

Light at the End of the Tunnel - Unemployment and Mental Health after Age 50

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Abstract

Recent literature reports a U-shape in mental health over the life-cycle, with mental health dipping during prime working ages. However, what is behind the U-shape remains a mystery. We find that across countries (U.S., UK and continental Europe) the U-shape is present for unemployed and disabled men, but not for employed and retired men, who have stable mental health scores. We hypothesize that the social norm (expectation) of work has a detrimental causal effect on the mental health of those not able to abide by it (e.g., the unemployed and disabled) and that this effect should disappear with retirement as it becomes more accepted for individuals not to work. Using SHARE data on individuals aged 50+ from 11 European countries, we regress the mental health of the unemployed and disabled on the age-, country-, and wave-dependent retirement fraction (our proxy for the social norm of work) and find statistically and economically significant effects. This suggests that the U-shape in mental health is the result of changes in the social norm (expectation) of work, which primarily affect the unemployed and disabled.

Keywords: mental health; unemployment; social norm

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1 Introduction

Keynes predicted in 1930 that by the early 21st century we would only work 15 hours per week, with advances in technology and productivity providing the means to increasingly substitute work for leisure. Instead, work seems to have taken an ever more prominent role in how we define ourselves. Politicians across the political spectrum routinely claim to stand up for the rights of “hard-working families” and governments continuously redesign institutions in their attempt to optimize labor markets for economic growth. Their efforts materialize in ever-changing sets of laws and regulations to increase (female) labor-market participation and reduce unemployment (e.g., through earned income tax credits, childcare benefits, job search requirements for the unemployed, etc.). Finding oneself without work, or the prospect thereof, can be a stressful experience in such work-centered societies, with potentially serious mental health and well-being consequences for those unable to (find) work.

In this paper we investigate how the inability to conform to the social norm of work - the commonly held belief that able-bodied adults ought to work - negatively affects mental health of the unemployed and disabled. We hypothesize that the detrimental effect of nonconformity depends on the strength of the prevalent social norm of work. Using data on individuals aged 50+ from 11 European countries, we regress the mental health of the unemployed and disabled on the age-, country-, and wave-dependent retirement fraction (our proxy for the social norm of work) and find statistically and economically significant effects.

The annual costs of mental ill-health exceed 4% of GDP in OECD countries (OECD, 2014). At any point in time 15-20% of the working-age population is affected by a common mental health problem, such as anxiety or depression, and one in two people experiences such mental health problems during life (OECD, 2014). One quantitatively important pattern reported in the recent literature is the U-shape in mental health and well-being over the life-cycle (e.g., Blanchflower & Oswald 2008; Stone et al. 2010; Blanchflower & Oswald 2016; and papers cited therein), with mental health better among the young and old and worse during prime working ages. In cross-sectional survey data Blanchflower & Oswald (2008) find a U-shape in happiness and life-satisfaction for a wide range of developed and developing countries, and an inverse U-shape in mental distress in the UK and continental Europe (the countries on which they had such data). Similarly, Blanchflower & Oswald (2016) find an inverse U-shape in antidepressant use in 27 European countries: people in their late 40s are approximately twice as likely to be taking antidepressants as those under age 25 or over age 65. Consistent with this pattern, Stone et al. (2010) find a U-shape in global well-being (i.e. a person’s overall appraisal of his/her life) as well as in affective states,¹ and Stone et al. (2017) report decreases in perceived stress after age 50.

What explains the U-shape is not known and referred to by some as a mystery and paradox, given that health deteriorates in old age (Blanchflower & Oswald 2008; Stone et al. 2010, 2017; Ulloa et al. 2013). Researchers generally control for confounding factors that change over the lifetime and are known to affect well-being, such as labor-market status, marital status and income, but including such factors does not substantially remove the U-shape (Blanchflower & Oswald, 2008, 2016; Stone et al., 2010, 2017). For example, Stone et al. (2017) note that “*factors such as employment, social support, marital status, health conditions, health insurance, and church attendance, which conceptually appeared to be logical candidates given their association with age and stress*” did not provide a compelling explanation for the pattern. As a consequence, the discussion on the drivers of the U-shape is limited to theorizing² and “*[t]he scientific explanation for the approximate U-shape*

¹Affective states describe the experience of emotion, feelings and moods, such as the experience of stress or happiness.

²For example, the literature mentions as possible explanations for improving well-being at older ages (i) increased

currently remains unknown” (Blanchflower & Oswald, 2017).

In our own recent work (Van de Kraats et al., forthcoming) using data on Dutch men, we find the U-shape to be strongly associated with involuntary labor-market inactivity, such as unemployment and disability, but not, or only weakly, associated with other variables such as educational attainment, household income, or marital status. Figure 1 plots the average MHI-5 score, an index score for depression and anxiety between 0 (worst mental health) and 100 (best mental health), for Dutch men between the ages of 16-65, separately for the employed / retired (solid diamonds) and for the unemployed / disabled (hollow circles). Mental health is fairly stable for employed and retired individuals, but a clear U-shape is apparent for the unemployed and disabled. These patterns are not unique to the Netherlands. Figure 2 plots the fraction of individuals in the 50+ population with a mental health score indicative of clinical mental ill-health (above a certain cut-off) for the employed / retired, the unemployed and the disabled in the US, England, continental Europe and the Netherlands. The plots show a strong pattern of improving mental health with age for both the unemployed and disabled. For the unemployed we even observe (almost) full convergence of mental health scores with the employed / retired. This suggests that our U-shape finding in Figure 1 is not merely driven by country-specific institutions or cohort effects that are specific to the Netherlands.

To the best of our knowledge, the finding that the U-shape in mental health appears to be driven by the unemployed / disabled is a new one. We take it as a cue that unemployment / disability are important drivers of the U-shape.³ While some previous work has found a rough U-shaped age pattern in the association between unemployment and mental health (e.g., see Jackson & Warr 1984; Warr & Jackson 1985, 1987; Warr et al. 1988; Clark & Oswald 1994; Gathergood 2013) none of these studies have entertained the possibility that unemployment and disability itself are the main drivers of the observed U-shape in mental health over the life cycle.

How would unemployment and disability affect mental health? Figures 1 and 2 suggest that the mental health of the unemployed and disabled deteriorates at ages when men are generally joining the labor force, is at its worst during prime working ages, and improves again near retirement. Could it be that the inability of the unemployed and disabled to work is affecting their mental health more severely at those ages when most are working? And, could it be that the overall U-shape (across all individuals) can be fully explained by the U-shape on the unemployed and disabled? Motivated by this, we test in this paper the hypothesis that the U-shape in mental health for the unemployed and disabled can be explained by the social norm (expectation) of work. Our hypothesis is that the inability to work detrimentally affects the mental health of the unemployed and disabled and that this is particularly important during prime working ages when the social norm (expectation) that one ought to work is high. We label this hypothesis the *social norm of work* effect.

We investigate the social norm of work effect using data from the Survey for Health, Aging and Retirement (SHARE) on individuals aged 50+ from 11 European countries. For each un-

“wisdom” and emotional intelligence with age, (ii) a tendency to recall more positive memories (“positivity effect”), (iii) increased ability to self-regulate emotions, (iv) selective mortality whereby happier people live longer, (v) different interpretation of and response to survey questions across the age distribution, (vi) cohort effects, and (vii) “systemic age differences in how survey respondents compare themselves with some standard, such as their peers, their view of an ideal self, or even to themselves prior to a life event” (Stone et al., 2017, 2010).

³Why have others not uncovered this result? As in Figures 1 and 2, we plot life-cycle patterns in the associations between mental health and important determinants of mental health (e.g., educational attainment, marital status, labor market status such as unemployment). These plots show a U-shape only for the unemployed / disabled, suggesting 1) that unemployment / disability affects mental health and 2) that this effect changes with age. The literature, on the other hand (e.g., Blanchflower & Oswald 2008, 2016; Stone et al. 2010, 2017) generally controls for such factors as unemployment status which can only account for an average level-effect but not for the changing relationship with age. Therefore it has difficulty identifying unemployment and disability as drivers of the observed U-shape.

employed individual we proxy the social norm (expectation) of work by the age-, country-, and wave-dependent retirement fraction. This is, arguably, an exogenous measure as it represent 1) aggregate information and 2) is unrelated to the unemployed individual as it largely reflects labor-market institutions and labor-market decisions of the employed.

Figure 3 provides first descriptive evidence for the social norm of work effect based on the raw SHARE data. For each country in our sample the figure plots the average EURO-D score (our mental health measure, further explained in section 3) - ranging from 0 (best mental health) to 12 (worst mental health) - of the unemployed / disabled (with crosses) and the employed / retired (with triangles). The plot also shows linear fits and their corresponding 95% confidence intervals for both groups based on individual-level data for the 11 European countries in our sample. The EURO-D axis (right-hand scale) has been inverted so that upward movements represent improvements in mental health.

The most striking pattern in Figure 3 is the overall convergence of the mental health of the unemployed and disabled with the mental health of the employed and retired. The mental health of the employed and retired is fairly stable in most countries, with the exception of Italy and Spain, which show a slight worsening of mental health with age.⁴ By contrast, the mental health of the unemployed improves steadily with age. The only exception to the resulting pattern of convergence is Greece, which shows declining mental health of the unemployed / disabled. Furthermore, the plots show that the converging mental health patterns of the two groups coincide with increases in the average retirement fraction - our social norm of work proxy. Hence, Figure 3 provides first descriptive evidence for the social norm of work effect. Interestingly, in most countries full convergence appears to take place near the age of full retirement. We refine this analysis in the remainder of this paper where we regress mental health of the unemployed / disabled on our proxy for the social norm of work and find robust and statistically and economically significant effects.

Our paper makes three main contributions. First, we contribute to the general subjective well-being and mental health literature by demonstrating the importance of labor-market status to the observed U-shape in mental health. We provide further evidence that the U-shape in mental health primarily exists for the unemployed and disabled by replicating our earlier finding (Van de Kraats et al., forthcoming) in 11 European countries using SHARE data. We also demonstrate that, on average, the mental health of the unemployed and disabled improves and eventually converges with that of the previously employed at the age when the majority of them have retired, while the mental health of the employed, and subsequently retired, remains stable. This further strengthens the notion that it is the labor-market status of the unemployed and disabled that drives the U-shape in older age (but plausibly also at young ages). To the best of our knowledge this is a new result. It is an important finding given the literature’s difficulty in explaining the U-shape. If our results are correct, the U-shape should be more pronounced for groups or societies where the social norm of work is strong, for example, in societies with low unemployment. Similarly, we expect a stronger U-shape for males than for females because of weaker labor-force attachment of women and potential differences in the social norm (expectation) of work by gender (for example, for the cohorts under consideration in this paper, 22.2% percent of women reported home making as their primary activity compared to just 0.4% of men). Thus we would expect important differences between groups and countries in the strength of the U-shape. Perhaps this can explain Deaton’s (2008) intriguing finding that the U-shape in life-satisfaction is only found “among the very highest-income countries - including the United States, Canada, United Kingdom, Australia, and New Zealand [...]”

