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Working conditions and retirement: How important are HR policies in prolonging working life?**

Abstract

Human resource (HR) measures to improve job satisfaction can prolong working lives, yet there is little evidence about the size of such effect. We provide a comprehensive literature review and an analysis of the link between the length of the remaining working life of older workers and a number of indicators of job satisfaction for 12 European countries, using the panel dimension of the Survey of Health, Ageing and Retirement in Europe (SHARE). We simulate the best-case potential for HR policies to extend working lives. Results suggest that this potential is at around three additional working months. This effect is small in comparison to other policies to extend working lives.

Keywords: extended working lives, retirement, working conditions, human resource management, SHARE
(JEL: J18, J24, J26, J28, E24)

Introduction

It is a well-recognized fact that European societies are ageing and that this creates challenges for traditional welfare systems. In many countries, the financial crisis of 2007-08 and the subsequent recession exacerbated a political and financial crisis within pension systems at a time when large numbers of the post-WWII baby-boomer generation started to retire. A remedy promoted throughout Europe, and by the European Commission in particular, is to extend working lives and promote work beyond the statutory retirement age.

Poor working conditions and low job satisfaction tend to increase workers' propensity to retire (Andersen et al., 2007; Borella & Mascarola, 2009; D'Addio et al., 2010; Thorsen, 2012). In this paper, we estimate the additional time in work before

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retirement that results from greater job satisfaction. Company policy, we argue, can affect job satisfaction, which makes exploring the latter's potential for extending working lives a worthwhile endeavour. We do not claim that all working conditions seemingly connected with job satisfaction are under the purview of company policy. Many are subject to extraneous factors, such as the job insecurity resulting from economic crisis. Nonetheless, there are aspects of job satisfaction that organisations can shape, perhaps significantly, for instance, by adopting progressive age management strategies or working arrangements that promote physical and emotional wellbeing in the workplace. By way of shorthand, we refer to such practices as human resource (HR) policies, cognizant of the fact that HR entails a broader set of activities and outcomes than we are concerned with here, and whose capacity to shape wellbeing in the workplace may be mediated externally as well as internally.

The evidence that HR policy can directly influence retirement decisions, including decisions to delay retirement, however, is equivocal. Furunes et al. (2015), for instance, find that HR practices are *not* among the main reasons cited by older workers for continuing to work. And while a rich body of literature has studied the adoption of HR policies (e.g. Conen et al., 2012; Perek-Białas & Turek; 2012, Jensen & Møberg 2012; van Dalen et al.; 2014), few studies have attempted to measure the impact of the type or quality of HR policies on employee satisfaction and the subsequent propensity to extend working lives or postpone retirement. As a result, as Beehr and Bennett (2007) note, we lack a robust understanding of what organisations may be able to do to prevent losing valued employees to retirement.

The present paper contributes to this exploration of the scope for HR policy to affect employee retention through delayed retirement, utilizing longitudinal data for 12 European countries. While minimum standards for HR policies – broadly speaking – are within the purview of regulatory frameworks, such as the European Union Working Time Directive or national or industry agreements on working conditions, including on pay, health and safety standards, and leave entitlements, there is broad scope for differences in implementation at the individual workplace. We utilize this variation in measured elements of HR policies and job satisfaction to first establish a link between the two and, second, to estimate the impact of job satisfaction on the length of older workers' remaining working life.

Specifically, we examine the extent to which HR management-influenced (and influenceable) workplace practices are associated with greater job satisfaction. We then ask whether job satisfaction delays the start of retirement among older workers.

Unlike much of the literature on retirement, the present study is concerned with actual retirement behaviour rather than intentions, as the latter can be a poor predictor of the former (van Solinge & Henkens, 2013; Solem et al., 2014).

In examining the link between HR policy, job satisfaction and the act of retiring, our analyses first show a very high level of job satisfaction among older workers. While there are differences across countries, they are minor, as are variations between the different years for which data are analysed. Second, we find that job satisfaction is closely associated with the positive assessment of a range of workplace and working conditions typically within the purview of HR and business management, such as workload or pay. Third, our econometric estimations find that greater job satisfaction contributes to a delay in retirement, but the added time in work before retirement is relatively short, averaging around three additional months. In light of this evidence, we conclude that there may be very limited scope for HR policy to contribute directly to extending working lives: its main tool for doing so, namely the creation of working conditions associated with high levels of job satisfaction, appear to be already well deployed; greater job satisfaction among (older) workers would – on average – add little in terms of delaying retirement.

The rest of the article is organised as follows: section II discusses relevant literature, followed by a description of the data sources and research method (section III). Section IV provides the main results, while section V concludes and provides a discussion of the findings.

A Review of the Literature

Measuring Workplace Satisfaction and the Link to Work Conditions

An effective HR policy that motivates, trains and retains low-skilled and older workers in particular has many dimensions, which are not easily codified or measurable. Effective HR policies have some degree of personalisation, further complicating the measurement of HR policies as an *entity.* In light of this challenge, the focus of our study is on examining *outcome indicators* of HR management policies, namely satisfaction with working conditions measured along several dimensions as well as overall job satisfaction. The selection of indicators is informed and to a large extent guided by the available data. The present study analyses the Survey of Health, Ageing and Retirement in Europe (SHARE), which contains data on a number of relevant indicators of workplace conditions, notably:

- a physically demanding workload;
- the experience of time pressure at work;
- job autonomy;
- the availability of support in difficult situations;
- recognition;
- perceived adequacy of salary;

- promotion prospects and
- job security.

