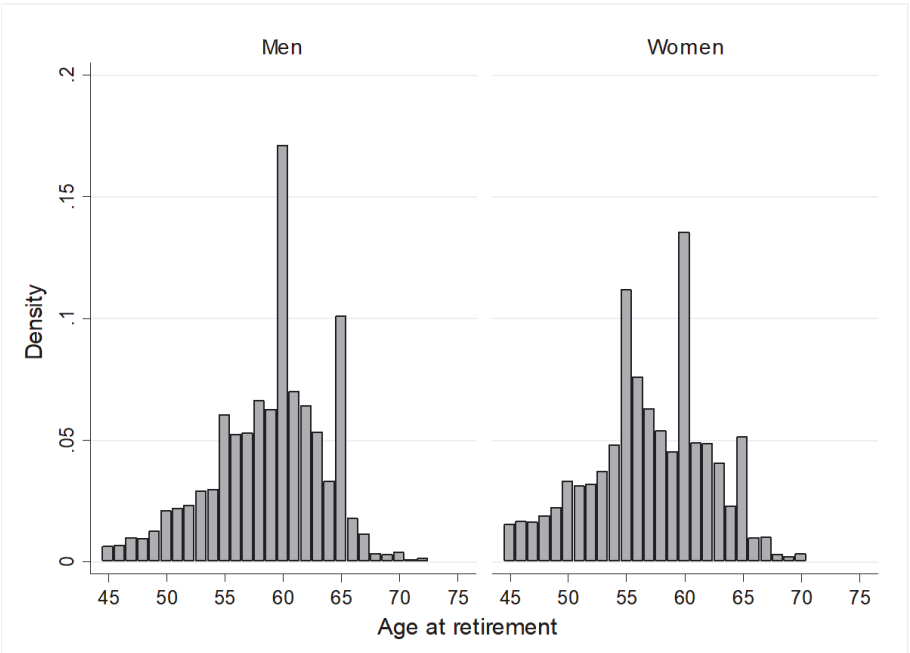
Our dependent variable, *age at retirement*, is calculated as the difference between the year of retirement and the year of birth of the respondent. In cases where the year of retirement is missing, but the respondent has left the labour market and has indicated the year at labour market exit, we have used this latter information instead of year of retirement. The distribution of this variable is shown in Figure 1. Our sample includes respondents born between 1910 and 1960 who on average retired at the age of 58.1 (58.9 among men and 57.1 among women). More than 90 % of the respondents considered in this study also declare to be retired. As De Preter et al. (2012, p. 515) has noticed, the category "retired" in the activity status question of SHARE is a "self-defined status [that] might, however, be problematic in cases where the worker is actually receiving unemployment benefits rather than pension benefits, but feels him or herself retired […], however, only 0.5 per cent of those who define themselves as retired, report receiving unemployment, sickness or disability benefits." Yet, in our case, we also control for whether respondents receive disability benefits. For completeness, we have carried out robustness checks (available on request) with three different specifications, i.e. by a) using only information on retirement year, b) using only information on labour market exit, and c) using the combined information by restricting the sample to those declaring to be retired at wave 3. Generally, the results were similar to those reported in the paper. There are some cases where coefficients loose or gain significance, however, the effect sizes

1 Indeed, among those who retired before the age of 45 the percentage of applications for disability pension is double than among the retirees at older ages.

2 Additional models have been carried out including respondents who retired before the age of 45 or after the age of 75, and results were qualitatively the same as those reported here.

and their direction remain similar. Therefore, we preferred reporting those that allowed us relying on a larger sample size.

Figure 1. Distribution of the measure of retirement age as used in the models reported in the text.