Second, we contribute to the literature on the effect of unemployment on mental health. The

⁴However, as these plots show mental health scores averaged over the survey waves such a slight pattern may also be partially explained by a calendar time effect, for example because individuals in the panel report worse mental health in later waves due to the great recession.

negative association between unemployment and mental health / subjective well-being has been firmly established across a range of academic disciplines, starting with the earliest pioneering research in social psychology (see [Eisenberg & Lazarsfeld, 1938](#); [Jahoda, 1981, 1988](#), for early work, and [Feather, 1990](#), for a review). A main empirical challenge consists in uncovering whether this relationship is causal. Several authors have attempted to establish the causal nature of the relationship by instrumenting the transition from employment to unemployment using exogenous firm or plant closures. The results in this literature are mixed, often failing to establish causal effects.⁵ Our paper contributes to this literature by demonstrating an effect of unemployment and disability on mental health during prime working ages. Our social norm of work perspective provides a specific mechanism by which the causal effect of unemployment on mental health may operate.

Last, we contribute to the small, but growing, literature on the effect of the social norm (expectation) of work on the mental health of the unemployed. In this literature we are the first (i) to exploit cross-country variation in the social norm of work, demonstrating results hold in various institutional settings, and (ii) to employ a new and better proxy for the social norm of work: the fraction of retired peers (which we measure using the age-, country- and wave-dependent retirement fraction). In contrast to the frequently used local unemployment rate (e.g., [Clark, 2003](#); [Clark et al., 2010](#); [Gathergood, 2013](#)), our proxy does not directly depend on decisions made by the unemployed. Hence, it provides a more plausibly exogenous measure of the social norm of work. We provide evidence that the social norm of work negatively affects the mental health of those who cannot meet it. Such evidence is important as it provides guidance to policy and decision makers about the potential for intervention to improve societal well being.

Section 2 discusses literature relevant to our hypothesis. Section 3 describes the SHARE data. Section 4 outlines the empirical methodology. Section 5 presents the results of our analyses. Section 6 concludes.

2 The social norm of work

According to [Elster \(1989, p.121\)](#) “[t]here is a social norm against living off other people and a corresponding normative pressure to earn one’s income from work.” Hence, unemployment is generally associated with social stigma and a loss of status as unemployment constitutes a violation of the *social norm of work*. To fully understand what we mean by this, it is useful to define social norms and to apply this definition to the context of unemployment and mental health. One useful definition in the economics literature is given by [Fehr & Gächter \(2000\)](#), who define a social norm as:

“[...] 1) a behavioral regularity; that is 2) based on a socially shared belief of how one ought to behave; which triggers 3) the enforcement of the prescribed behavior by informal social sanction.”

In the context of the labor market and mental health the idea is that: 1) individuals generally work, 2) it is commonly believed that this is appropriate behavior for able-bodied adults, and 3) a

⁵For example, [Browning et al. \(2006\)](#) finds no effect of job displacement on mental health in Denmark, [Salm \(2009\)](#) finds no effect of plant closures on health outcomes in the U.S., and [Schmitz \(2011\)](#) finds no effect of plant closures on satisfaction with health, mental health and hospital visits in Germany. These null-findings support the idea that the unemployed have worse (mental) health mainly due to the selection of the mentally unhealthy into unemployment. On the other hand, [Kassenboehmer & Haisken-DeNew \(2009\)](#) find negative effects of job loss on life satisfaction for German women after company closures and [Kuhn et al. \(2009\)](#) find that job loss due to plant closure increases expenditures on antidepressants and hospitalizations for reasons of mental health problems among Austrian men.

violation of this behavioral regularity carries with it social stigma, affecting mental health and well-being, and providing a motivation to (search for) work. Social stigma can both be driven by internal beliefs and expectations of the unemployed individual, as well as by social sanction (disapproval) by peers. The stronger the social norm of work, the larger the negative effect of nonconformity to the social norm is for the unemployed. Or as [Clark et al. \(2010\)](#) state: “The social-norm effect suggests that, in a society in which most people work, being unemployed represents a greater deviance from the social norm and is thus harmful for the individual’s social status and perceived well-being.”^{6,7}

Direct measurement of social norms for empirical analysis is difficult as it requires the ability to measure individuals’ beliefs and a method to aggregate those beliefs. Several authors take the pragmatic approach of considering behavior as a proxy for beliefs and to use aggregate outcomes of behavior as a proxy for the prevalent social norm. For example, researchers often proxy the social norm of work by the unemployment rate in the locality of an unemployed individual (e.g., [Clark, 2003](#); [Clark et al., 2010](#); [Powdthavee, 2007](#); [Shields et al., 2009](#)). It is assumed that “[a]s the number of unemployed rises, working gradually loses its normative effect, which attenuates the negative effect of unemployment on the well-being of the unemployed” ([Clark et al., 2010](#)).

Recent literature in economics, psychology and medicine finds the unemployment rate to have a positive effect on the mental health of the unemployed (see, e.g., [Cohn, 1978](#); [Jackson & Warr, 1987](#); [Warr et al., 1988](#); [Clark & Oswald, 1994](#); [Clark, 2003](#); [Clark et al., 2010](#); [Powdthavee, 2007](#); [Shields et al., 2009](#); [Gathergood, 2013](#)). For example, [Clark \(2003\)](#) finds that in the UK the mental health of unemployed men is positively correlated with the regional unemployment rate of 11 UK regions. Quantitatively, [Clark \(2003\)](#) estimates that (for prime-age men) unemployment no longer has a detrimental effect on mental health if at least 20% of individuals in one’s locality are unemployed. In other words, at such a high unemployment rate the social norm of work becomes so weak that it no longer matters for well-being whether one is employed or not.

Several other measures of the social norm of work have been employed. For example, in Germany, “living off public funds”, reduces life satisfaction for the unemployed ([Chadi, 2014](#)). In Switzerland, regional results of a referendum on cuts in unemployment benefits reduced life satisfaction of the unemployed more in areas where voters were in favor of cuts ([Stutzer & Lalive, 2004](#)). In the UK, ([Clark, 2003](#); [Gathergood, 2013](#)) find that the effects of unemployment are moderated if a cohabiting partner or other household member is also unemployed. Finally, [Hetschko et al. \(2014\)](#) find that life satisfaction of unemployed individuals improves upon retirement, above and beyond potential retirement effects experienced by employed individuals upon retirement. They interpret this as a social norm of work effect as they argue that the transition from unemployment to retirement constitutes a return to social norm conformity, while individuals who retire from employment conform to the social norm both before and after the labor market transition. As in most papers in this literature, the significant positive effect is driven by men only.

In this paper we propose a new proxy for the social norm of work: the fraction of retired workers of the same age. With age, the social norm of work changes as more and more people retire and it becomes more acceptable not to work. According to our social norm of work hypothesis, the mental health and well-being of unemployed and disabled individuals should improve as more people in the same age group are retired. Theoretically we can capture this mechanism in a simple model based on the seminal work on social norms and identity economics by [Akerlof & Kranton \(2000\)](#), which we present in appendix [A.1](#). Empirically, we construct and use an age-, country-, and wave-dependent retirement fraction as our social norm of work proxy (see section [4](#) for detail). Our

⁶Similarly, in their theoretical work [Lindbeck et al. \(1999\)](#) “[...]assume that to live off one’s own work is a social norm, and that the larger the population share adhering to this norm, the more intensely it is felt by the individual.”

⁷In appendix [A.1](#) we present a brief theoretical model of the social norm of work and its relation with mental health for the unemployed / disabled.

proxy has some important methodological advantages. In contrast to the local unemployment rate, the retirement fraction does not directly depend on decisions made by the unemployed. Hence, it provides a more plausibly exogenous measure of the social norm of work. Moreover, it is not subject to the confounding mechanism that a higher unemployment rate reduces the probability of returning to work and may therefore negatively affect the mental health of the unemployed (Chadi, 2014). Finally, the unemployment rate captures business-cycle fluctuations which may have mental health effects on their own.

3 Data

We use data from the Survey for Health, Aging and Retirement (SHARE) (Börsch-Supan et al., 2013). SHARE, modeled after the US Health and Retirement Survey (HRS), is designed to gather data on a wide range of topics as individuals age, including work and retirement, assets, income and consumption, health and health-care utilization, family life and social networks. Currently there are six waves of data available. However, we do not use the third survey wave as it consists of life-history interviews and does not include mental health measures. We use a “harmonized” version of the SHARE data, harmonized by Gateway to Global Aging Data (2017) to improve comparability of aging data-sets across the world.

The first wave of SHARE data was collected in 2004/2005 and subsequent follow ups have been timed at approximately two-year intervals. Data for the latest wave, wave 6, was gathered in 2015. The exact timing of each survey wave differs slightly across countries.⁸

To ensure we have a sufficient number of consecutive waves for each country, allowing us to exploit the panel dimension of the survey, we include all countries that were part of SHARE’s wave 1: Austria, Belgium, Denmark, France, Germany, Greece, Italy, The Netherlands, Spain, Sweden, and Switzerland.

3.1 Sample restrictions and definitions

We restrict our main analysis to individuals between age 50 (the youngest age to participate in SHARE) and the normal retirement eligibility age, to capture the age range in which the retirement transition takes place. (see Table 1). The cut-off at the normal retirement eligibility age is motivated by the fact that in most countries unemployment and disability are automatically converted into retirement upon reaching the normal retirement eligibility age so that unemployment and disability no longer apply. We use the retirement eligibility ages given in Table 1 and thus drop all individuals who have reached or exceed the normal retirement age applicable to their country and survey year. Table 2 provides an overview of the total number of men interviewed by country and wave in the the selected age range.

We perform all analyses separately for men and women as it is well-established that mental health levels and the most important correlates of mental health differ substantially between men and women (for example, see the review by Kessler & Bromet, 2013, who report that women have a lifetime risk of depression that is roughly twice that of men). Moreover, we expect the social norm of work to be stronger for men than for women, mainly due to gender roles, which have been shown to influence the gender-gap in earnings and labor-market participation. For example, Bertrand et al. (2015) use US data to argue that gender identity norms, which induce an aversion to a situation where the wife earns more than the husband, reduce labor-force participation and

⁸Wave 1 roughly corresponds to 2004/5, Wave 2 to 2006/7, Wave 4 to 2011/12, Wave 5 to 2013 and Wave 6 to 2015. See <http://www.share-project.org/data-documentation/waves-overview.html> for detail.

incomes of wives. Consistent with gender roles, the recent literature on the social norm of work effect typically finds significant positive mental health and well-being effects for men but not for women (Clark, 2003; Clark et al., 2010; Gathergood, 2013; Hetschko et al., 2014). Gender roles are likely of importance among the older cohorts we focus on in this paper, as they grew up with more traditional household task divisions (e.g., see Bianchi et al. (2000) for trends in the gender division of household labor and participation in the paid labor market).

