**Effects of increasing retirement age on mental health of older workers in the context of working conditions**

**Abstract for the EuHEA Conference 2024**

***Objectives***

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

Several studies have attempted to analyze the effects of pension reforms on the mental health of older workers, with most suggesting adverse effects that escalate with a greater work horizon increase (Serrano-Alarcón et al., 2023; Bertoni et al., 2022; Carrino et al., 2020; de Grip, 2009). Conversely, an extended retirement horizon may also encourage businesses to invest in the skills of senior workers to retain them in employment (Hairault et al., 2010) and adapt jobs to their skills (Miranti and Li, 2020), potentially benefiting their mental health. Older workers may also adopt healthier behaviors anticipating an extended work horizon, as found by Bertoni et al., 2018 for the 2004 Italian pension reform. On the contrary, Bauer and Eichenberger, 2021 illustrate this by showing that lowering the legal retirement age from 65 to 60 in the Swiss construction sector led to a 33% increase in sick leave between ages 56 and 60.

The literature debate on well-being and mental health throughout the life cycle reveals diverse patterns – U-shape, inverse U-shape, and other relationships (Bell, 2014; Frijters and Beatton, 2012; Blanchflower and Oswald, 2008), suggesting that the end of the career is not universally understood across countries, depending on retirement systems and senior employment policies. However, to the best of our knowledge, multi-country studies on the effects of pension reforms on mental health are scarce, with Bertoni et al., 2022 being a notable exception.

Notably, many authors find heterogeneous effects depending on working conditions, such as increased depression in jobs with a high risk of automation (Bertoni et al., 2022) and elevated depression for women in lower occupational grades with high-strain jobs (Carrino et al., 2020). Other authors have also demonstrated this relationship between working conditions and mental health, highlighting lower-grade high-strain, and physically demanding (Belloni et al., 2022; Shai, 2018; Henseke, 2018).

Building upon the work of Bertoni et al. (2022) and Carrino et al. (2020), we strive to offer a more detailed exploration of the relationship between an extended work horizon and depression in the context of diverse working conditions. We combine comprehensive longitudinal data on working conditions from the European Working Conditions Survey, aggregated at the level of 4-digit ISCO codes, with microdata from 10 EU countries from the Survey of Health, Ageing and Retirement in Europe. We distinguish ourselves from previous studies by incorporating exogenous data on working conditions and providing a comprehensive analysis of the relationship between retirement policies and depression outcomes in the context of job-related work characteristics.

***Data***

Our study uses release 8.0.0 of the Survey of Health, Ageing and Retirement in Europe (SHARE). The survey provides comprehensive longitudinal information on socio-economic status, health, and social and family networks for nationally representative samples of individuals aged 50 and above residing in 28 European countries and Israel. We extract individual-level demographic and health data for 10 European countries from waves 4 and 6 of the survey, released in 2011 and 2015 respectively, and add retrospective employment data from a retrospective wave 7 (2017). Finally, we retrieve individuals’ occupations in the form of 4-digit ISCO codes from waves 6, 7, and 8 (2020), depending on availability (these codes were gradually recorded by the survey authors since 2015).

We then use the occupation codes to merge SHARE data with job quality indices extracted from waves 5 and 6 (2010 and 2015) of the European Working Conditions Survey (EWCS). The survey covers diverse occupations, sectors, and age groups of 35 countries, describing the work landscape in the form of 7 comprehensive job quality indices - skills and discretion, working time quality, physical environment, social environment, intensity, prospects, and monthly earnings – that we aggregate by country, year, and 4-digit ISCO codes.

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

***Methods***

*Sample*

We focus on the 2011 and 2015 releases of SHARE to facilitate data alignment with job quality data from EWCS, available for 2010 and 2015, respectively. We approximate job quality indices for 2011 with available for 2010 values. Our study covers data from 10 European countries that participated in both waves of SHARE: Austria, Belgium, Czech Republic, Denmark, Estonia, France, Italy, Slovenia, Spain, and Switzerland. We had to exclude Sweden as it faced a reform introducing a flexible retirement scheme allowing for lower retirement ages, and Germany – because of insufficient observations after data pre-processing.