The main explanatory variables relate to *quality of working conditions* and the *economic sector* in which respondents were employed in their last main job. A battery of items on quality of working conditions partially cover the demand-control model (Karasek et al., 1998) and the effort-reward imbalance model (Siegrist et al., 2004): the control dimension considers freedom in how to do the work and the opportunity to develop new skills; the demand dimension includes questions on physical demands (whether their main job was or was not physically demanding and the work environment comfortable) and psychosocial demands (whether their job was or was not time demanding, whether it was or was not emotionally demanding and whether they were exposed to recurrent conflicts); the reward domain is tapped by asking whether their salary was adequate and whether they had received recognition for their work. Additionally, social support at work was measured through support in difficult situations, good atmosphere with colleagues, and whether employees were treated fairly. All questions about working quality were asked on a 4-point Likert scale (from "strongly agree" to "strongly disagree"). In order to make them all indicating a positive working conditions quality, we constructed a set of dummy

variables for all work quality components where 0 corresponded to negative opinion and 1 to positive opinion for each work characteristic.

We estimate the effect of each specific item separately instead of, for example, using the effort-reward ratio because not all items necessarily work in the same direction. As mentioned above, evidence from previous studies is mixed and some did not find support for the combination of effort-reward items (Schnalzenberger et al., 2014).

With regard to our second explanatory variable and following the classification of sectors suggested by the European Commission (2013) and De Preter et al. (2012), we collapsed the economic sectors into manufacturing, industry (mining and quarrying; electricity, gas and water supply; construction), trade sector (wholesale and retail trade; transport, storage and communication), finance and insurance (financial intermediation; real estate, renting and business activity), service sector (hotels and restaurants; public administration[3]; education; health and social work; other community services), and primary sector (agriculture, hunting, forestry, and fishing).

Based on previous research, the following control variables are included in the analysis. We distinguish three levels of education (low if isced = 1 or 2; medium if isced = 3 or 4; high if isced = 5 or 6). In SHARELIFE, only the number of years of education is available. We, therefore, retrieved information about the educational attainment level from previous waves exploiting the longitudinal dataset.

We consider occupational classification, namely if the respondent was a white-collar worker (legislators, senior officials or managers, professionals, technicians or associate professionals, clerks, and service, shop or market sales workers) or a blue-collar worker (skilled agricultural or fishing workers, craft or related trades workers, plant or machine operators or assemblers, and workers in elementary occupations) in their last main job. The latter usually benefits from longer insurance periods at younger ages than white-collar workers due to the earlier entrance into working life.

Additionally, we control for whether respondents were civil servants (= 1; = 0 otherwise) in their main job because this occupational group usually follows alternative institutional regulations and thus may differ from the other employees.[4]

In order to account for disability as a reason for earlier retirement, we also control for whether the respondent has ever applied for a disability pension and, if yes, whether this was granted (a three-category variable distinguishes between never applied; applied, not granted; applied and granted).

3 From the analyses, we excluded respondents having been soldiers (0.76 % of the original sample) due to specific pension regulations that apply to such occupational group.

4 In the sample of Italy and Poland, there is no distinction between civil servants and the other employees. Therefore, this variable can only take value 0 in these two countries.

The year of birth enters the regression analysis in order to take different pension regulations for different birth cohorts into account. In an additional robustness check, we have run the same analyses separately on three subsamples defined by birth cohort (in tertiles) to account for possible differences in, e.g., labour market conditions and welfare state regulations, that might play a role in the analysed relationship. It appears that not physically demanding jobs are related to higher ages at retirement only for the youngest cohort, a comfortable work environment only for the middle cohort, and an adequate salary is related to lower ages at retirement for both the youngest and middle cohorts, but not the oldest one (models available on request). However, our paper does not focus on cohort effects and by including the year of birth in the regression models, we at least party capture this possible bias. Country dummies are entered in all models. In the pooled model, gender is included as a control variable in order to account for possible differences in the retirement behaviour and in the statutory retirement age between men and women. The descriptives for all variables included in the regression analyses are shown in Table 1, by gender (Table 1a) and by sector (Table 1b).