3.1.1 Labor-market definitions

For our analyses we need to classify each individual’s labor-market status. This is necessary both to select our sample of interest (the unemployed and disabled), a comparison sample (the employed and retired), as well as to construct our social norm of work proxy: the age-, country- and wave-specific retirement rate.

We define an income-based measure of labor-market status using reported income sources and hours worked. It is well-established that people misreport their labor-market status. This may be especially true for the unemployed and disabled, who may misreport due to the social stigma of not having a job.⁹ We apply the following categorization to allocate individuals to one of four labor-market status groups:

- **Retired:** If the individual reports retirement income and less than 10 working hours per week (i.e. $\text{retirement income} > 0 \cap \text{weekly work hours} < 10$)
- **Employed:** If the individual reports no retirement income, but does report income from work or self-employment and 10 or more working hours per week (i.e. $\text{retirement income} = 0 \cap \text{earnings or self-employment income} > 0 \cap \text{weekly work hours} \geq 10$)
- **Unemployed and disabled:** If the individual reports no retirement income and less than 10 working hours per week (i.e. $\text{retirement income} = 0 \cap \text{weekly work hours} < 10$)
- **Undefined:** If the individual is not defined as retired, employed or unemployed based on the above definitions.

Table 3 breaks down our sample into the four labor-market status categories. The table shows that the sample of interest for our main analyses consists of a total of 5,754 unemployed men out of a total of 37,987 men between age 50 and the normal retirement eligibility age in the SHARE data, or approximately 15%. Just under 12% of men aged 50-68 are not classified as retired, employed or unemployed according to our income-based labor-market status measure. We perform sensitivity tests in section XX where we further refine our income-based measure in an effort to allocate the majority of the unclassified group to one of the three labor-market groups. Results of our analyses are generally unchanged.

3.2 Mental health score: EURO-D scale

We use the EURO-D scale, a measure of symptoms of depression, as our measure of mental health. The EURO-D scale was developed specifically to enable cross-country comparison of risk profiles for older Europeans (Prince et al., 1999). It is a simple 12-item screening instrument that can be easily administered in surveys such as SHARE. The 12 items consist of yes/no answers to survey questions on items related to the following domains: depression, pessimism, suicidality, guilt, sleep, interest, irritability, appetite, fatigue, concentration, enjoyment, and tearfulness. A score of 1 is allocated to an item if the answer is indicative of depression (see appendix A.2 for the full description of

⁹We discuss potential misreporting of labor-market status in section XX. Here we show that for groups where we don’t expect a bias our labor market definition is highly consistent with self-reported labor market status.

EURO-D items and the way they are scored). The total EURO-D score is then calculated by summing over the individual items, i.e. it ranges from 0 (best mental health) to 12 (worst mental health).

The EURO-D scale has been validated and shown to perform well as a screening instrument for diagnostic criteria for depression in SHARE data (Castro-Costa et al., 2008) but also in other contexts, e.g., in developing nations (Guerra et al., 2015). Scores of 4 or higher are generally considered to be indicative of depression (Prince et al., 1999; Castro-Costa et al., 2007; Fonseca et al., 2014). Figure 4 shows the distribution of EURO-D scores for unemployed men in the pooled sample. A substantial fraction - 29.8% - of individuals has a score of 4 or higher, indicating that they are likely to suffer from a mood disorder such as depression. Figure 5 shows there is substantial wave-to-wave variation in EURO-D scores within unemployed individuals.

3.3 Descriptive statistics

Table 4 provides descriptive statistics for the main sample. The average age is 57.9 and 29% of unemployed men are above the early retirement eligibility age. Household income is measured in Euros as the sum of all income, after any taxes and contributions, at the couple-level economic unit, i.e. the respondent and the spouse, if there is a spouse.¹⁰

In our analyses we control for physical health using variables that summarize the number of limitations in activities of daily living (ADL) and limitations in instrumental activities of daily living (IADL). Both measures are constructed using 5 survey items: The activities of daily living consist of bathing, dressing, eating, getting in/out of bed and walking across a room. The instrumental activities of daily living consist of using the phone, taking medications, managing money, shopping for groceries, and preparing meals. Each survey item is set to 0 if the individual did not report any problems with the (instrumental) activity and set to 1 if the individual reported to have some difficulty with the (instrumental) activity. The ADL and IADL measures represent the sum of the relevant items so that scores range from 0-5, with higher scores representing worse physical health. Table 4 shows that men in our sample score, on average, higher on (i.e. have more difficulty with) the ADL scale than on the IADL scale.

We measure educational attainment using the 1997 International Standard Classification of Education (ISCED-97) codes. Respondents reported their highest obtained degree, which were mapped by educational experts to educational achievements according to the ISCED-97 codes. This results in seven categories of educational attainment - no education, primary education, lower secondary education, upper secondary education, post-secondary non-tertiary education, first stage of tertiary education and second stage of tertiary education - with most individuals - 34% - having obtained upper-secondary education.

Finally, we consider marital status. Marital status is, after gender, one of the strongest correlates of mental health, with a higher prevalence of disorders for those who are divorced, separated or widowed (Kessler & Bromet, 2013; Rai et al., 2013; Weissman et al., 1996). We distinguish among several categories of current marital status: being married, partnered, separated, divorced, widowed and never having been married. The majority of individuals in our sample - 67% - are married.

¹⁰In SHARE wave 1 income variables were collected before taxes and social contributions while subsequent waves collected only after-tax income variables. To solve this issue Bertoni et al. (2016) have estimated harmonized post-tax estimates for SHARE wave 1, which we use in this paper.

4 Methodology

In this paper we explore the hypothesis that the social norm of work drives (the later part of) the observed U-shape in mental health for the unemployed / disabled. Theoretically there are three reasons why a negative association between mental health and unemployment may occur: (i) deteriorating mental health may cause unemployment, (ii) unemployment may cause poor mental health, or (iii) the unemployed may simply be different people, along potentially unobserved dimensions, with worse mental health outcomes. The U-shape in the association between mental health and unemployment over the life cycle then logically implies that at least one of these three relationships changes with age. We test our hypothesis that the size of the effect of unemployment and disability on mental health depends on the prevailing social norm of work. The social norm of work decreases with age near the age of retirement as more and more individuals retire and it becomes more socially accepted not to work.

4.1 The social norm of work proxy

We define a reference group of “relevant others” for the unemployed and disabled, as individuals of a similar age a , in the same country c , and survey wave w . For this reference group, we then calculate the fraction that is retired. This age- (a) , country- (c) and wave- (w) dependent retirement fraction Ret_{acw} is our proxy for the social norm of work, with a higher retirement fraction representing a weaker social norm of work.

Specifically, let the total sample of male SHARE respondents between age 50 and the normal retirement eligibility age in country c who appear in at least one survey wave consist of $j = 1, \dots, N_c$ individuals. A subset K_{acw} of these individuals are unemployed or disabled at age a in country c and wave w . We use data on all N_c individuals to construct the retirement fraction at age a in country c for wave w . Let N_{acw} denote the total number of individuals of age a , from country c in wave w , and let R_{jacw} be an indicator variable that is set to 1 if individual j of age a in country c and wave w is retired. Then the retirement fraction Ret_{acw} is:

$$Ret_{acw} = \frac{\sum_{j=1}^{N_c} R_{jacw}}{N_{acw}} \quad (1)$$

Next, we assign to our sample of K_{acw} unemployed or disabled individuals i the social norm of work Ret_{acw} at age a , in country c and wave w .

In our main analyses, we include in the calculation of Ret_{acw} those who are up to one year younger or older. This three year moving age band is motivated by a desire for a sufficient number of observations yet sufficient accuracy to capture the effect of age-dependent policies.¹¹

Figure 6 plots the retirement fraction using the three year age band, for each country and wave over the 50-70 age range. The figure shows how the retirement fraction Ret_{acw} increases with age, with a gradual pattern for some countries (e.g., Belgium, Greece, Italy) and a sharper pattern for others (e.g., France, Sweden, Switzerland). However, the sharpest increases in the retirement fraction usually represent the normal retirement age (for example age 65 in Sweden), so that the section of the retirement fraction beyond this age is out of scope for our main analysis. For some countries (e.g., Austria, Belgium, Denmark, France, Germany, Italy, The Netherlands) the retirement fraction profile shifts to the right for later waves, indicating that people retire later. This is consistent with a general trend of recent policy reforms attempting to increase the retirement age. According to our hypothesis, shifts in retirement patterns should also shift the social norm of work.

¹¹In section 5.2 we perform sensitivity analyses using different bandwidths. Results are robust.

We prefer our social norm of work proxy over the much used (local) unemployment rate for three reasons. First, the retirement fraction is, arguably, an exogenous measure as 1) it represent aggregate information and 2) is unrelated to the unemployed individual, largely reflecting labor-market decisions of the employed and a society’s labor-market institutions, such as early retirement eligibility rules set by governments and firms. Unlike the local unemployment rate, the retirement fraction is not directly dependent on the labor-market status of the unemployed, which reduces issues of simultaneity.¹²

Second, a higher unemployment rate reduces the probability of returning to work, which may negatively affect the mental health of the unemployed (Chadi, 2014). The retirement fraction does not suffer from this because there is no reason to assume that it is indicative of the chances of getting back to work for an unemployed individual.

Third, high unemployment may be indicative of an economic recession, which may have negative mental health effects on its own (e.g. see Ruhm, 2000, 2003, 2005). The retirement process, on the other hand, is to a large extent constrained by labor-market institutions, and therefore not as sensitive to the business cycle.

4.2 Regression analysis

A sufficiently strong social norm of work effect for the unemployed and disabled, together with relatively stable mental health of the employed and retired, implies that mental health of the two groups converges with age as observed in Figure 3. Hence, we can test our social norm of work hypothesis using the regression:

$$MH_{iacw}^U - \overline{MH}_{acw}^{ER} = \alpha + \gamma Ret_{acw} + \beta X_{iw} + \varepsilon_{iw}, \quad (2)$$

where MH_{iacw}^U refers to the mental health (EURO-D) of unemployed (denoted by superscript U) individual i of age a in country c and wave w and \overline{MH}_{acw}^{ER} gives average mental health of employed and retired (denoted by superscript ER) individuals of age a in country c and wave w . Thus, for unemployed individual i , \overline{MH}_{acw}^{ER} gives a reference level of mental health of individuals who *do* conform to the social norm of work. We construct \overline{MH}_{acw}^{ER} in the same way as we construct the retirement fraction Ret_{acw} , using a three-year age band. Hence, on the left-hand side of equation 2 we have the *mental health gap*, i.e. the difference between an unemployed / disabled individual’s EURO-D score and the average EURO-D score of his/her reference group. On the right-hand side of equation 2 Ret_{acw} is the retirement fraction at age a in country c and wave w , X_{iw} represents a set of control variables, and ε_{iw} denotes the error term for individual i in wave w .