To ensure our sample is representative of individuals potentially impacted by pension reforms, we implement several filters. We narrow our focus to individuals aged 50 or above, maintaining continuous employment status throughout the study period, and not working past the statutory retirement age. We also exclude individuals eligible for special state pension conditions, such as invalidity, sickness, or disability. Using retrospective employment data from SHARE wave 7, we further exclude individuals with less than 10 years of social security contributions, as they are susceptible to being detached from work. Due to the limited accessibility of ISCO codes, we also leave out individuals with job changes between 2011 and the year the ISCO code was recorded (ranges between 2015 and 2020). Finally, some observations are lost due to missing values.

The resultant sample constitutes a balanced panel with 3492 observations, corresponding to 1746 unique individuals. 56% of individuals are female, with an average age of 55.79. On average, individuals have 1.82 children. In terms of employment sectors, 61% work in the private sector, 27% in the public sector, and the remainder are self-employed. Detailed descriptive statistics are presented in Annex 1.

*Work horizon change*

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

Utilizing MISSOC data, we use old age pension eligibility criteria in concerned countries, including age, gender, number of children (for the Czech Republic), sector of employment (for Italy), years of contribution to social security, and years of residence, to define cells and calculate statutory retirement age for each individual, under an assumption of continuous employment in the future (see Annex 2). The average calculated statutory retirement age in our sample is 62.72 years, and the average residual work horizon is 6.93 years.

The MISSOC database also allows us to identify pension system reforms introduced between 2011 and 2015 and calculate the induced changes in work horizon. 8 out of 10 countries tightened old age pension eligibility criteria, leading to an increase in residual work horizon of up to 5.25 years over the study period. In total, 45.3% of individuals in the sample experience an increase in work horizon with an average of 1.08 years.

*Depression*

We capture the target variable with the Euro-D scale (Prince et al. 1999), a clinical measure of depression introduced in 1999 to harmonize data on late-life depression in Europe. This scale measures depression on a 0-12 scale with the score corresponding to the number of symptoms of depression revealed. It covers such aspects of depression as depressed mood, pessimism, wishing death, guilt, lack of sleep, lack of interest, irritability, lack of appetite, fatigue, lack of concentration, lack of enjoyment, and tearfulness. Generally, clinical depression is confirmed if the individual has 4 or more symptoms of the scale (Prince et al. 1999; Braam et al., 2005). In our sample, the average Euro-D score is 1.83 with 19% of individuals showing evidence of clinical depression.

*Job quality indices*

Our study explores 6 job quality indices provided by EWCS: skills and discretion, working time quality, physical environment, social environment, intensity, and prospects. The indices reflect the multidimensional nature of job quality, and each dimension has an independent influence on the health and well-being of workers (Fishta and Backé, 2015; Theorell et al, 2015). Each index consists of a set of indicators covering different aspects of the corresponding job quality dimension. The indices are measured on a scale from 0 to 100, where the higher the index score, the better the job quality.

As the structure of surveys slightly varies across waves, we had to recalculate some of these indices to achieve the maximum concordance between the editions of 2010 and 2015. We aggregate the indices by 4-digit ISCO codes, country, and year. Detailed compositions and descriptive statistics for obtained indices are presented in Annex 3.

*Empirical approach*

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

(1)

In Equation (1), , , and stand for individual, cell, and wave, respectively. is the Euro-D score. is a dummy indicator for 2015. We isolate the effect of pension reforms by including fixed effects at the cell level (). Singleton cells are removed from our sample (12 observations). The coefficient of interest is , which represents the difference-in-differences effect of a 1-year increase in work horizon on depression. ​ represents a vector of additional individual-level variables, including respondents’ gender, residual work horizon, number of children and grandchildren, household income (in logs), perceived general health level on a 5-point scale, number of chronic diseases, job quality indices, and binary indicators for living as a couple, having life insurance and having savings, as well as fixed effects for the industry of employment. is an error term. We cluster standard errors at the level of the cell.