Table 1. Descriptives of All Variables Included in the Models, by a) Gender and b) Sector (%)

a)	Men	Women
Agree:		
Freedom to decide	65.67	62.36
Opportunity to develop skills	74.74	63.67
Job not physically demanding	46.41	48.12
Comfortable work environment	60.33	72.27
Not time demanding	43.84	51.23
Not emotionally demanding	51.38	50.30
No conflicts	69.69	77.98
Adequate salary	69.73	58.06
Recognition received	77.42	75.31
Adequate support	72.47	72.90
Good atmosphere	94.95	93.00
Fairness of treatment	83.61	81.53
Sector: service	29.23	54.24
Manufacturing	23.18	18.69
Industry	20.42	3.65
Trade	17.31	13.83
Finance	3.82	3.99
Primary	6.05	5.61
Education: low	44.88	48.29
Middle	33.66	33.90
High	21.46	17.81

a)	Men	Women
White collar worker	52.77	66.83
Civil servant	14.29	13.03
Disability pension: never applied	89.99	89.77
Applied but did not get it	1.14	1.53
Applied and got it	8.87	8.70
Year of birth (median)	1938	1940
Country: AT	4.05	4.40
DE	8.99	8.09
SE	7.07	10.86
NL	8.30	5.83
ES	6.19	2.92
IT	11.34	6.34
FR	8.81	10.04
DK	6.64	9.14
GR	7.19	4.76
CH	4.60	3.74
BE	12.77	9.26
CZ	7.95	16.06
PL	6.09	8.55
N	4,893	4,115

b)	Service	Manufac-tory	Indus-try	Trade	Finance	Primary
Agree:						
Freedom to decide	70.51	57.86	61.27	61.23	70.66	52.56
Opportunity to develop skills	71.87	66.89	75.28	65.61	83.48	54.08
Job not physically demanding	52.87	46.09	35.51	45.13	82.91	18.98
Comfortable work environment	78.86	52.13	48.65	67.51	90.03	40.80
Not time demanding	52.13	43.83	41.95	45.34	41.31	45.73
Not emotionally demanding	44.27	56.86	56.92	52.97	46.72	59.39
No conflicts	74.74	75.14	71.28	71.33	68.09	72.87
Adequate salary	64.45	63.64	67.80	65.75	76.92	47.44
Recognition received	79.87	72.88	76.15	74.65	80.91	68.12
Adequate support	74.63	72.83	70.06	71.68	77.49	63.57
Good atmosphere	94.07	94.38	93.99	93.43	94.30	94.50
Fairness of treatment	84.11	82.61	82.25	81.36	82.91	77.04
Female	60.95	40.41	13.05	40.18	46.72	43.83
Education: low	36.18	54.60	52.83	52.05	24.79	73.62
Middle	32.44	34.00	35.51	36.51	51.00	19.54

b)	Service	Manufac-tory	Indus-try	Trade	Finance	Primary
High	31.38	11.40	11.66	11.44	24.22	6.83
White collar worker	78.32	37.36	36.12	65.11	92.59	17.27
Civil servant	72.06	0.89	4.44	8.83	7.69	4.55
Disability pension: never applied	91.94	88.65	86.77	90.25	94.87	82.54
Applied but did not get it	1.17	1.58	0.87	1.20	0.28	3.42
Applied and got it	6.88	9.77	12.36	8.55	4.84	14.04
Year of birth (median)	1939	1939	1939	1939	1940	1936
Country: AT	4.04	4.62	4.44	4.45	3.42	3.23
DE	7.78	10.09	8.53	9.04	7.69	8.16
SE	11.82	6.99	5.40	7.27	13.96	2.47
NL	9.07	4.41	6.35	7.84	9.40	2.47
ES	2.95	4.89	8.79	4.24	3.70	9.11
IT	9.56	8.57	9.57	6.99	3.99	15.18
FR	9.91	7.09	10.10	11.02	13.68	4.93
DK	10.21	5.99	5.57	6.64	9.97	3.80
GR	5.63	3.05	9.75	8.05	7.69	5.88
CH	4.92	3.63	2.70	4.94	6.27	1.33
BE	12.02	13.19	8.96	11.65	9.97	2.28
CZ	7.29	18.18	10.88	11.16	8.55	23.53
PL	4.81	9.30	8.96	6.71	1.71	17.65
N	3,662	1,903	1,149	1,416	351	527