Estimation of the social norm of work effect using equation 2 has the added advantage that under the relatively weak assumption that age α_a , country γ_c and wave τ_w effects do not among individuals, we immediately difference them away in our dependent variable. As such we can still account for α_a , country γ_c and wave τ_w effects, but we do not need to control for the age, country and wave dimensions in our set of control variables X_{iw} . This allows us to exploit the maximum

¹²Reverse causality is only present if the mental health of the unemployed affects the retirement fraction. We cannot think of a credible reason as to why this may be the case. One may be concerned that endogeneity may occur due to omitted variables. For example, an age trend in mental health or an age-specific aggregate mental health shock may lead to a mental health change for the unemployed and an increase in the retirement fraction. However, we do not believe this to be a serious issue, especially since the retirement fraction is increasing with age: it is reasonable to assume that a negative aggregate mental health trend or shock leads to an increase in the retirement fraction and a simultaneous worsening of mental health of the unemployed. Hence, if we find effects in the expected direction, our estimates suffer at most from a downward bias due to this issue.

amount of variation in our social norm of work proxy, the retirement fraction Ret_{acw} , which varies only with age, country and wave.¹³

To identify the social norm of work effect using equation 2, we also require the assumption that *on average* mental health of the employed and retired does not differ due to other factors than the age, country, and wave effects. If this is the case, we can fairly compare average mental health of reference groups of different ages, countries and waves with each other, and thus with the unemployed and disabled in our regression sample. We believe this is a reasonable assumption given the stability of average mental health scores that we observe in the raw data (see Figure 3).¹⁴

By introducing average mental health of the reference group on the left hand side of equation 2 we introduce a new endogeneity issue that may bias our estimates. This is the “standard” endogeneity issue in the retirement literature that retirement and mental health may influence each other in both directions, and that retirement and mental health may both be influenced by (unobserved) third factors. Previously, we argued that from the perspective of the unemployed / disabled individual the retirement fraction Ret_{acw} is exogenous, but with the mental health gap as our dependent variable, this assumption may be violated. We deal with this issue in robustness tests in section 5.3.

5 Results

5.1 Regression analysis

Table 5 presents the results of a cross-sectional OLS estimation of equation 2. In a simple regression without controls, we obtain a highly significant estimate of -0.86 for the effect of the social norm of work (proxied by the retirement fraction) on the mental health of the unemployed (column 1). The estimate is robust (remains highly significant and the coefficient changes only minimally) to controlling additionally for indicators of educational attainment and marital status (column 2), as well as (instrumental) activities of daily living and household income (column 3). Hence, a 100%-point increase in the retirement fraction (i.e. moving from nobody retired to everybody retired) is associated with a drop of approximately 0.8 on the EURO-D scale. With an average EURO-D score of 2.62 (standard deviation 2.46) the social norm of work appears to have a large impact on the mental health of the unemployed / disabled. As a point of reference, we know from existing literature that marital status is considered to be the most important correlate of mental health (e.g. see Kessler & Bromet, 2013), with being separated or divorced substantially elevating the risk of depression. Table 5 shows that the highly significant point estimate of 0.72 for being divorced (column 3) is slightly smaller than our estimate for the social norm of work. This indeed provides

¹³If we simply use the EURO-D score (i.e. MH_{iacw}^U) as the dependent variable, we are preferably also able to control for age α_a , country γ_c and wave τ_w effects. However, it becomes difficult to obtain accurate estimates for the effect of the retirement fraction Ret_{acw} in the presence of age controls because of collinearity between age functions and the retirement fraction Ret_{acw} (see Figure 6). Nevertheless, in section 5.3 we discuss such results under the assumption of no age effects since (i) we believe, based on raw data, that this is a valid approximation of the age pattern and (ii) it allows us to deal with potential simultaneity between \overline{MH}_{acw}^{ER} and Ret_{acw} in equation 2. We show that results are very similar to those of our main analysis.

¹⁴The main threat in our setting is that transitions from employment to (early) retirement may violate this assumption due to a retirement effect on mental health. However, a sufficiently strong retirement effect should also be reflected in the age patterns in Figure 3, which is not obvious. Moreover, existing literature on the mental health effect of retirement frequently finds no or only small and temporary effects. For example, (Fonseca et al., 2014) only finds weak evidence for a positive effect of retirement on mental health, and (Neuman, 2008; Coe & Lindeboom, 2008; Coe & Zammaro, 2011; Fonseca et al., 2015) find no evidence of an effect. Moreover, any positive effects may not have a lasting impact, for example, Horner (2014) reports that life satisfaction returns to the baseline trend a few years after retirement.

credence to our hypothesis that the effect of the social norm of work on the unemployed and disabled may be substantial enough to explain the overall U-shape (across all labor-status groups) in mental health that the literature reports. Although we have argued in section 4 that by using the mental health gap as our dependent variable we do not need to control for country or wave effects, we show that when we include country dummies (column 4) or country-wave interaction dummies (column 5) the coefficient estimates for the retirement fraction remains highly significant and of similar magnitude at -0.92 and -0.94, respectively.

Estimation of equation 2 using only within-individual variation results in significant and slightly larger estimates. Table 6 repeats the results of Table 5 using the fixed-effects estimator with clustered standard errors. The estimated effect size increases to -0.92 in column (1) relative to the OLS estimate of -0.86. Again, the results are robust to the inclusion of additional controls (columns 2 and 3). In column (3) the effect size increases to -1.14, approximately a 40% increase compared to the same OLS estimate. The fixed-effects estimator controls for time-invariant unobserved heterogeneity. For example, the estimator deals with potential biases due to differential self-selection into unemployment across countries, waves and age groups to the extent that unobserved heterogeneity is time-invariant. The highly significant and large estimates for the retirement fraction are reassuring evidence for the social norm of work hypothesis.

5.2 Sensitivity

Table 7 presents the results of three sensitivity tests using the fixed-effects estimator and the full set of control variables. First, in column (1) we drop Greece from the sample as Figure 3 indicates that compared to other countries age patterns in mental health are different for both the unemployed and disabled as well as the employed and retired. Moreover, Greece has been extraordinarily effected by the recent economic crisis. As expected, excluding Greece leads, in absolute terms, to a slightly larger point estimate of -1.27.

To test the sensitivity of the results to our construction of social norm of work proxy, we change the age bracket in the construction of the retirement fraction Ret_{acw} (see equation 1). In our main specifications we used a 3-year age bracket to construct the retirement fraction Ret_{acw} . In column (2) we narrow this to a 1-year age bracket and in column (3) and we widen this to a 5-year age bracket. At -1.10 and -1.27, respectively, both estimates are highly significant and of similar magnitude as the previous results. This implies that our results are not very sensitive to how one defines the social norm of work proxy along the age dimension.

5.3 Robustness

A main concern with regression results based on equation 2 is potential endogeneity of the retirement fraction Ret_{acw} due to the inclusion of reference group mental health \overline{MH}_{acw}^{ER} on the left-hand side. As a robustness test we run our analyses simply using the EURO-D score MH_{iacw}^U as the dependent variable in appendix A.5. This solves the endogeneity issue but comes at the costs of our ability to account for age effects due to high collinearity of age with the retirement fraction Ret_{acw} (see Figure 6). In appendix A.5 we argue why in this setting it seems a reasonable assumption that there are no age effects in mental health. We show that under this assumption regression results are highly similar to those in our main analysis.

6 Conclusion

In this paper we investigate the effect of the social norm of work on mental health of the unemployed and disabled. We hypothesize that a stronger social norm of work leads to worse mental health outcomes for the unemployed and disabled. We proxy the social norm of work using the fraction of retired individuals from a reference group for each unemployed / disabled individual. We argue that as more individuals in the reference group retire, the social norm of work decreases. We define the reference group based on individuals of similar age and from the same country and survey wave.

We find statistically and economically significant effects in the hypothesized direction, also when exploiting only within-individual variation. The estimated effect size is substantial with a point estimate of -1.14 when including individual fixed-effects and controls for marital status, physical health and income. This implies that predicted mental health for unemployed and disabled individuals improves by more than a full point on the EURO-D scale when we move from nobody retired to everybody retired.

Our descriptive analysis of mental health patterns for employed and retired individuals reveals that mental health is overall stable with age, unlike for the unemployed and disabled. Across all 11 SHARE countries except Greece, we find a strong pattern of converging mental health between the unemployed and disabled on the one hand and the employed and retired on the other hand. Together with our significant and substantial social norm of work effect this suggests that much of the U-shaped age pattern in mental health and well-being reported in recent literature (e.g. [Blanchflower & Oswald 2008, 2016](#); [Stone et al. 2010, 2017](#)) may be driven by the mental health improvement of the unemployed and disabled. With our social norm of work hypothesis we are the first to provide a credible explanation for the so far unsolved mystery of what mechanisms may drive the U-shape.

Moreover, in general we shed new light on the causal effects of unemployment of mental health outcomes. By investigating the specific mechanism of the social norm of work we gain a better understanding of why mental health outcomes of the unemployed and disabled are so much worse than among the employed and retired.

Our analyses only consider individuals older than age 50. As such we can, in fact, only draw conclusions about mental health patterns that relate to the "second half", or right-hand side, of the U-shape. Future work will have to test the social norm of work hypothesis also at younger ages to establish if this mechanism provides a potential explanation for the entire U-shape.

Finally, our empirical strategy leaves some space for other mechanisms that may contribute to the U-shape in mental health for the unemployed and disabled. For example, our proxy for the social norm of work, the age-, country-, and wave-dependent retirement fraction, may also pick up a value of leisure effect: as there are more retired peers it becomes easier to coordinate social leisure time for an unemployed and disabled individual. Such a *leisure effect* may positively affect mental health of the unemployed and disabled. Furthermore, near retirement institutions generally become more favourable for unemployed and disabled individuals. For example, job search requirements may be less strict for older unemployed individuals. Finally, the prospect of retirement in the near future may increase income security through, e.g., a state pension, as opposed to an effect operating through the social norm of work. However, this limitation applies to most existing work on the social norm of work effect (e.g. [Clark, 2003](#); [Clark et al., 2010](#); [Gathergood, 2013](#)). Future work should focus on excluding such mechanisms.