Before turning to the empirical analysis, the following section presents an overview of relevant literature that provides incremental evidence of the link between retirement decisions and workplace conditions.

Job Satisfaction - the Dependent and Independent Variable

Several studies find a positive effect of job satisfaction on later retirement and delayed labour market exit. Examples include longitudinal studies by von Bonsdorff et al. (2010) and Krause et al. (1997), conducted in Finland. Undertaking a meta-analysis of 99 empirical studies of retirement decisions of retirees and older workers published between 1978 and 2007, Topa et al. (2009) conclude that working conditions and job satisfaction inversely affect retirement decisions.

Based on US data, Wang et al. (2008) find that job satisfaction is positively associated with bridge employment rather than full retirement. Mein et al. (2000) identify positive and statistically significant associations of high job satisfaction and later retirement for male and female British civil servants, as do Kubicek et al. (2010) for married Wisconsinites. Interviewing older employees in a US state government, Beehr et al. (2000) find that several work-related factors, including those captured perhaps somewhat ambiguously as "being tired of working", each markedly affected estimated expected retirement ages.

Job Demands

Krause et al. (1997) find heavy physical work to be positively associated with labour market exit via disability retirement, while von Bonsdorff et al. (2010) find that physically demanding work has weaker effects on early retirement intentions than mentally demanding work. Further, in a study of Spanish nurses aged over 50 years, Burke et al. (2012) show a positive and statistically significant association between job demands (and emotional demands) and retirement intentions. Similarly, in a Belgian study, Schreurs et al. (2011) describe a link between physically demanding work and labour market exit using structural equation modelling; they find that job demands (measured in terms of workload and problems with change) positively affect the need for recovery, which in turn positively affects early retirement intention. Similarly, research on Polish blue-collar workers aged over 45 years, but under the statutory retirement age (for men 65 years; women 60 years) shows heavy lifting at work to be associated with an increased probability of early retirement (Szubert & Sobala, 2005). Finally, in a cohort study of employees of the city of Helsinki, Lahelma et al. (2012) report evidence of physical workload associated with musculoskeletal disease leading to labour market exit via the social security disability scheme.

Not all evidence, however, points to demanding working conditions making retirement intentions or retirement itself more likely. Contrasting evidence is provided by Carr et al. (2016) for the UK, who find no evidence of physical job demands affecting work exit. Similarly, using Dutch data, Henkens and Leenders (2010) conclude that jobs deemed by workers to be physically demanding do not necessarily affect early retirement intentions, as they are often mediated by personal contexts, in this instance, marriage quality. Other qualifying studies include that of Blekesaune and Solem (2003), who find a positive association between hard physical work and early retirement in Norway for women but not for men.

Time Pressure and Work-related Stress

Several studies have looked at the link between work stress and retirement. Using a sample study of 15,045 older workers surveyed in Europe, Fleischmann et al. (2013), for instance, show a positive and significant association between autonomy over work pace and labour market participation (i.e. being in work or unemployed rather than retired). Burke at el. (2012) show a positive (and statistically significant) association between work overload and early retirement intentions in Spain, while in the United States Wang et al. (2008) identify strong negative effects of subjective work stress on the probability of bridge employment, whereby older workers leave their career jobs for alternative, typically part-time work instead of opting for full retirement.

Yet, again, the evidence is equivocal. For instance, the job demand index of Mein et al. (2000) (where two out of four variables cover time pressure) reveals no effect on early retirement for men or women. Similarly, in a Dutch Panel study, van Solinge and Henkens (2013) find effects of job pressure on early retirement intentions, but not actual early retirement. Similarly, Carr et al. (2016) find no evidence of 'psychosocial demands' (defined as fast work and time pressure) affecting labour market exit in England.

Job Autonomy ("Freedom to Decide How I Do My Work")

Related to time pressure experienced in the workplace is job autonomy and the ability to regulate one's workload. Several studies have identified a connection between job control and retirement intentions and/or early retirement, including Elovainio et al. (2005) studying Finnish workers, Schreurs et al. (2011) in their study of Belgian workers; Carr et al. (2016) examining the English Longitudinal Study of Ageing; and Lunau et al. (2013) using data from 13 European countries.

A few studies, however, have failed to find a clear link between job autonomy and retirement (e.g. Henkens and Leenders, 2010), although small case numbers may have been responsible in at least some instances (for example, Beehr et al., 2000; Shacklock and Brunetto, 2008).

Support In Difficult Situations

Pressures at work may be mediated by making appropriate support available or by sharing on-the-job responsibilities, but current evidence suggests little effect on preferences for retirement or retention. The studies by Van Solinge and Henkens (2013), Carr et al. (2016) and Lehalma et al. (2012) identify only weak relationships that dissipate as confounding factors, such as psychosocial demands, physical health or decision authority, are controlled for.