Method

In order to determine the relationship between quality of working conditions attributes and sector of employment on the one hand and age at retirement on the other, we carry out linear regression analyses first on the pooled sample of men and women and second by gender. We also estimate a series of linear regression models where different sectors are considered one at a time. As the role of each quality of working conditions item might differ across sectors, we have identified significant differences by carrying out a fully interacted model (available from the authors upon request). We will comment on this in the *Results* section.

Additionally, we have carried out analyses by country as well as by region (Northern, Western, and Southern Europe[5]) and found that the associations between the explanatory variables and age at retirement by country/region were qualitatively the same as those reported here. Also, additional analyses were carried out including one work characteristic at a time, but again the results did not significantly differ

5 Note that in this case we have not carried out our models on the Eastern European countries because they are not a homogenous group in terms of welfare policies.

from those reported in the next section. Similarly, distinguishing the subsamples of respondents who had ever applied for a disability pension and those who did not, did not further explain the association between quality of working conditions and age at retirement.

Results

Descriptive findings

On average, age at retirement significantly differs across sectors, as shown in Table 2. The age at retirement for all employees was highest in the service sector (at the same level as in finance and insurance among all employees and for the subsample of women) and lowest in industry for men and manufacturing for women.

Table 2. Mean Age at Retirement of the Whole Sample and by Gender, by Sector of Employment

	Manufacturing	Industry	Trade sector	Finance and insurance	Service sector	Primary	Oneway test
All	57.3	58.1	57.8	58.5	58.5	58.1	***
Men	58.6	58.4	58.7	58.9	59.6	59.2	***
Women	55.4	56.0	56.5	57.9	57.9	56.6	**
N	1,903	1,149	1,416	351	3,662	527	

Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Among men, the age at retirement did not differ much across sectors, with the exception of the age at retirement in the service sector being statistically significantly higher than in manufacturing, industry, and the trade sector. Also the age at retirement of men in the industry sector was significantly lower than for their counterparts who were employed in the primary sector. Women in the service and financial sectors remained significantly longer employed than women in the manufacturing, industry, trade, and primary sectors.

On average, men retired later than women across all sectors. Such difference was always statistically significant at least at the 5 % level (significance tests by gender not shown, available on request).

Multivariate results

The results of the multivariate analysis on the pooled sample of all employees (Table 3) show that, once controlled for socio-demographic characteristics and sector of employment, four quality of working conditions items are associated with a higher age at retirement (freedom to decide; no physical demand; comfortable work environment; fairness of treatment) and two with a lower age at retirement (no conflicts; adequate salary), partially confirming Hypothesis 1.

Freedom to decide how to do work, in particular, results to be an important factor in influencing (a higher) age at retirement. Both items measuring physical demands (not physically demanding job and comfortable work environment), one item among the psychosocial demands (not emotionally demanding job) and one within the social support dimension (fair treatment) are related to a significantly higher age at retirement, but only among men. Within the reward domain, adequate salary was negatively associated with age at retirement for all employees. On average, people with adequate salary in their last job retired almost half a year earlier than their counterparts without adequate salary. Surprisingly, people not exposed to recurrent conflicts and disturbances in their work environment had on average lower ages at retirement than those with higher levels of conflict. In general, our findings suggest that quality of working conditions attributes play a more significant role for men's than for women's age at retirement.