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A Appendix

A.1 Theoretical model

We incorporate the social norm of work hypothesis in a simple economic model. In our set-up we let utility proxy our main outcome of interest: mental health. Although economists traditionally do not measure utility, this psychology approach has in recent years become mainstream in the growing economics literature on life satisfaction, well-being and mental health (e.g., see [Clark, 2003](#); [Kahneman et al., 2004](#); [Blanchflower & Oswald, 2004, 2008](#); [Ulloa et al., 2013](#)).

A.1.1 Set-up

Our model is a direct application of the theory by [Akerlof & Kranton \(2000\)](#) to unemployment of older workers. The theory by [Akerlof & Kranton \(2000\)](#) allows for a tractable analysis of social norms via identity utility. To do so, we require, in addition to the standard economic framework, three ingredients to analyze identity: social categories, norms and ideals, and identity utility.

- *Social Categories:* We begin by classifying adult individuals into two types: (i) working age individuals and (ii) retirement age individuals. We indicate social categories with \mathbf{C} . Each person j has an assignment of all individuals to the social categories \mathbf{c}_j , so that each person has a conception of her own social category and that of all other people.
- *Norms and Ideals:* We suppose that working age individuals *should* be employed. In contrast, retirement age individuals do not have to be employed but can enjoy leisure time during retirement or may choose to continue working, depending on individual preferences and the constraints of the institutional environment (e.g., enforced retirement exists in some countries). We indicate the behavior that is appropriate for people in different social categories (in different situations) with \mathbf{P} . Hence, \mathbf{P} represents what is commonly referred to as the “social norm,” i.e. the socially shared belief.
- *Gains and Losses in Identity Utility:* We suppose individuals lose utility when they fail to comply with the social norm \mathbf{P} that corresponds to their assigned social category \mathbf{c}_j . Applied to our setting, a working age individual loses utility when he/she is not employed. A retirement age individual, on the other hand, does not lose utility from not working.

We can further formalize this using the following utility function

$$U_j = U_j(\mathbf{a}_j, \mathbf{a}_{-j}, I_j), \quad (3)$$

where \mathbf{a}_j represent an individual’s actions and \mathbf{a}_{-j} the actions of all other individuals.¹⁵ $U(\cdot)$ is increasing in identity I_j , which captures the individual’s identity or self-image as described by the following function:

$$I_j = I_j(\mathbf{a}_j, \mathbf{a}_{-j}; \mathbf{c}_j, \varepsilon_j, \mathbf{P}). \quad (4)$$

Here ε_j represents j ’s own given characteristics and identity depends on these characteristics to the extent that they match the ideal of j ’s assigned category, indicated by \mathbf{P} . An individual j chooses actions to maximize utility, taking as given \mathbf{c}_j , ε_j , \mathbf{P} and \mathbf{a}_{-j} .

¹⁵ “Since \mathbf{a}_j and \mathbf{a}_{-j} determine j ’s consumption of goods and services, these arguments in $U(\cdot)$ are sufficient to capture the standard economics of own actions and externalities” ([Akerlof & Kranton, 2000](#)).

A.1.2 Identity losses for the unemployed

Next, we argue that the actions of unemployed (older) individuals are themselves also constrained in an important way. In its simplest form, the individual faces the choice set for labor market activity $\mathbf{a}_j = \{\text{to work, not to work}\}$. Thus an individual of working age would prefer to work as this increases his/her identity utility. However, in most/many cases unemployed older individuals are unable to find suitable work such that the choice set simply consists of $\mathbf{a}_j = \{\text{not to work}\}$. This implies that the actions of a working age individual will not conform to the prescribed social norm and consequently the individual suffers a loss in identity utility.

Social norm of work and age

In reality the social norm of work is often not as black and white as described above. The actions of individuals (\mathbf{a}_j and \mathbf{a}_{-j}) are likely to directly feed into the commonly held beliefs of what appropriate behavior constitutes. Then, the decisions of individuals to engage in work determines, to an important extent, the social norm of who is expected to work in which situation, captured by \mathbf{P} . One important dimension along which this norm is likely to vary is age; the expectation of an individual to work will be especially strong during prime-age.

It seems intuitive that the social norm to work changes gradually as individuals approach the retirement phase of life and the fraction of peers in age choosing (early) retirement increases. This retirement behavior, which from the unemployed individual's perspective is the behavior of others \mathbf{a}_{-j} , is likely to affect the social norm \mathbf{P} , so that with age it becomes increasingly accepted that individuals are no longer working. Hence, we can distinguish a more finely grained number of social categories \mathbf{C} and corresponding social norms \mathbf{P} . With increasing age, individuals may gradually move from the social category "working age" to that of "retirement age", and as they do so the social norm of work is gradually reduced. Consequently, the deviation from the norm and the corresponding loss in identity utility are reduced when an unemployed individual shifts his/her own assigned social category with age. This may have a direct impact on mental health.

Besides the mentioned punishment in identity utility driven by own internal beliefs of what constitutes socially appropriate behavior, an unemployed individual may also suffer a loss in identity utility through "direct sanctions" imposed by peers. For example, being confronted with one's unemployment in social interactions and the inability to comply with the social norm can negatively affect identity. In most western societies it is common to ask someone what he/she does for a living when getting first acquainted. The inability to give a socially desirable answer to a question of another individual (\mathbf{a}_{-j}) may negatively impact identity (I_j) and thereby reduce identity utility for the unemployed: $\frac{\delta U_j}{\delta I_j} \frac{\delta I_j}{\delta \mathbf{a}_{-j}} < 0$.

A.2 EURO-D scale survey items

1. **Depression:** "In the last month, have you been sad or depressed?"
0 No
1 Yes
2. **Pessimism:** "What are your hopes for the future?"
0 Any hopes mentioned
1 No hopes mentioned
3. **Suicidality:** "In the last month, have you felt that you would rather be dead?"

- 0 No such feelings
 - 1 Any mention of suicidal feelings or wishing to be dead
4. **Guilt:** “Do you tend to blame yourself or feel guilty about anything?”
- 0 No such feelings
 - 1 Obvious excessive guilt or self-blame, mentions guilt or self-blame, but it is unclear if these constitute obvious, or excessive guilt or self-blame
5. **Sleep:** “Have you had trouble sleeping recently?”
- 0 No trouble sleeping
 - 1 Trouble with sleep or recent change in pattern
6. **Interest:** “In the last month, what is your interest in things?”
- 0 No mention of loss of interest, non-specific or uncodeable response
 - 1 Less interest than usual mentioned
7. **Irritability:** “Have you been irritable recently?”
- 0 No
 - 1 Yes
8. **Appetite:** “What has your appetite been like?”
- 0 No diminution in desire for food, non-specific or uncodeable response
 - 1 Diminution in desire for food
9. **Fatigue:** “In the last month, have you had too little energy to do the things you wanted to do?”
- 0 No
 - 1 Yes
10. **Concentration:** “How is your concentration?” (Difficulty in concentrating on entertainment or reading)
- 1 Difficulty in concentrating on entertainment
 - 2 No such difficulty mentioned
11. **Enjoyment:** “What have you enjoyed doing recently?”
- 0 Mentions any enjoyment from activity
 - 1 Fails to mention any enjoyable activity
12. **Tearfulness:** “In the last month, have you cried at all?”
- 0 No
 - 1 Yes

A.3 Tables

Table 1: Retirement ages - Men

	2004		2005		2006		2007		2011		2012		2013		2015	
	E	N	E	N	E	N	E	N	E	N	E	N	E	N	E	N
Austria	61.5	65	62	65	62	65	62	65	62	65	m	m	62	65	62	65
Belgium	60	65	60	65	60	65	60	65	60	65	m	m	60.5	65	61.5	65
Denmark	65	67	65	67	65	67	65	67	65	67	m	m	65	67	65	67
France	56	60	56	60	56	60	56	60	56	60	m	m	56	60.67	57	61.33
Germany	63	65	63	65	63	65	63	65	63	65	63	65.08	63	65.17	63	65.33
Greece	58	65	58	65	58	65	58	65	58	65	m	m	62	67	62	67
Italy	57	65	57	65	57	65	57	65	60	65	m	m	60	66.25	62	66.25
Netherlands	.	65	.	65	.	65	.	65	.	65	m	m	.	65.08	.	65.25
Spain	60	65	60	65	60	65	60	65	61	65	m	m	61	65	61	65
Sweden	.	65	.	65	61	65	61	65	61	65	m	m	61	65	61	65
Switzerland	63	65	63	65	63	65	63	65	63	65	m	m	63	65	63	65

Sources: [MISSOC \(2017\)](#) and [OECD \(2005, 2007, 2009, 2011, 2013, 2015\)](#). Notes: E stands for the early retirement age and N stands for the normal retirement age. If there exists no option for early retirement this is indicated with a full stop. Depending on the timing of the SHARE survey waves we do not need data on retirement eligibility ages for all countries for all years. When we did not gather data on retirement eligibility ages for a particular country and year this is indicated with m. In the SHARE data we observe age in months. Therefore, we convert the early and normal retirement ages from ages into months for our analyses. Additional comments on retirement ages by country in section ??.

Table 2: Cross-tabulation for number of observations by countries and waves (men between age 50 and the normal retirement eligibility age)

Country	Wave					Total
	1	2	4	5	6	
Austria	358	217	1,095	805	496	2,971
Belgium	942	811	1,327	1,303	1,257	5,640
Denmark	479	751	647	1,106	955	3,938
France	570	503	841	554	521	2,989
Germany	749	596	261	1,407	918	3,931
Greece	706	791	0	0	1,051	2,548
Italy	593	607	672	980	1,073	3,925
Netherlands	787	686	607	846	0	2,926
Spain	443	482	702	1,276	882	3,785
Sweden	725	599	278	722	498	2,822
Switzerland	245	367	849	592	459	2,512
Total	6,597	6,410	7,279	9,591	8,110	37,987

Table 3: Tabulation of labor market status categories (men between age 50 and the normal retirement eligibility age)

Labour market status	Number	Per cent
Retired	7,435	20
Employed	20,401	54
Unemployed	5,754	15
Other	4,397	12
Total	37,987	100

Table 4: Summary statistics for unemployed men between age 50 and the normal retirement eligibility age

	Men
Outcome	
EURO-D	2.62 [2.46]
Characteristics	
Age	57.9 [4.05]
> early ret. age	0.29
Household income (EUR)	21821.7 [31982.0]
ADL	0.27 [0.81]
IADL	0.18 [0.69]
Education (ISCED-97)	
No	0.060
Primary	0.20
Lower secondary	0.21
Upper secondary	0.34
Post-secondary	0.023
First stage tertiary	0.17
Second stage tertiary	0.0035
Marital Status	
Married	0.67
Partnered	0.074
Separated	0.015
Divorced	0.099
Widowed	0.014
Never married	0.13
Number of observations	5754