Procedural Justice: Remuneration and Promotion

Whilst absolute pay level may only have a marginal influence on job satisfaction and, hence, the desire to remain working rather than to retire, perceptions of inequity may affect retirement preferences more strongly. The former was illustrated in the meta-analysis by Judge et al. (2010) that reviewed evidence of the link between pay levels and job satisfaction reported in 92 studies published between 1990 and 2007.

By contrast, the survey analysis by Lunau et al. (2013) of older workers in 13 European countries concludes that perceived effort-reward imbalances in the workplace increase the risk of depression, which, in turn, increases workers' propensity to retire early. Conversely, van Solinge and Henkens (2013) show that anticipating opportunities for promotion, and professional/occupational or personal development, all contribute to delayed retirement.

Research Methods

The Data

Our data source is the Survey of Health, Ageing and Retirement in Europe (SHARE). It is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks of approximately 120,000 individuals (more than 297,000 interviews) from 27 European countries (and Israel) aged 50 or older. We use data from wave 1 (2004), 2 (2006/7), 4 (2010/11), 5 (2013) and 6 (2015) for 12 countries that were covered in multiple waves.[1] Table 1 gives an overview of the questions asked on job satisfaction and working conditions in each of the four waves.

Each of these questions measures different domains susceptible to or shaped by what in this paper we generically refer to as HR or work place management policies and practices. For example, agreement or otherwise with the statement that "My job is physically demanding" describes the type of work the survey respondents undertake. But it is also an expression and outcome of operational business decisions to alleviate physically demanding activities, such as via process automation or modi-

1 Wave 3 (SHARELIFE) has a different format from the other waves and our main questions of interest were not asked.

fication of work intensity. Likewise, responses to "I am under constant time pressure due to a heavy workload" are indicative to the extent that job content is – or is not – experienced as well-tailored to the individual's abilities and that workers receive adequate support to perform their jobs. The same applies, with greater clarity, to the other descriptors captured by the statements in Table 1. Capacity to decide on how one does one's work, training and development opportunities, recognition, remuneration, and promotion opportunities are ultimately within the realm and responsibility of corporate and, typically, HR practices, whilst 'support in difficult situations' reflects more immediate collegial and supervisory relationships as well as higher-level HR policy.

Table 1. Questions and statements on job satisfaction from the SHARE survey

Question number	*Question or statement*
EP026	All things considered, I am satisfied with my job.
EP027	My job is physically demanding.
EP028	I am under constant time pressure due to a heavy workload.
EP029	I have very little freedom to decide how I do my work.
EP030	I have an opportunity to develop new skills.
EP031	I receive adequate support in difficult situations.
EP032	I receive the recognition I deserve for my work.
EP033	Considering all my efforts and achievements, my [salary is/earnings are] adequate.
EP034	My [job promotion prospects/prospects for job advancement] are poor.
EP035	My job security is poor.
Following the questions the respondent is asked: "Would you say you strongly agree, agree, disagree or strongly disagree?"	

Note: Questions are identical in all SHARE waves.

Question EP026 of SHARE, which asked respondents to indicate their level of agreement or disagreement with the statement that "All things considered, I am satisfied with my job", shown at the top of Table 1, serves as an aggregate measure of job satisfaction and an explanatory variable of interest in explaining length of working lives in our analysis.

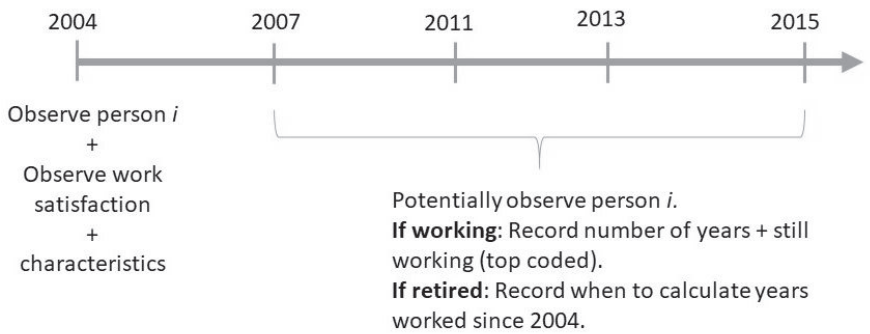
Data Preparation

SHARE records responses to questions on the presence of these conditions on a four-point Likert scale: strongly agree, agree, disagree, and strongly disagree.

The longitudinal dimension of SHARE is important for determining the link between working conditions and future retirement. Our sample is constructed by linking working conditions in the wave when an individual is first observed to the retirement status of the same individual in the wave in which the person is last ob-

served. If the person retired in the last wave of observation, we further observe the year of retirement (Figure 1).

Figure 1. Constructing the data set from 5 waves of SHARE surveys.



For the individuals who are still working in the last wave in which they are observed, we cannot know the exact length of the remaining working life before retirement. For such individuals, length of working life is top coded. Note that top coding occurs at different values. An individual interviewed in 2004 and again in 2007 when he or she was still working but then is not interviewed again will have a top-coded observation of length of working life (since first interview) of three years. Another individual first interviewed in 2004 and still working in 2015 will have a top-coded value of 11 years.

This procedure leaves us with a data set that is derived from longitudinal data but has the structure of a cross-sectional data set with one observation per individual containing (among other variables) year, age when first observed, number of years worked between first and last wave the individual was observed and an indicator of whether the observation is top coded (i.e. the individual is still working when last observed). In addition, each observation contains overall job satisfaction, responses to questions on working conditions, and a list of other time invariant characteristics such as gender, and level of educational attainment.