In addition, we try a binary specification for the outcome variable with 1 indicating proof of clinical depression (Euro-D > 3), estimating a logistic regression using maximum to obtain the log-odds of the probability of reform-induced clinical depression:

(2)

In equation 2, is the probability of experiencing clinical depression, and is the natural logarithm of the odds of experiencing clinical depression.

For both specifications of the outcome variable, we also consider a binary specification for the treatment variable, with a dummy for ∆YTR>0, and a non-linear specification that compares respondents with 𝛥𝑌𝑇𝑅=0 with those with 0<∆YTR<=1, 1<∆YTR<=2, and ∆YTR>2, allowing an exploration of the effects contingent upon the dose of treatment or, in other words, the scope of the reform.

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

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

***Results***

**Annex 1 - Summary descriptive statistics for the final SHARE sample**

|  |  |  |
| --- | --- | --- |
|  | Mean | SD |
| *Outcome*  Euro-D score  Euro-D score > 3  Motivation lack  Affective suffering |  |  |
| *Treatment*  ΔYTR  ΔYTR > 0  0<∆YTR<=1  1<∆YTR<=2  ∆YTR>2 |  |  |
| *Covariates determining cell*  Gender  Age  Number of children  Years of contribution to social security  Years of residence  Sector of employment |  |  |
| *Additional covariates*  Number of grandchildren  Living as a couple (yes/no)  Education in years  Net household income  Savings (yes/no)  Life insurance (yes/no)  Self-perceived general health (0-5 scale)  Number of chronic diseases |  |  |
| N observations |  | |

**Annex 2 – Statutory retirement age and full pension eligibility rules**

|  |  |  |
| --- | --- | --- |
| **Country** | **2011** | **2015** |
| **Austria** | *Age:* 65 for males and 60 for females  *Contributions:* 45 years | *Age:* 65 for males and 60 for females  *Contributions:* 45 years |
| **Belgium** | *Age:* 65  *Contributions:* 45 years | *Age:* 65  *Contributions:* 45 years |
| **Czech Republic\*** | *Age:* 62 and 2 months for males, depends upon the number of children for females (61 if no children, 60 if 1 child, 59 if 2 children, 58 if 3 or 4 children, 57 if 5 or more children  *Contributions:* 27 years (17 years if age of 65) | *Age:* 62 and 10 months for males, depends upon the number of children for females (62 if no children, 61 if 1 child, 60 if 2 children, 59 if 3 or 4 children, 58 if 5 or more children  *Contributions:* 31 years (20 years if age of 67 and 10 months) |
| **Denmark** | *Age*: 65 (67 for those who had reached the age of 60 on 1.7.1999)  *Contributions:* - | *Age*: 65 (67 for those who had reached the age of 60 on 1.7.1999)  *Contributions:* - |
| **Estonia\*** | *Age:* 63 for males and 61 for females  *Contributions:* 15 years | *Age:* 63 for males and 62 and 6 months for females  *Contributions:* 15 years |
| **France\*** | *Age:*  If minimum period of contributions completed: 60 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by four months per birth year to reach 62 for persons born in 1956 or later.  If minimum period of contributions not completed: 65 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by 4 month per birth year to reach 67 for persons born in 1956 or later.  *Contributions:*  Determined according to the birth year of the person concerned - 1949: 160 quarters, 1952: 164 quarters | *Age:*  If minimum period of contributions completed: 60 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by four months per birth year to reach 62 for persons born in 1955 or later.  If minimum period of contributions not completed: 65 for persons born before 1 July 1951. As of 1 July 2011, gradual increase by 5 month per birth year to reach 67 for persons born in 1955 or later.  *Contributions:*  Determined according to the birth year of the person concerned - 1952: 164 quarters; 1953 and 1954: 165 quarters, 1955 and 1956: 166 quarters |
| **Italy\*** | *Age:* 66 for males, 61 only for females working in the public sector, 60 for the other females  *Contributions:* 40 years (5 if retiring at age of 70 for those first insured after 1996) | *Age:* 66 and 3 months for males, 66 and 3 months for females working in the public sector, 64 and 9 months for self-employed females, 63 and 9 months for other females  *Contributions:* 42 years and 6 months for males, 41 years and 6 months for females |
| **Slovenia\*** | *Age and contributions:* 63 for males and females if 15 years of contributions, 63 for males and 61 for females if 20 years of contributions, 58 for males if 40 years of contributions, 58 for females if 38 years of contributions | *Age and contributions:* 65 if 15 years of contributions, 60 if 40 years of contributions |
| **Spain\*** | *Age:* 65  *Contributions:* 35 years | *Age and contributions:* 65 if 35 years and 9 months of contributions, 65 years and 3 months if less contributions |
| **Sweden** | *Age:* 65 | *Age:* 65 |
| **Switzerland** | *Age:* 65 for males and 63 for females | *Age:* 65 for males and 63 for females |