Table 3. Beta Coefficients and Standard Errors of the Quality of Working Conditions Items from Linear Regression Models on Actual Retirement Age, for the Pooled Sample and by Gender

	All		Men		Women	
	b	*SE*	*b*	*SE*	*b*	*SE*
Freedom to decide	0.401***	0.100	0.393**	0.132	0.397**	0.150
Opportunity to develop skills	0.174	0.107	0.067	0.146	0.254	0.158
Job not physically demanding	0.240*	0.104	0.332*	0.141	0.181	0.156
Comfortable work environment	0.283*	0.114	0.440**	0.148	0.125	0.179
Not time demanding	-0.008	0.100	-0.029	0.131	0.010	0.153
Not emotionally demanding	0.105	0.100	0.289*	0.131	-0.102	0.154
No conflicts	-0.289**	0.112	-0.446**	0.139	-0.040	0.184
Adequate salary	-0.459***	0.104	-0.452**	0.142	-0.415**	0.153
Recognition received	-0.083	0.125	0.042	0.164	-0.285	0.193
Adequate support	0.099	0.117	0.016	0.150	0.161	0.185
Good atmosphere	-0.192	0.199	-0.116	0.279	-0.207	0.286
Fairness of treatment	0.385**	0.136	0.491**	0.182	0.323	0.205
Cons	465.513***	11.228	485.733***	15.066	427.994***	16.828
N	9,008		4,893		4,115	

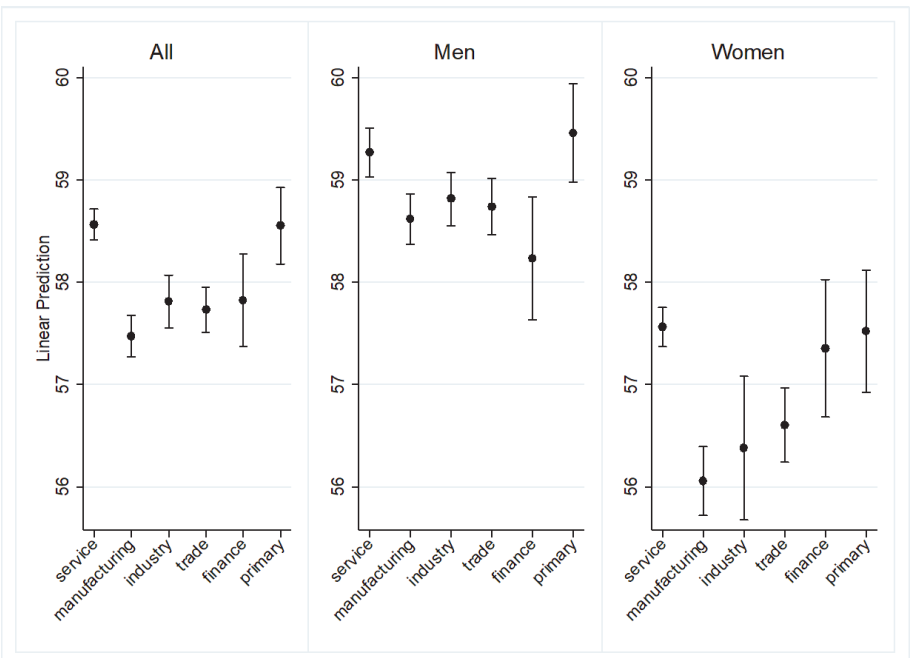
Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. All models control for economic sector, education, white-/blue-collar worker, year of birth, civil servant, country, disability pension. The pooled model also controls for gender.

In additional robustness checks, we have excluded the control for sector, accounting for its possible endogenous nature and correlation with educational attainments. The results for quality of working conditions items are similar to those reported in the paper.

Our second explanatory variable, economic sector, also reveals several significant associations with age at retirement. Figure 2 shows the predicted age at retirement by sector, calculated from predictions of the respective gender-specific fit models (shown in Table 3) at observed values in the sample of all covariates.