Econometric Approach

The premise for our analysis is that good HR policies (on the dimensions we are measuring) influence responses to the questions on working conditions (EP027 to EP035 in Table 1), which in turn affect overall job satisfaction (WP026). Confirming this link in the data constitutes a first test of our results. Thus, we first estimate a simple ordered logistic regression model of the relationship between overall job satisfaction and individual HR policy domains (Cameron & Trivedi, 2005). We do

this for the pooled sample of observations over the five waves, and for both high and low-skilled older workers.

Apart from providing a test of the usefulness of the data, a close mapping of working conditions in relation to overall job satisfaction also allows us to reduce the dimensionality of the analysis of working conditions and length of working lives; instead of looking at the impact on length of working lives of each item of working conditions, we can look at the impact of overall job satisfaction alone.

Job Satisfaction and Length of Working Life

Consider first the following econometric model where the number of years worked since year *tstart,* measured at year *t*, $\text{yearsw}(t, t_{start})$, is related to job satisfaction (measured at *tstart*), $wsat(t_{start})$, and other controls:

$$\text{yearsw}(t, t_{start})_i = wsat(t_{start})_i + \beta X_i + \varepsilon_i (1)$$

Number of years worked has a maximum value of $t - tstart$. Estimating (1) with ordinary least squares regression is potentially subject to bias if the probability of observing a top-coded outcome depends on the explanatory variables of interest. This is likely to be the case in our application because a priori we would expect people who are more satisfied with their working conditions to work longer and hence be more likely to be observed as top coded in our data set. While we clearly acknowledge this, and take it into account in our econometric specification below, we *also* argue – based on descriptive statistics – that this bias is not large in our sample.

In order to account for the top-coded nature of the data, one can employ a technique that controls for this 'selection' into top coding. We use a modified tobit approach for this (Wooldridge, 2009; Roodman, 2009). The modified tobit model in principle adjusts the estimates for the observations that are top coded. The standard critique of the tobit model relying on the same parameterisation for the selection part as for the part used for the point estimates apply in equal measure here. A maximum likelihood approach is used to estimate the model. Specifically, the log likelihood takes the following form:

$$(2)\ \text{LnL} = -\tfrac{1}{2}\sum_{\text{i} \in \text{yearsw} < (\text{t} - \text{t}_{\text{start}})} \left\{ \left(\frac{\text{yearsw} - \text{wsat} - \beta\text{X}}{\sigma} \right) - \log\left(2\pi\sigma^2\right) \right\} + \sum_{i \in yearsw = (t - t_{start})} log\left\{ 1 - \Phi\left(\frac{yearsw - wsat - \beta X}{\sigma} \right) \right\}$$
$$\varepsilon \sim \text{N}\left(0, \sigma^2 \bullet \text{I}\right)$$

The contribution to the likelihood function for observations where length of working life is observed (i.e. not top coded) is standard (first term) and for the top-coded observations (second term) equal to drawing an error term in the (normalised) interval $yearsw - wsat - \beta X$, where *yearsw* is the value for which top coding applies. Note that the top-coding value is observation-specific because it depends on

the time between observations, which will depend on which wave the individual was first interviewed and in which wave he or she was last interviewed.

The full sample available for the analysis contains around 20,000 observations of individuals aged 50 to 64 years who were in employment when first interviewed, and were interviewed in at least one later wave.

The final step of our analysis is to construct an estimate of the maximum potential gain in employment from increasing all workers' job satisfaction to the maximum value. Given parameter estimates from equation (2) and individual-level characteristics, the number of potential years of employment is calculated and compared to the actual number of years observed.

Results

Link Between Work Conditions and Job Satisfaction

Our first step is to show that there is a link between the individual HR policy domains and overall job satisfaction. This step is important to sustain our line of argument. If overall job satisfaction is not strongly related to the individual HR policy domains, it is difficult to argue that we can capture better HR management as changes in overall job satisfaction.

To investigate the association between the individual domains of human resource policy and overall job satisfaction, we pool all five waves of SHARE data (wave 1, 2, 4, 5 and 6) where these questions were asked of employees. To account for the ordinal nature of the job satisfaction question, an ordered logistic model explaining overall job satisfaction is estimated. For this purpose, statements querying negative experiences (e.g. "My job security is poor") were inverted to reflect (agreement with) positive work experiences or workplace condition (e.g. "I receive the recognition I deserve for my work"). Each categorical explanatory variable enters as a factor variable in order to allow maximum flexibility in the specification. We estimated nine different models with variations in the number of other control variables included (age, country, gender and educational attainment).[2] In all models the coefficients, except for those corresponding to promotion opportunity, have the right ordering: the more positive the respondent is on a specific HR outcome, the greater the general job satisfaction.