Source: SHARE waves 1, 2, 4, 5 and 6

Table 5: Men - OLS

Specification	(1)	(2)	(3)	(4)	(5)
Ret _{acw}	-0.858*** (0.145)	-0.809*** (0.146)	-0.805*** (0.150)	-0.924*** (0.157)	-0.937*** (0.159)
Primary		-0.252* (0.148)	-0.146 (0.151)	-0.186 (0.152)	-0.143 (0.155)
Lower secondary		-0.704*** (0.147)	-0.517*** (0.151)	-0.605*** (0.155)	-0.581*** (0.157)
Upper secondary		-0.745*** (0.141)	-0.537*** (0.144)	-0.657*** (0.152)	-0.629*** (0.154)
Post-secondary		-0.911*** (0.247)	-0.840*** (0.259)	-0.907*** (0.267)	-0.864*** (0.269)
First stage tertiary		-0.997*** (0.151)	-0.779*** (0.156)	-0.842*** (0.162)	-0.808*** (0.164)
Second stage tertiary		-1.475*** (0.552)	-0.973* (0.568)	-1.098* (0.568)	-1.015* (0.571)
Partnered		0.0153 (0.124)	0.0284 (0.131)	0.00207 (0.131)	-0.00498 (0.132)
Separated		0.517** (0.263)	0.441* (0.257)	0.435* (0.257)	0.425 (0.258)
Divorced		0.852*** (0.108)	0.720*** (0.108)	0.690*** (0.109)	0.680*** (0.111)
Widowed		1.178*** (0.268)	1.160*** (0.261)	1.144*** (0.262)	1.153*** (0.263)
Never married		0.587*** (0.0987)	0.412*** (0.100)	0.382*** (0.101)	0.384*** (0.102)
ADL			0.519*** (0.0511)	0.515*** (0.0512)	0.514*** (0.0514)
IADL			0.336*** (0.0605)	0.334*** (0.0605)	0.335*** (0.0607)
HH income ('0 000 EUR)			-0.0241** (0.0103)	-0.0265** (0.0107)	-0.0300*** (0.0110)
Constant	1.278*** (0.0472)	1.727*** (0.138)	1.449*** (0.142)	1.810*** (0.195)	1.225*** (0.362)
Observations	5754	5700	5191	5191	5191
R ²	0.006	0.038	0.095	0.099	0.105
Country dummies	No	No	No	Yes	Yes
Country × dummies	No	No	No	No	Yes

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 6: *Men - fixed-effects*

Specification	(1)	(2)	(3)
Ret _{acw}	-0.924** (0.378)	-1.015*** (0.385)	-1.139*** (0.392)
Partnered		-0.559 (0.723)	-0.596 (1.013)
Separated		0.629 (1.553)	1.050 (2.207)
Divorced		0.734 (0.762)	0.711 (0.874)
Widowed		1.728 (1.242)	1.435 (1.179)
Never married		-1.584* (0.831)	-1.200 (1.040)
ADL			0.351*** (0.118)
IADL			0.331** (0.154)
HH income ('0 000 EUR)			-0.00952 (0.0133)
Observations	2605	2574	2274
R ²	0.714	0.720	0.728

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 7: *Men: Sensitivity test - fixed-effects*

Specification	(1) No Greece	(2) Retired peers: 1-year age bracket	(3) Retired peers: 5-year age bracket
Ret _{acw}	-1.268*** (0.406)	-1.078*** (0.379)	-1.266*** (0.398)
Partnered	-0.517 (1.030)	-0.591 (1.017)	-0.589 (1.007)
Separated	1.131 (2.235)	1.031 (2.203)	1.053 (2.202)
Divorced	0.824 (0.922)	0.700 (0.875)	0.730 (0.868)
Widowed	1.486 (1.184)	1.423 (1.186)	1.440 (1.182)
Never married	-1.106 (1.047)	-1.209 (1.036)	-1.183 (1.035)
ADL	0.370*** (0.120)	0.351*** (0.118)	0.354*** (0.118)
IADL	0.357** (0.157)	0.329** (0.154)	0.333** (0.154)
HH income ('0 000 EUR)	-0.00914 (0.0132)	-0.00944 (0.0132)	-0.0100 (0.0133)
Observations	2166	2274	2274
R ²	0.727	0.727	0.728

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 8: Men: robustness test - OLS

Specification	(1)	(2)	(3)	(4)	(5)
Ret _{acw}	-0.851*** (0.146)	-0.797*** (0.147)	-0.780*** (0.151)	-0.955*** (0.157)	-0.974*** (0.159)
Primary		-0.311** (0.149)	-0.209 (0.152)	-0.247 (0.152)	-0.157 (0.155)
Lower secondary		-0.759*** (0.148)	-0.576*** (0.152)	-0.664*** (0.155)	-0.603*** (0.156)
Upper secondary		-0.810*** (0.142)	-0.615*** (0.145)	-0.717*** (0.152)	-0.653*** (0.154)
Post-secondary		-1.072*** (0.249)	-1.001*** (0.261)	-0.945*** (0.268)	-0.866*** (0.269)
First stage tertiary		-1.071*** (0.152)	-0.869*** (0.157)	-0.899*** (0.162)	-0.828*** (0.163)
Second stage tertiary		-1.457*** (0.556)	-0.955* (0.572)	-1.175** (0.569)	-1.051* (0.570)
Partnered		0.0499 (0.125)	0.0554 (0.132)	0.00301 (0.132)	-0.0122 (0.132)
Separated		0.581** (0.265)	0.510** (0.259)	0.452* (0.257)	0.416 (0.258)
Divorced		0.904*** (0.109)	0.777*** (0.108)	0.721*** (0.110)	0.678*** (0.111)
Widowed		1.176*** (0.270)	1.165*** (0.263)	1.155*** (0.262)	1.138*** (0.262)
Never married		0.606*** (0.0994)	0.441*** (0.101)	0.421*** (0.101)	0.389*** (0.102)
ADL			0.531*** (0.0515)	0.521*** (0.0513)	0.515*** (0.0513)
IADL			0.334*** (0.0609)	0.339*** (0.0605)	0.340*** (0.0606)
HH income ('0 000 EUR)			-0.0213** (0.0104)	-0.0239** (0.0107)	-0.0303*** (0.0109)
Constant	2.822*** (0.0476)	3.320*** (0.139)	3.034*** (0.143)	3.205*** (0.196)	2.798*** (0.362)
Observations	5754	5700	5191	5191	5191
R ²	0.006	0.040	0.098	0.113	0.124
Country dummies	No	No	No	Yes	Yes
Country × wave dummies	No	No	No	No	Yes

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 9: *Men: robustness test - fixed-effects*

Specification	(1)	(2)	(3)
Ret _{acw}	-0.822** (0.379)	-0.910** (0.386)	-1.027*** (0.396)
Partnered		-0.529 (0.699)	-0.567 (0.984)
Separated		0.731 (1.542)	1.248 (2.235)
Divorced		0.856 (0.741)	0.831 (0.855)
Widowed		1.738 (1.301)	1.451 (1.252)
Never married		-1.527* (0.846)	-1.131 (1.055)
ADL			0.360*** (0.118)
IADL			0.345** (0.152)
HH income ('0 000 EUR)			-0.00750 (0.0132)
Observations	2605	2574	2274
R ²	0.718	0.723	0.730

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

A.4 Figures

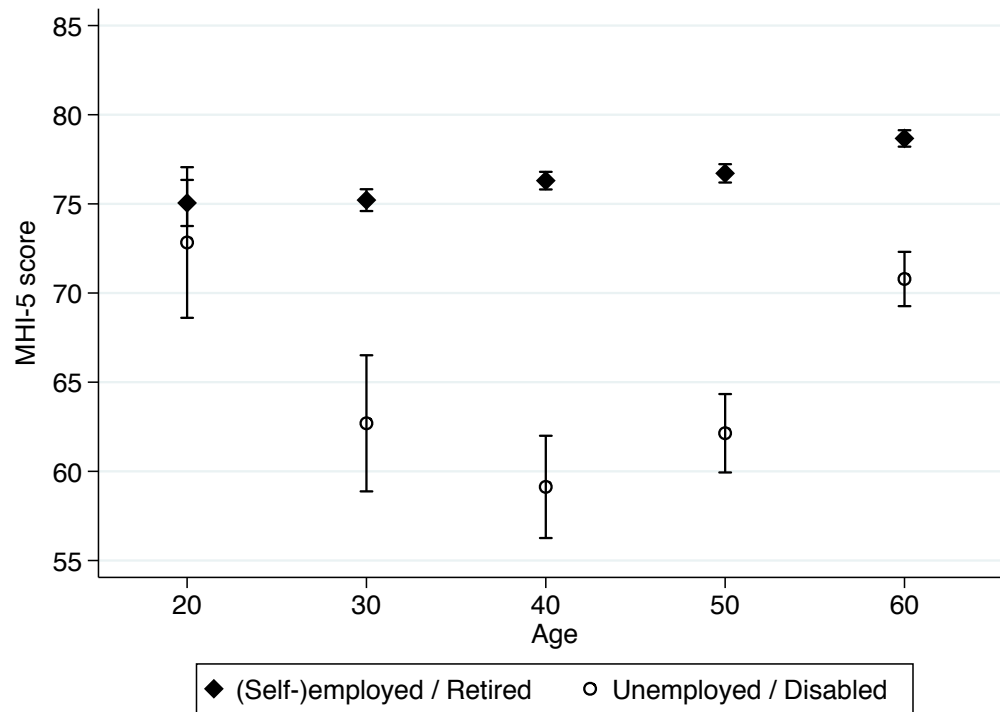


Figure 1: Life cycle plot of MHI-5 score for Dutch men. The plot displays average MHI-5 scores and 95% confidence intervals for 10-year age groups (16-25, 26-35,...,56-65). The MHI-5 score is an index score for depression and anxiety between 0 (worst mental health) and 100 (best mental health). Labor market status is based on self-reported labor market status. MHI-5 scores of 60 or lower are indicative of mental ill-health (Perenboom et al., 2000).