People who worked in the service and primary sectors were more likely to retire later than their counterparts who worked in other sectors. These results, in general confirming Hypothesis 2, hint that factors other than quality of working conditions may matter for differences with the age at retirement between economic sectors. Male workers in the financial sector are at a comparably low retirement age, whereas retirement ages of women in the financial and service sectors do not significantly differ.

Figure 2. Predicted margins of sector of employment on age at retirement on the pooled sample and by gender.



In a second step, we have analysed the association between working conditions items and age at retirement by sector. The results (Table 4) show that quality of working conditions as a factor influencing age at retirement matters more in ser-

vices, manufacturing, and industry than in the trade, financial, and primary sectors. In the latter two sectors, only freedom to decide is positively and significantly associated with age at retirement. In contrast to our initial expectation, the absence of poor working conditions in sectors where they are usually more common (such as not physically demanding jobs in manufacturing and not emotionally demanding jobs in the service sector) is not significantly related to retirement age. Instead, we have lent more support to the opposite mechanism: absence of poor working conditions in sectors where, indeed, they are not typical matters. In fact, not physically demanding jobs in the service sector and not emotionally demanding jobs in the industry show a significant positive relation with retirement age.

In the fully interacted pooled model, the effect of no conflicts on retirement age is significantly lower in manufacturing compared to services, and the effect of a good atmosphere is significantly lower in the service sector compared to manufacturing (results available from the authors on request). In comparison with the service sector, the effect of adequate support on age at retirement is significantly lower in the industrial sector. In contrast, a not emotionally demanding job and a good work atmosphere contribute significantly to higher ages at retirement in the industry compared to the service sector. Furthermore, also in comparison with trade and primary sector, a good atmosphere is associated with a lower age at retirement in the service sector. A not emotionally demanding job is significantly associated with a higher age at retirement in the industrial sector in comparison to manufacturing, trade, and finance. It is noteworthy that industry is the only sector where freedom to decide is not positively associated with a higher age at retirement (which is significantly different from the financial sector). Moreover, only in industry, adequate support is negatively and significantly associated to age at retirement, and this significantly differs from its association in services, trade, financial, and primary sectors. Not physically demanding jobs are associated with higher ages at retirement only in the service sector, where levels of physical strains are considerably lower compared with manufacturing, industry, and the primary sector.

The subsamples for men and women by sector are very small (especially for the financial and primary sectors). Therefore, we neither report nor interpret these results.

Table 4. Beta Coefficients and Standard Errors of the Quality of Working Conditions Items from Linear Regression Models on Actual Retirement Age, by Sector

	Service		Manufacturing		Industry		Trade		Finance		Primary	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Freedom to decide	0.344*	0.166	0.400*	0.200	-0.078	0.281	0.331	0.251	1.249**	0.457	0.858*	0.415
Opportunity to develop skills	0.112	0.174	0.282	0.223	0.364	0.312	-0.075	0.254	-0.392	0.576	0.659	0.458
Job not physically demanding	0.406*	0.158	0.328	0.225	-0.079	0.339	0.099	0.252	0.093	0.548	0.035	0.632
Comfortable work environment	0.296	0.194	0.330	0.225	0.748*	0.313	0.343	0.284	0.374	0.701	-0.139	0.478
Not time demanding	-0.048	0.156	0.106	0.215	-0.120	0.291	-0.128	0.248	-0.203	0.437	-0.087	0.473
Not emotionally demanding	-0.181	0.161	0.070	0.211	1.055***	0.286	0.338	0.253	-0.371	0.473	0.495	0.455
No conflicts	-0.071	0.182	-0.572*	0.238	-0.202	0.306	-0.414	0.280	0.240	0.474	-0.531	0.491
Adequate salary	-0.595***	0.161	-0.243	0.222	-0.552	0.325	-0.128	0.268	0.107	0.521	-0.542	0.453
Recognition received	0.048	0.206	-0.179	0.254	-0.136	0.351	-0.326	0.315	0.540	0.654	0.071	0.517
Adequate support	0.301	0.188	-0.112	0.249	-0.860**	0.330	0.327	0.296	0.542	0.571	0.504	0.481
Good atmosphere	-1.020**	0.321	0.255	0.424	0.429	0.560	0.298	0.479	-0.180	0.879	0.766	0.902
Fairness of treatment	0.422	0.221	0.713*	0.285	0.352	0.396	0.154	0.345	0.269	0.609	0.611	0.550
Cons	464.22***	18.46	386.55***	22.53	463.86***	32.75	488.52***	27.42	490.20***	52.49	505.23***	49.63
N	3,662		1,903		1,149		1,416		351		527	