Amongst our cohort of interest, those aged 50 to 54 years, these associations were the strongest with respect to employees' experience of time pressure at work, freedom to decide how to do their work, being supported in difficult work situations, and job security. Those reporting positively about these conditions were statistically significantly more likely also to report higher job satisfaction than were those reporting negatively about these conditions. The odds of overall job satisfaction also

2 Detailed results are available from the authors upon request.

increased with greater opportunity to develop new skills, greater recognition in the workplace and the perception that the salary received was adequate. In these instances, however, the main statistical divide was between those employees reporting 'very' negative experiences (i.e. "very strongly" agreeing to a negative statement, or "very strongly" disagreeing with a positive statement) and all others, with odds increasing with each unit change. In contrast, assessments of the physical demands of a job and of prospects for job advancement were not associated with overall job satisfaction.

The model also performs well in terms of being able to generate a distribution of job satisfaction that is very close to the sample distribution (Table 2).

Table 2. Distribution of job satisfaction in the sample and predicted job satisfaction (%)

	Full sample		Low skilled (ISCED 0-3)		High skilled (ISCED 4-6)		Predicted all HR components "Very satisfied"
	Sample	Predicted	Sample	Predicted	Sample	Predicted	Predicted
Very satisfied	40.8	40.4	37.2	36.9	48.7	47.9	97.8
Satisfied	50.6	50.9	53.6	53.6	44.3	44.9	2.3
Dissatisfied	6.7	6.8	7.0	7.1	5.9	6.0	0.0
Very dissatisfied	2	1.9	2.3	2.3	1.1	1.1	0.0

Notes: Pooled sample of employed individuals (50-64 y/o) in SHARE waves 1, 2, 4, 5 and 6. Predictions based on ordered logistic regression of level of job satisfaction on individual elements of work conditions as listed in Table 1. Last column indicates predicted distribution of job satisfaction if every individual had maximum satisfaction on all work conditions as listed in Table 1. All regressions include controls for country, gender and age. Pseudo R^2 = 0.15 with N= 40,533 for the full sample. Detailed results are available upon request.

Job satisfaction levels are generally high; more than 90 per cent of our full sample, and the sub-samples of low or high skilled employees state that they are satisfied or very satisfied with their job. This also holds across individual waves of data. Our model predicts that, if every individual had rated each of their working conditions at the highest positive level of satisfaction, 98 per cent of them would described themselves as very satisfied with their job overall.

Despite the apparent statistical association between job satisfactions and most work conditions, we cannot rule out potential confounder bias affecting the observed associations. Both job satisfaction and workplace conditions could be mediated by unidentified third factors with the effect of distorting the true relationship that we seek to measure. Examples would be personal affinity to (dislike of) work colleagues or the employer, which may increase (decrease) job satisfaction and also lead to higher (lower) ratings of workplace conditions. In the absence of theoretically and empirically tested, robust instrumental variables to control for any such confounding, we use socio-demographic control variables to mitigate the effect. Insofar as our reported estimates of the additional years in work that may result from greater job

satisfaction (and subjectively better work conditions) remain subject to confounder bias, they are most likely depressed by the observed increase in job satisfaction among the oldest sections of older workers, i.e. those closest to or indeed beyond the statutory retirement age. The estimates are, hence, most likely upper bounds for what is achievable in terms of working life extension through improvements in workplace conditions and associated job satisfaction.

Job Satisfaction and Working Longer: Descriptive Statistics

Before turning to the formal econometric results, it is instructive to consider some other descriptive statistics. Table 3, Panel A, shows a stronger tendency to be satisfied or very satisfied with the job the older the individual, with higher levels of satisfaction observed among the higher skilled. Correspondingly, the older the worker, the less inclined he or she is to retire "as early as possible" (Table 3, Panel B). The two phenomena are connected since, although job satisfaction is known to increase with age (e.g. Clark et al., 1996), it is also mediated by confounding factors, such as rising remuneration, workplace status and older workers' capacity to secure jobs they find fulfilling (Riza et al., 2016; Boumans et al., 2011) – all factors affected by workplace management. The lower propensity of older workers, especially those that have passed the statutory retirement age, to wish to retire 'a.s.a.p.' likely reflects the fact that many who would have expressed this preference in previous years have indeed already done so, while factors, such as financial need, may explain that some continue to work (Miller & Nyce, 2014), especially lower-skilled workers and, within that group, those aged 65 to 69.

These statistics are indicative of the size of effect that we may expect from better HR policies. To further investigate potential differences, we look at the employed individuals from wave 1 who were also observed in later waves (Table 3, Panel C). Most information is contained for individuals interviewed in both wave 1 (2004) and wave 5 (2015), and therefore observed for the longest time span.

Taking the group of high-skilled 50 to 54 year olds as an example, 1.7 additional years in work (9.5 years – 7.8 years; see top left corner) can be obtained, on average, if everyone currently dissatisfied with their workplace could be 'transitioned' to becoming very satisfied. This would indicate a marked change, but it would only apply to 7 percent of employed people in this age group (see Panel A).

Panel C of Table 3 does not tell the full story because some people were still working in 2015 and, hence, will end up working longer than the recorded 11 years (i.e. their observation is top coded at 11 years in our data set). This is the case for around 50 percent of the sample, and more prevalent among high-skilled than low-skilled workers. The difference in the percentage of top-coded observations among those who *strongly* agree that they are satisfied with their work and those who merely *agree* is small, in particular in the younger age groups (not reported). This sug-

gests that the two categories may be treated as one, and comparison focussed on those either agreeing or disagreeing with the statement.