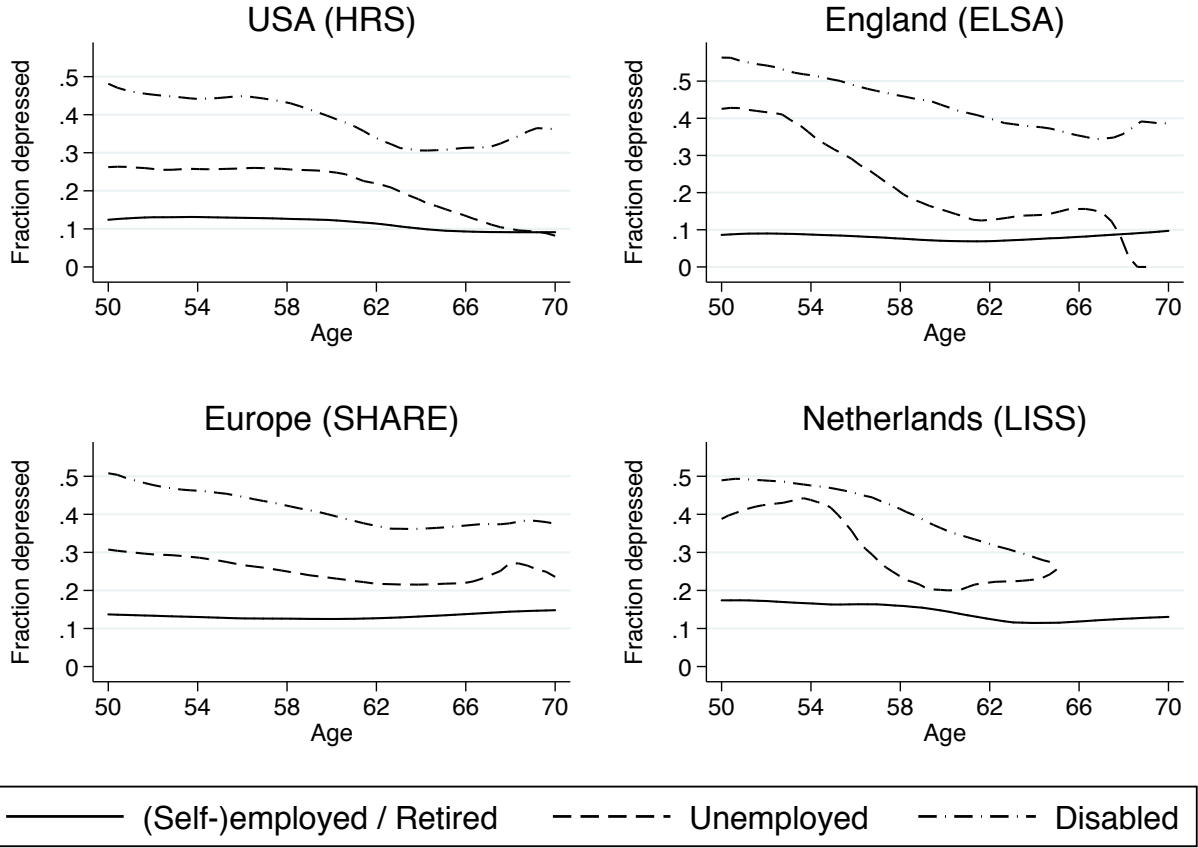


Figure 2: Fraction of individuals with a mental health score that is indicative of mental ill-health. The plots are based on kernel-weighted local polynomial regressions. Data comes from the Health and Retirement Study (HRS; using the 5 waves from 2004 to 2012), the English Longitudinal Study of Aging (ELSA; using the 5 waves from 2004 to 2012), the Survey of Health, Aging, and Retirement in Europe (SHARE; using all waves except wave 3, which concerned life-history interviews) and the Longitudinal Internet Studies for the Social sciences (LISS; waves 1-8 in 2007-2015) for the USA, England, Europe and The Netherlands, respectively. For all surveys we converted mental health scores in a binary “depression” indicator using cut-off scores that have been determined for the prediction of mood or anxiety disorders. The HRS and ELSA use the CES-D scale, for which scores of 4 or higher are indicative of mental ill-health (Fonseca et al., 2014), SHARE uses the EURO-D scale, which has a similar cut-off score of 4 (Prince et al., 1999; Castro-Costa et al., 2007; Fonseca et al., 2014), and LISS uses the MHI-5 scale, for which a score of 60 or lower is indicative of mental ill-health (Perenboom et al., 2000). All plots are based on self-reported labor market status.

Men

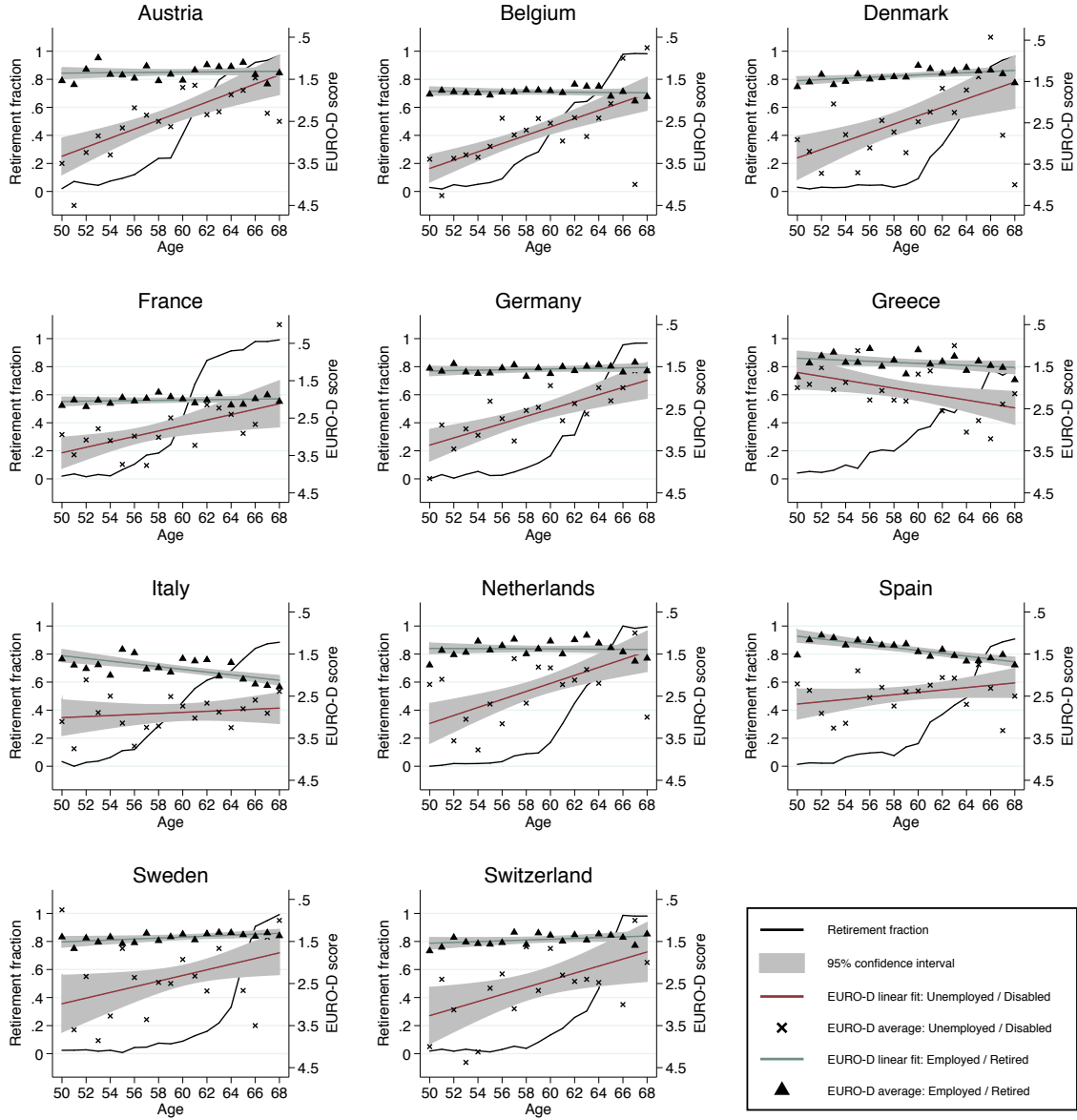


Figure 3: Retirement fraction by country and age in years and EURO-D scores for unemployed and non-unemployed individuals by country and age in years. The linear fits are based on individual-level data. All plots are averaged over the 5 survey waves included in the analysis.



Figure 4: Histogram of EURO-D scores for unemployed men between age 50 and the normal retirement eligibility age.

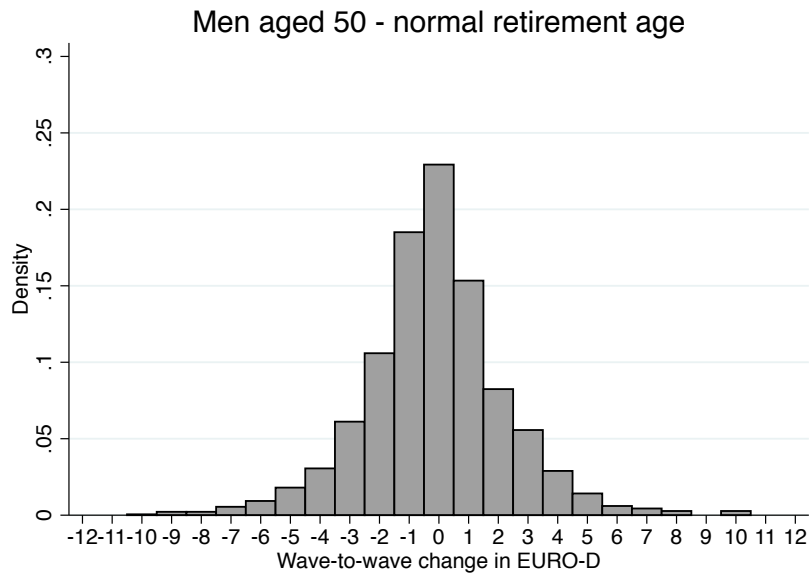


Figure 5: Histograms of wave-to-wave changes in EURO-D scores for unemployed men between age 50 and the normal retirement eligibility age.