\*Rules changed between 2011 and 2015

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Index** | **Dimension** | **Components** | **Mean (SD)** | |
| **2010** | **2015** |
| **Physical environment** | *Ambient* | Exposure to vibrations from hand tools, machinery  Exposure to noise so loud that you would have to raise your voice to talk to people  Exposure to high temperatures that make you perspire even when not working  Exposure to low temperatures whether indoors or outdoors  Exposure to breathing in smoke, fumes, powder or dust |  |  |
| *Posture related* | Posture-related painful or tiring positions  Carrying or moving heavy loads  Repetitive hand or arm movements |
| *Biological, chemical conditions* | Handling or being in direct contact with dangerous substances such as chemicals or infectious materials |
| **Social environment** | *Adverse social behaviour* | *In the last month:*  Exposure to verbal abuse  Exposure to unwanted sexual attention  Exposure to threats  *In the last year:*  Exposure to physical violence  Exposure to sexual harassment  Exposure to bullying/harassment |  |  |
| *Social support* | *Management quality:*  Your immediate boss respects you as a person  Your immediate boss provides useful feedback in your work  *Social support:*  Help and support from colleagues (most of the time/always)  Help and support from your manager (most of the time/always) |
| **Intensity** | *Quantitative demands* | Working at very high speed (three-quarters of the time or more)  Working to tight deadlines (three-quarters of the time or more)  Enough time to get the job done (never or rarely)  Frequent disruptive interruptions |  |  |
| *Pace determinants and interdependency* | Interdependency: three or more pace determinants  Work pace dependent on: the work done by colleagues  Work pace dependent on: direct demands from people such as customers, passengers, pupils, patients, etc  Work pace dependent on: numerical production targets or performance targets  Work pace dependent on: automatic speed of a machine or movement of a product  Work pace dependent on: the direct control of your boss |
| *Emotional demands* | Hiding your feelings at work (most of the time or always)  Handling angry clients, customers, patients, pupils, etc. (three-quarters of the time or more) |
| **Working time quality** | *Duration* | Long working hours (48 h or more a week)  Long working days (10h or more a day) |  |  |
| *Atypical working time* | Night work  Saturday work  Sunday work  Shift work |
| *Working time arrangements* | Set by the company  Can choose between different schedules  Can adapt working hours  Entirely determined by self  Change in working time arrangements  No regular change  Change the same day  Change the day before  Change several days in advance  Change several weeks in advance |
| **Skills and discretion** | *Cognitive dimension* | Solving unforeseen problems  Carrying out complex tasks  Learning new things  Working with computers, smartphones and laptops, etc. (at least a quarter of the time)  Ability to apply your own ideas in work |  |  |
| *Decision latitude* | Ability to choose or change order of tasks  Ability to choose or change speed or rate of work  Ability to choose or change methods of work  Having a say in choice of work colleagues |
| *Organisational participation* | Consulted before objectives are set for own work (‘always’ or ‘most of the time’)  Involved in improving the work organisation or work processes of own department or organisation (‘always’ or ‘most of the time’)  Ability to influence decisions that are important for your work (‘always’ or ‘most of the time’) |
| *Training* | Training paid for or provided by employer over the past 12 months (or paid by oneself if self-employed)  On-the-job training over the past 12 months Trend index score (maximum 100) |
| **Prospects** | *Career prospects* | Job offers good prospects for career advancement |  |  |
| *Job security* | Might lose job in the next six months |