Table 3. Work satisfaction and wish to retire 'as early as possible' (in %) and number of years worked, by age groups and educational attainment.

Panel A: Work statisfaction (%)	**High-skilled (ISCED 0-3)**					**Low-skilled (ISCED 4-6)**				
Satisfied with main job?	**50-54**	**55-59**	**60-64**	**65-69**	**70-74**	**50-54**	**55-59**	**60-64**	**65-69**	**70-74**
Strongly agree	48	48	58	74	77	35	37	46	49	70
Agree	44	45	38	24	17	55	54	47	44	28
Disagree	6	6	4	1	6	7	5	5	5	1
Strongly disagree	1	1	0	1	.	3	2	2	3	1
Panel B: Retire 'as early as possible' (%)										
Strongly agree	32	33	21	11	11	43	43	36	26	5
Agree	52	44	38	19	35	55	61	55	36	57
Panel C: Mean number of years worked between 2004 and 2015 (years)										
Strongly agree	9.5	6.2	3.3	3.0		8.6	5.5	3.0	1.5	
Agree	9.3	5.5	4.0			8.4	5.5	3.4		
Disagree	7.8	6.8				8.2	5.8			
Strongly disagree										

Notes: Data are from SHARE waves 1, 2, 4 and 5. Cells with less than 20 observations are not shown in Panel A. Only answers 'strongly agree' and 'agree' included in Panel B. Panel C: only individuals observed in 2004 and 2015.

Effect of Job Satisfaction on Length of Working Lives

We now return to the fuller econometric treatment of the effect of job satisfaction on length of working lives. Our base regression relates the number of years worked since the first interview (*wave 1 only*) to job satisfaction. Because of the small number of individuals stating '*strong* disagreement' with the statement that they are satisfied with their job, we collapse the categories of strong and simple disagreement. For simplicity, we refer to those agreeing with the statement that they are 'satisfied' or 'very satisfied' with their job, and those disagreeing with those who state they are 'unsatisfied'.

In our analyses, we control for gender, country, age and education (measured on a three-point scale using the International Standard Classification of Education, ISCED 0-2, ISCED 3-4 and ISCED 5+).[3] Table 4 presents the results from estimating different variants of equation 2. The main coefficients of interest are `satisfied' and `unsatisfied', with 'very satisfied' being the base category. We vary two important characteristics of the regression, which serves as a sensitivity test for our

3 ISCED 0-2 = early childhood education, primary education and lower secondary education; ISCED 3-4 = upper secondary and post-secondary non-tertiary education; ISCED 5-8 = short-cycle tertiary education, Bachelor or equivalent level education, Master or equivalent level, Doctoral or equivalent level.

study. First, we study two age groups, namely all those aged 50 to 64 years in 2004 and thus still below the age at which retirement becomes an option; and then only those aged 50 to 54. We analyse the latter, younger age group separately because it is least likely to be influenced by potential sample selection issues whereby older individuals retire due to poor working conditions even before we are able to observe them. The employment rate for 50 to 54 year olds is high in the countries studied, hence the sample is not subject to this form of sample selection.

Second, we vary the survey waves included in the estimation. Using only wave 1, the estimates should be the least sensitive to top coding because individuals are observed for the longest period and the share of top-coded observations will be smaller. Adding data from later waves increases the overall sample as it introduces 'new' workers that turn 50 years of age in that survey year. But these 'new' workers are also less likely to retire within the observation period, for the simple reason that they are younger and further away from any statutory retirement age. As a result, most observations for workers entering the respective age categories in 2013, i.e. from wave 5, will be top coded since very few of them will have retired in the two years prior to the final wave of data collection (wave 6 in 2015) available to this study.

Overall coefficient estimates are reasonably similar across the six specifications. Moving from being 'satisfied' to 'very satisfied' has no statistically significant effect on the length of working lives, except for the 50 to 64 year groups of workers drawn from waves 1 and 2 of SHARE (in regression 5). Stronger and consistently statistically significant effects, however, are observed for job dissatisfaction compared with job satisfaction. Older workers aged 50 to 54 and expressing dissatisfaction with their job tend to work between four-fifths and one year less than workers in the same age group that are 'very satisfied' with their job (regressions 1 to 3). The gap is a little smaller for all workers aged 50 to 64 drawn from the various waves (regressions 4 to 6), ranging from 0.53 to 0.60 years after controlling for country, age and educational attainment. A gender effect is observed for workers aged 50 to 64 years in waves 1 or 2 (regression 5): women tend, on average, to work 0.22 fewer years than men, all else being equal. The smaller coefficient for the larger sample of 50 to 64 years olds is expected since the additional year effect should be smaller the older the worker.[4]

Conversely, to reflect the focus of our investigation, an increase in job satisfaction, specifically a switch from dissatisfaction to satisfaction, is associated with a longer duration of employment as people approach – and eventually enter – retirement.

4 As a further robustness check, we performed a rolling regression by successively including data for 2-year age cohorts between the ages of 50 and 65. These showed that estimated coefficients become smaller in absolute size as older and older workers are included. Full results are available on request.

Table 4. Regression of years spent in work, for two age groups drawn from different SHARE survey waves, full country sample.