Significance levels: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. All models control for gender, education, white-/blue-collar worker, year of birth, civil servant, country, disability pension.

Discussion

A large amount of research has examined institutional and individual factors affecting retirement intentions of older workers or individuals' retirement behaviour. Findings of this research, while being valuable, have revealed a lack of understanding of how different quality of working conditions and sector of employment are related to the actual age at retirement. Addressing this issue is important in that public pension systems are threatened by lower levels of social contributions or taxes of the active working population due to low levels of labour market participation of older people and early retirement. Prolonging employment and reducing early retirement are meant to solve these challenges in ageing societies. Yet, in order to design adequate public policies, it is necessary to shed light on the factors that contribute to higher ages at retirement.

First, the findings of this study reveal that several working conditions items are associated with higher age at retirement. In particular, freedom to decide how to do work has a strong positive association with age at retirement. This result sheds more light on the findings of Siegrist and Wahrendorf (2010) on employment at the age of 60, who also used SHARELIFE, but collapsed the quality of working conditions items into broad dimensions that possibly hided some variations. Contrary to Carr et al. (2016), who found no evidence for an association between physical or psychosocial job demands and work exit, our results indicate that there is an association between good physical and psychosocial working conditions and higher age at retirement for men. However, we could confirm that adequate salary is related to a lower age at retirement as found by Schnalzenberger et al. (2014). The finding of lower ages at retirement among those people not exposed to recurrent conflicts in their work environment might be explained by an issue of self-selection into jobs. People who select jobs with high levels of conflict may prefer them because they may offer a higher wage and are more challenging.

Different from what previous literature on retirement intentions and behaviour suggested (e.g. Carr et al., 2016; Schnalzenberger et al., 2014), our results show that quality of working conditions attributes play a bigger role in men's age at retirement than in women's. One possible explanation is that we have included more quality of working conditions items than they did. Furthermore, one should note that previous studies mainly examined retirement intentions or the probability of transition from work to retirement rather than age at retirement. As argued by Dal Bianco et al. (2015), estimates show that quality of working conditions plays a very different role when focusing on actions rather than on intentions.

We acknowledge that a wide range of birth years might hide cohort differences due to working and retirement histories under different labour market conditions and welfare state regulations. We partly accounted for this by controlling for birth year and we carried out robustness checks on subsamples defined by age tertiles as well as restricting the working sample to respondents aged 50–70. Despite the rather ro-

bust results, some working conditions attributes were associated with higher ages at retirement only for specific cohorts (i.e., not physically demanding jobs for the youngest cohort; a comfortable work environment for the middle cohort; and adequate salary for the youngest and middle cohorts, but not for the oldest one). In light of the fundamental differences in terms of values of the workers, labour market conditions and welfare state regulations for older workers, it is interesting to note that none of the working conditions attributes considered emerged to be relevant only for the oldest cohort. The result that more working conditions attributes are significantly related to age at retirement for the middle and youngest cohorts than for the oldest one may reflect a structural worsening in the (perception of) working conditions over time. Moreover, with stricter and later access to full old-age pension benefits (in times of closing early retirement routes and increasing statutory retirement ages) working conditions might become more important. Yet, given the limited sample size of the data used once stratified by birth cohorts, the interpretation of these results can only be speculative. These differences might indeed be due to generational differences, but also to sample size issues that additional analyses on possibly larger datasets might clarify.