Men

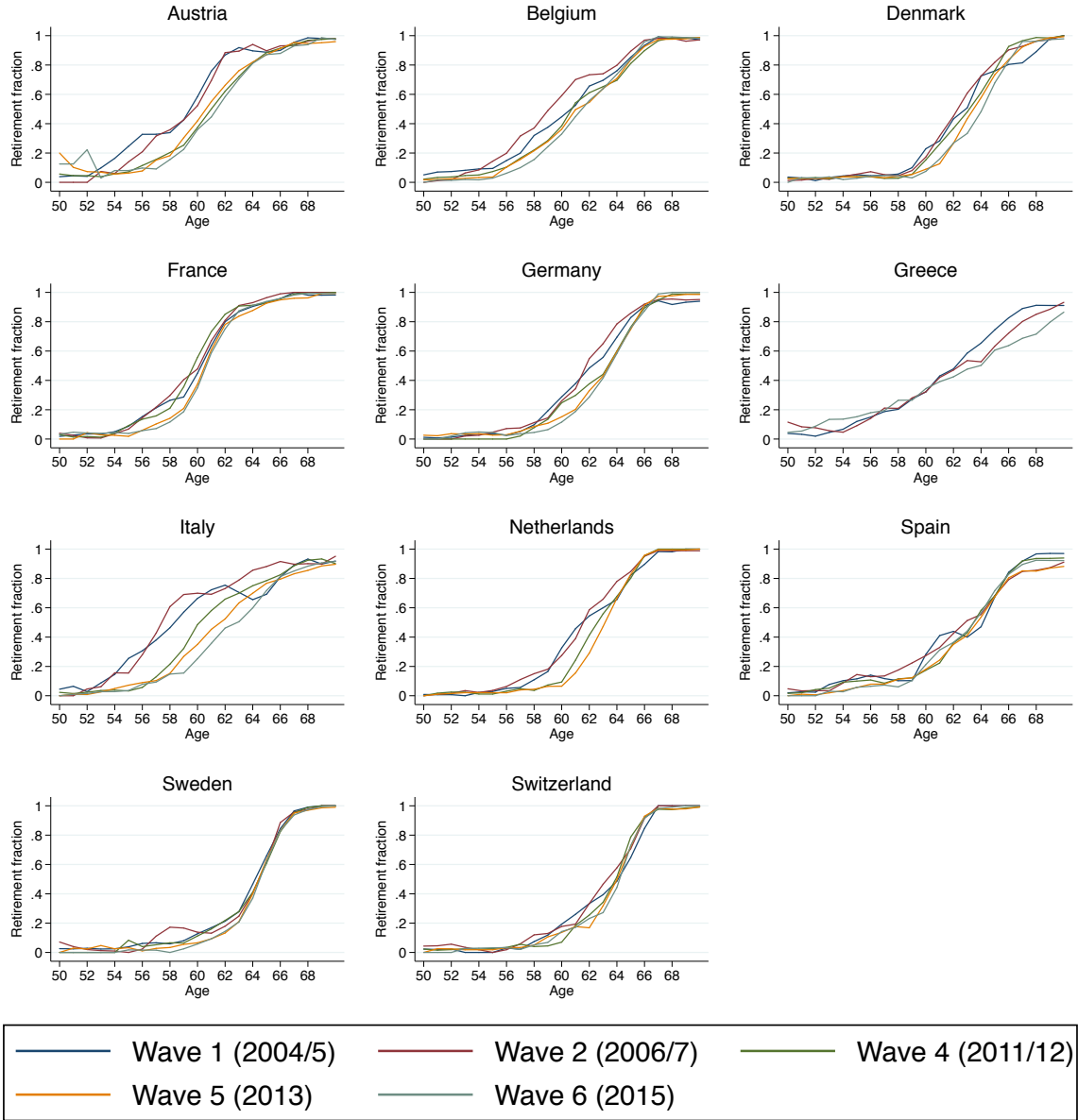


Figure 6: Retirement fraction Ret_{acw} by country and wave over age as used in our main regression specification (see equation 1).

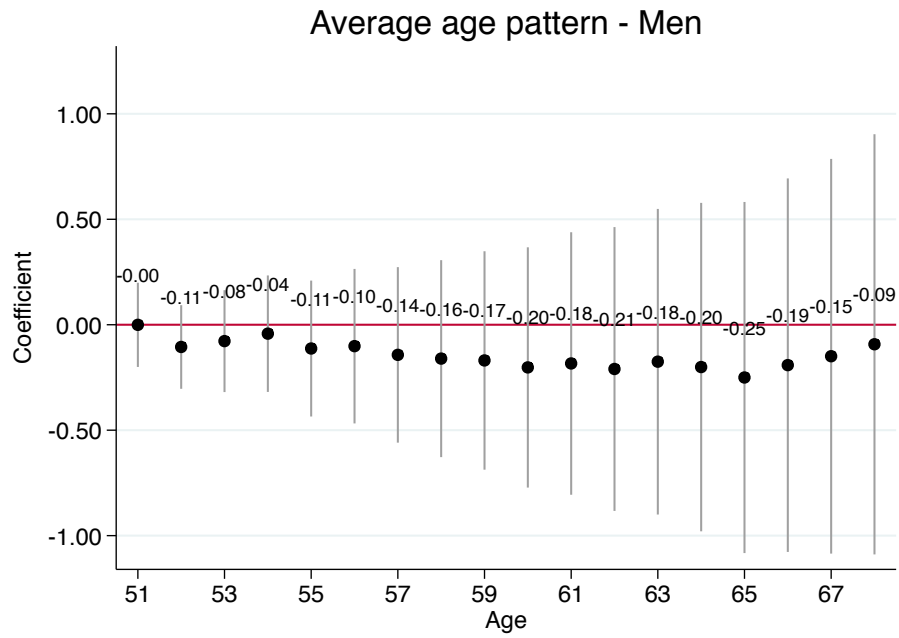


Figure 7

Men

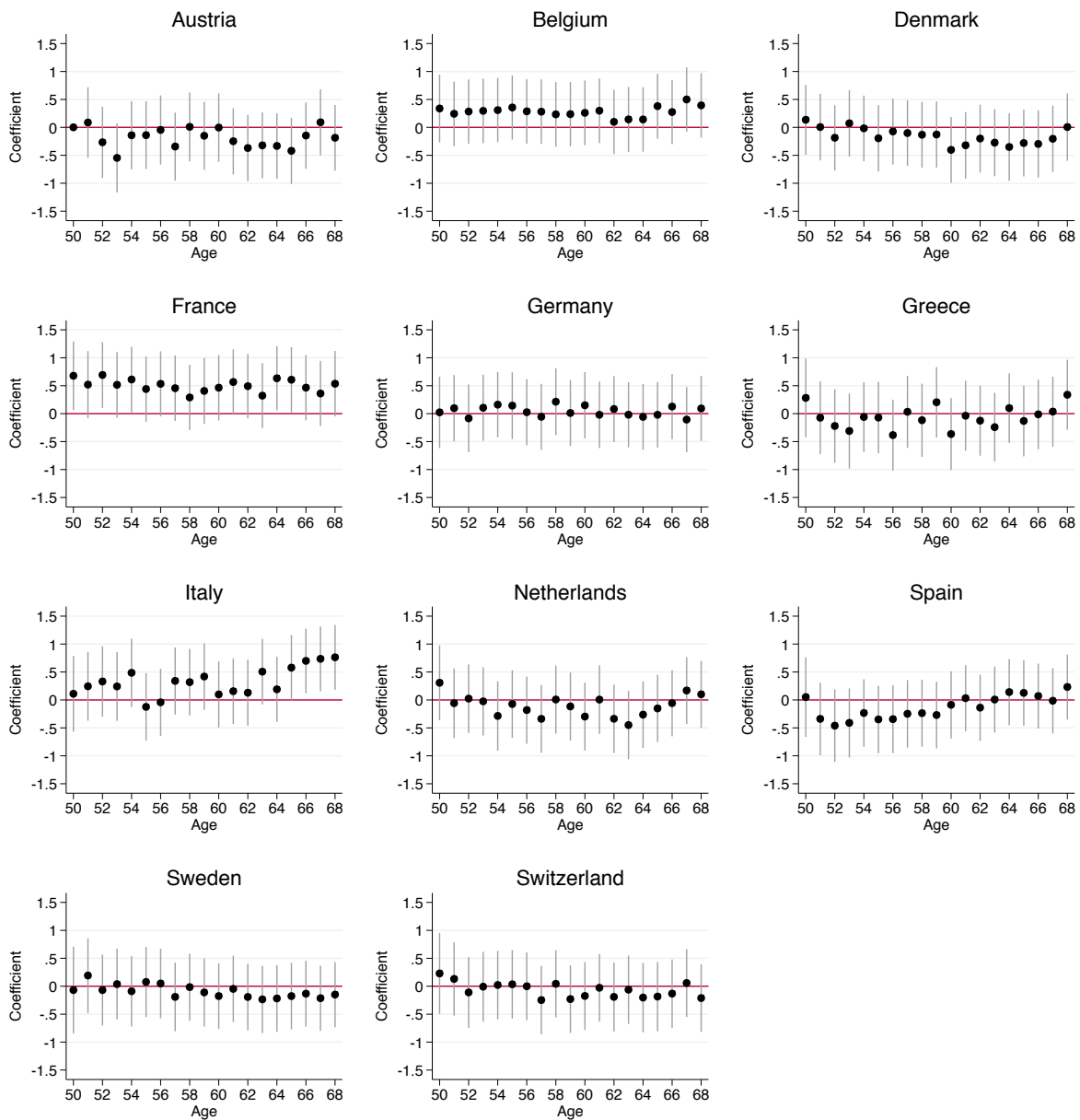


Figure 8

A.5 Robustness: EURO-D score as the dependent variable

As a robustness test we run the regressions that simply uses MH_{iacw}^U , the observed EURO-D scores, as the dependent variable instead of the mental health gap relative to the reference group. Hence, we estimate:

$$MH_{iacw}^U = \alpha + \gamma Ret_{acw} + \beta X_{iw} + \varepsilon_{iw}, \quad (5)$$

However, because of the high collinearity of age with the retirement fraction Ret_{acw} (see Figure 6), linear or quadratic age controls would remove any effect of the retirement fraction in this regression specification. Therefore we do not control for age in this specification. We justify this based on our finding, both in this paper and in our previous work (Van de Kraats et al., forthcoming), that mental health scores of the employed and retired, the reference group for the unemployed and disabled, are very stable with age. In the SHARE data this is mainly supported by the following three descriptive results.

First, Figure 3 shows that mental health for the employed and retired is fairly stable in most countries in the SHARE sample. The main exceptions to this are Italy and Spain which show a slight worsening of the EURO-D score with age. Second, Figure 7 shows coefficient estimates of a fixed-effects regression of the EURO-D score on a full set of age dummies for the employed and retired in the age range 50-68. In this regression we control for survey wave using wave dummies. None of the coefficient estimates for ages 51-68 differ significantly from zero, implying that on average across countries there are no differences in mental health compared to the reference group of individuals aged 50. Finally, Figure 8 presents a similar plot based on OLS estimation where we interact age dummies with country dummies and control for survey wave. Here we observe that also for each individual country the age pattern of the employed and retired is flat.

The advantage of estimating equation 5 is that we no longer have to worry about potential bias due to simultaneity between the retirement fraction Ret_{acw} and the average mental health score of the reference group \overline{MH}_{acw}^{ER} . Thus, there is a trade-off between the ability to difference out age, country and wave effects (as we do in our main specification using the mental health gap) and a potential endogeneity issue.

Table 8 presents the results of an OLS estimation of equation 5. Comparing columns (1)-(5) to those of Table 5, it becomes clear that the point estimates for the retirement fraction Ret_{acw} are highly similar in both specification, both in significance and size. Estimations with individual fixed-effects are also highly similar as follows from a comparison of Tables 6 and 9. Note that in a fixed-effects estimation wave dummies would mostly pick up age effects if we do not control for age itself (i.e. wave dummies pick to a large extend the fact that individuals age between consecutive waves). Hence, the argument that we cannot control for age effects implies that we also cannot control for waves when exploiting only within-individual variation.