	1	2	3	4	5	6
Age group	50-54	50-54	50-54	50-64	50-64	50-64
Waves included	1	1, 2	1, 2, 4,5	1	1, 2	1, 2, 4, 5
Very satisfied (base)						
Satisfied	0.03	-0.29	-0.01	-0.08	-0.22**	-0.09
	(0.20)	(0.17)	(0.15)	(0.10)	(0.08)	(0.07)
Unsatisfied / very unsat.	-0.77*	-0.82**	-1.00***	-0.57**	-0.53***	-0.60***
	(0.32)	(0.27)	(0.24)	(0.18)	(0.15)	(0.12)
Female	-0.08	-0.09	0.22	-0.19	-0.22**	-0.08
	(0.19)	(0.16)	(0.14)	(0.10)	(0.08)	(0.07)
Constant	8.62***	8.80***	10.7***	9.22***	9.17***	9.99***
	(0.58)	(0.54)	(0.43)	(0.37)	(0.32)	(0.23)
$\ln(\sigma^2)$	1.29***	1.30***	1.33***	1.12***	1.11***	1.10***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
LR χ^2	781.73	1108.41	2024.65	3506.33	5001.63	7286.68
(df)	(20)	(22)	(25)	(30)	(32)	(35)
Observations	2757	4270	7813	5907	8823	15978

Note: Results from interval regressions as specified in equation (2) in the main text. Sample weights applied. Standard errors in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001. An individual occurs only once with the longest observed spell (e.g. maximum spell 11 years from 2004 to 2015; shortest spell 2 years, for instance from 2011 to 2013, or 2013 to 2015). All regressions control for country, age group and educational attainment. 'Waves included' refers to the wave(s) where an individual was first intervied. Age group refers to the age group considered when first interviewed. All p-values from reported likelihood ratio test are smaller than 0.000.

Variations by Gender and Qualification

This association appears to be particularly strong for women and workers with higher educational qualifications, yet does not apply to the same extent to men and the lower qualified (Table 5). To demonstrate this, we re-estimate our base model for men, women, and workers with higher or lower educational qualifications separately, using the broader sample of 50-to-64-year olds in wave 1 or wave 2 of SHARE to increase the number of observations. Results overall are in line with those of Table 4, but whereas the earlier estimations had shown the coefficients of interest to be fairly stable over specifications, we now observe some interesting differences between men and women, and workers with high or low levels of education. The effect on the number of additional years worked when moving from being 'unsatisfied/very unsatisfied' to 'very satisfied' is higher for women than for men (0.8 years against 0.2 years). The difference is greater for different levels of education because those with higher levels of education and dissatisfied with their job work 1.3 fewer years than those satisfied with their job, compared to only 0.3 fewer years for those

with lower levels of education. However, only the year differences for women and higher educated workers are statistically significant. This suggests that job satisfaction is more important to the retirement decision of higher educated individuals, in particular for women.

Table 5. Regression of years spent in work, for gender and level of education, age group 50-64 year drawn from SHARE survey waves 1 and 2, full country sample.

	Base	Female	Male	Low educ	High educ
Age group	50-64	50-64	50-64	50-64	50-64
Very satisfied (base)					
Satisfied	-0.22**	-0.22	-0.17	-0.22*	-0.23
	(0.08)	(0.12)	(0.11)	(0.10)	(0.13)
Unsatisfied / very unsatisfied	-0.53***	-0.78***	-0.20	-0.28	-1.28***
	(0.15)	(0.21)	(0.21)	(0.18)	(0.27)
Constant	9.02***	8.59***	8.86***	8.23***	11.0***
	(0.29)	(0.41)	(0.39)	(0.34)	(0.51)
$\ln(\sigma^2)$	1.11***	1.07***	1.11***	1.11***	1.09***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
LR χ^2	5001.63	2586.41	2677.14	3060.91	2052.29
(df)	(32)	(31)	(31)	(30)	(30)
Observations	8823	4037	4786	5563	3260

Note: Results from interval regressions as specified in equation (2) in the main text. Sample weights applied. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Only wave 1 and 2 are used as starting points for employment spells. An individual occurs only once with the longest observed spell (e.g. maximum spell 11 years from 2004 to 2015; shortest spell 2 years, for instance, from 2011 to 2013, or 2013 to 2015.). Regressions control for gender and education (where relevant), country and age. 'Base' specification is equivalent to Table 4, specification 2. Age group refers to the age group considered when first interviewed. All p-values from reported likelihood ratio test are smaller than 0.000.

Country Variations

The number of observations, in particular in the age groups relevant to our study, is too small to allow a full country-by-country investigation. However, country-specific analysis was done for the countries with more than 500 observations for the age group 50 to 59 across all waves (not reported).[5] Estimated coefficients are remarkably stable, although rarely significant. If anything, they tend to be smaller than our baseline specification. This is likely because we include older workers up to the age of 59 year in wave 1 or 2 (rather than just 54 years) in order to increase the number of observations for a more robust analysis. As a result of this inclusion of workers of a higher average age, the number of additional years that a person may spend in work naturally decreases in the aggregate estimation. Nonetheless, the country-spe-

5 Countries include: Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Switzerland, Belgium and the Czech Republic. Detailed results are available upon request.

cific results provide confidence in the magnitude of the effects found in the base regression.