Moreover, this study found that the sector of employment is significantly related to age at retirement. In more details, people who worked in the service and primary sector tend to retire later than their counterparts who worked in other sectors. Following De Preter et al. (2012), the earlier age at retirement in manufacturing and industry is not surprising as these sectors usually tend to experience higher competition due to globalization pressure. The decline of older workers' physical or intellectual abilities may also lead to earlier retirement there. On the contrary, older workers in the service sector are usually less confronted with similar decline in the productivity (Skirbekk, 2003). Furthermore, skilled blue-collar workers in the manufacturing and industry sectors often have access to specific early retirement schemes (Radl, 2013).

Concerning the lower age at retirement for male workers in the financial sector, however, we may think of higher private pension knowledge and provision as one of the key mediating factors (Engström & Westerberg, 2003; Wiß, 2015). However, the age at retirement of women in the financial and in the service sectors does not significantly differ. One reason could be that in the financial sector, men in senior positions (more often than women in junior or administrative positions) profit from private or occupational pension schemes, allowing them to retire earlier and compensating for public pension cuts.

Finally, when analysing the relation between working conditions items and age at retirement by sector, we note that it is not much the absence of poor working conditions in a sector to be associated with the age at retirement but rather untypical working conditions. For example, not physically demanding jobs in the service sector and not emotionally demanding jobs in the industry show a significant positive

relation with age at retirement. Furthermore, in comparison with the service sector, the association between adequate support and age at retirement in the industry is significantly lower, possibly hinting at still existing and generous early retirement schemes for high-skilled blue-collar workers in the industry (Radl, 2013) supported by strong trade unions (Visser, 2015).

Conclusion and Implications

The aim of this paper was to deepen the investigation of the relationship between quality of working conditions and age at retirement as well as to explore the role of the economic sector of employment in such association. As the main findings presented above have shown, several good working conditions attributes are significantly associated with higher age at retirement, which partly supports our first hypothesis. In line with Hypothesis 2, employees who worked in the service sector show the highest age at retirement. For age at retirement, working conditions items seem to matter more for men than for women and more for employees in services, manufacturing, and industry than for their counterparts working in other economic sectors. The varying association between working conditions items and age at retirement across sectors also confirms Hypothesis 3.

Some limitations of this study, however, should be considered. First, as for other studies based on SHARELIFE data, results are based on a sample of retirees born between 1910 and 1960 representing generations with specific working careers and values which may differ from those of currently working men and women. Yet, our robustness checks carried out on subsamples defined by age tertiles as well as restricting the working sample to respondents aged 50–70 have shown similar results. Second, SHARE does not include the full original scales of the two stress models. However, by considering each item separately, we overcame this issue. Third, by using cross-sectional retrospective data, our analyses cannot establish a causal effect.

Nevertheless, our results have some important strengths and complement previous findings. In fact, we have carried out separate analyses by gender and sector for retirement behaviour, we could account for different dimensions of quality of working conditions and we have shown the relationship between sector of employment and age at retirement net of the working conditions attributes. Moreover, we did so using a multi-country set-up that considers highly comparable data for a large number of European countries.

The results of this work have implications for future interventions and studies. The first may focus on improving quality of working conditions in order to promote a higher age at retirement, especially for lower-educated workers who often are at risk of involuntary work beyond the statutory retirement age due to financial needs (Hofäcker & Naumann, 2015). In particular, increasing freedom in work-related decisions of employees may be an effective strategy. Future research is encouraged to

investigate factors that explain different retirement ages between economic sectors beyond quality of working conditions.

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