Estimating Additional Years in Work

The regression results can be used to estimate the additional number of years that we would expect a worker to spend in employment as a result of greater job satisfaction. The baseline for this estimation is the age group of 50 to 54 year olds with the coefficients coming from regression (2) in Table 4. First, for each individual in the sample, the number of years worked after the age of 50-54 is predicted using the baseline regression. The rating 'very satisfied' is assigned to every individual – keeping other characteristics fixed – and the number of years in work is again predicted using the same coefficients as in step 1 and retaining all other individual-level characteristics.

Table 6 shows the total combined effect for the full sample as well as country-specific effects (based on country-specific regressions). The effect when using the full sample is 0.2 years, that is, increasing job satisfaction to its highest level would add approximately two and a half months *on average* to the expected working life of a 50- to 54-year-old. The small average – or aggregate – effect comes from the combination of two factors: only a small share of the workforce is dissatisfied with their job (cf. Table 3) and the effect of increasing job satisfaction from 'good' to 'very good' is rather small at the individual level.

Looking across countries the effect is small and stable, suggesting that the overall results are not driven by one or two countries. None of the individual country-level effects are statistically significant due to the small sample sizes, hence we do not emphasize them.

Table 6. Effects on length of working life from optimal HR policies

Sample:	Full	AT	DE	SE	NL	ES	IT	FR	DK	CH	BE	CZ
Age group:	50-54	50-59										
	Number of additional working years:											
Estimated	10.5	6.5	9.5	10.8	10.1	10.4	8.3	7.5	10.4	10.0	7.6	6.8
Counterfactual	10.7	6.8	9.9	11.1	10.5	9.8	8.2	7.6	10.5	10.2	7.6	7.1
Difference	0.2	0.3	0.4	0.3	0.4	-0.5	-0.1	0.1	0.2	0.1	-0.0	0.4
Sample size	4270	830	535	768	860	621	645	1414	981	978	1337	874

Source: Authors' calculation based on country specific regressions (detailed results available upon request). Age group refers to age when first interviewed. 'Estimated' denotes the estimated average number of working years for the relevant age group given observable characteristics. 'Counterfactual' refers to the predicted number of years worked if all individual are *assigned* 'very satisfied' with their job.

More generally, the results are in line with Beehr et al. (2000, p. 219) who found that "a larger number of the non-work variables (five of eight) predicted retirement

age than work-related variables (one of seven). In other words, more elements of life outside the workplace were predictors of the retirement criterion than attitudes and perceptions about the workplace itself". Retirement decisions may thus be driven less by what happens in the workplace than by what happens in the personal life of workers and their home.

Conclusion and Implications

This paper has presented new evidence of the link between workplace and working conditions typically under the purview of HR policy on the one hand, and job satisfaction and associated retirement behaviour on the other. Its sobering conclusion is that, while job satisfaction among older workers is at a high level, the currently typical timing of retirement among highly and less job-satisfied older workers suggests little scope for extending working lives through higher job satisfaction. Insofar as we were able to demonstrate the link between job satisfaction and specific workplace and working conditions, there would also appear to be little room for HR to incentivise delayed retirement by furthering a better (or 'even better') working environment. Our estimation suggests that *hypothetically* increasing job satisfaction of 50- to 54-year-old workers to its highest possible level would extend working lives by just three months on average. Yet even these three months may be difficult to achieve if "the nature of the work itself" (Saari & Judge 2004, p. 397) or dispositional influences stable within persons across jobs are the most important determinants of job satisfaction. Neither may be within the influence of employers to change.

Retirement decisions are the results of complex and multifaceted considerations, options and opportunities, as well as unforeseen events, ranging from the personal (e.g. suddenly deteriorating health) to the collective (e.g. business closure). Moreover, retirement decisions continue to be largely framed by legislation, the presence and the extent of the 'enforcement' of statutory retirement ages (van Dalen et al., 2014). A loosening of such regulations, such as the abolition of the default retirement age in the UK and previously the US may, however, lead to change in retirement and, importantly, employer hiring behaviour, with potentially far-reaching implications for the structure of the labour market for older workers (Lain, 2012).

Raising the statutory retirement age may be a more effective measure for extending working lives. Simulations of the impact of the increase in the statutory retirement age by two years from age 65 to age 67 in Germany concluded that this change would delay retirement by 10.8 months (Fehr et al., 2010) or 9 months (Berkel & Börsch-Supan, 2004). For the Netherlands, raising the legal retirement age by two years for public sector workers is also expected to delay retirement by 10.8 months (de Grip et al., 2013). For Spain, raising the early retirement age from 60 to 63 and the statutory retirement age from 65 to 68 years is expected to delay retirement by 20 months (Díaz-Giménez & Díaz-Saavedra, 2009). In the US, an increase of the

normal retirement age by two years delayed retirement by one year (Mastrubuoni, 2006). In contrast to these stronger effects, a reform package proposed for Finland, which includes entry ages to regular pension raised by two years alongside greater access to part-time pensions, was estimated to delay retirement by just six months (Määtänen 2014).

Estimates of this kind are necessarily diverse and uncertain, but suggest that the potential effects of HR measures are, given a choice of alternative tools, comparatively small. Of course, this should not deter efforts to create better and more age-friendly workplaces.

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