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Retirement and Health Behavior

Abstract

In this paper we investigate whether and to what extent retirement changes health behavior. In the analysis we consider three sources of individual heterogeneity: gender, geographic region, and baseline health behavior. Using an instrumental variable approach that exploits exogenous variations in retirement ages within and across 10 European countries, we find that, among those who abstained from a behavior at baseline, retirement increases the frequency of alcohol consumption and the frequency of vigorous or moderate physical activity, but not necessarily the tendency to smoke. Among those who had a behavior at baseline, however, retirement decreases the tendency to smoke and implies a smaller increase in the frequency of vigorous activities. There was no mitigation of the impact to increase alcohol consumption. We further show that these effects are qualitatively similar across genders and the geographic regions of Europe.

Keywords: retirement, health behaviors, smoking, drinking, physical activity

JEL codes: J26, J14, I12, C23.

1. Introduction

Retirement is a major life-course transition that often brings changes in many areas of a person's life. As individuals live longer and the elderly share of a population increases, their health and well-being can impact economic growth and distribution, as well as having important consequences on specific industries, especially those associated with healthcare and recreational activities. In this paper we focus on how retirement affects health behavior. We provide a causal evaluation of the role of retirement on health behaviors within an international context. Using data from the Survey of Health, Ageing, and Retirement in Europe (SHARE), a panel survey on nationally representative samples of individuals aged 50 or over, we examine whether and to what extent retirement can induce people to make better lifestyle choices in relation to three key health behaviors: smoking, drinking alcoholic beverages, and physical activity.

There is extensive but conflicting research that looks at the causal effect of retirement on health. Charles (2004), Neuman (2008), Coe and Zamarro (2011), Latif (2013), Insler (2014) and Eibich (2015) all conclude that retirement may lead to significant health improvements; but other studies find negative retirement effects (e.g. Dave et al., 2008; Behncke, 2012). Retirement has also been shown to negatively affect cognitive abilities (Rohwedder and Willis, 2010; Bonsang et al., 2012; Mazzonna and Peracchi, 2012), and that such impacts might depend on people's occupational choices (Coe et al., 2012; Mazzonna and Peracchi, 2014).

The fact that one often observes differential health outcomes post-retirement raises the question to what extent such outcomes can be traced to changes in individuals' health behaviors. We focus on three behaviors – regular exercise, refraining

from smoking and avoiding excessive alcohol consumption – that are associated with various health benefits: lower incidence of chronic diseases (Britton et al., 2008), reduced risk of losing mobility in later life (LaCroix et al., 1993), and greater longevity (Ferrucci et al., 1999; LaCroix et al., 1993). Changes in health behaviors after retirement have received some moderate attention in the public health literature. Zantinge et al. (2013) offers an extensive review. They found conflicting results in the literature about alcohol consumption, but concluded that those who retired involuntarily increased drinking, while those who retired voluntarily showed no change. Their review of the literature indicated that moderate physical activity increased, but studies on smoking were too limited for any conclusions to be found.

Only a handful of studies in the economics literature have examined the relationship between retirement and health behaviors. They provide evidence that retirement generally induces better health behaviors; it may reduce smoking and increase exercise within both a US sample (Insler, 2014) and a Japanese sample (Zhao et al., 2013); it may also help relieve work-related stress and strain, increase the duration of sleep, as well as the frequency of participation in physical activities in a German sample (Eibich, 2015). To our knowledge, there is but one prior study on retirement and health behaviors in an international context (Celidoni and Rebba, 2015). Using data from SHARE, they find that retirement reduces people's tendency to remain inactive or abstain from any vigorous physical activity, but not necessarily their tendency to avoid smoking and drinking alcoholic beverages. Although the impact of retirement on vigorous physical activity appears to be more pronounced among females, there is little evidence of gender differences in how retirement affects either smoking or drinking alcoholic beverages.

It is reasonable wonder why we would expect health behaviors to change at retirement. From an economic perspective, the opportunity cost of time decreases and wage income decreases. Both these changes have substitution and income effects on the time costs of healthy behaviors. Depending on if the behavior is seen as a normal or inferior good, they might increase or decrease. Moreover, the investment value of healthy behaviors may decrease as income becomes less dependent on health and time horizons shorten (Grossman, 1972). The behavioral model used in Rosenman (2011) shed further insights on these conflicting incentives. Zantinge et al. (2013) speculates on how the social changes of retirement can affect healthy behaviors, including a desire to maintain health and independence, changes in social interaction, and different peer groups as a worker transitions from employment to retirement. With so many conflicting elements in the impact of retirement on healthy behaviors, the overall result is an empirical question depending on the relative strengths of the different factors.

From an empirical perspective, identifying the causal effect of retirement on health-related behaviors presents the challenge that retirement is likely endogenous.[1] Causality may run in reverse: individuals with unhealthy lifestyles may be more prone to becoming ill, and this may induce them to retire earlier than individuals with healthier lifestyles. There may also be unobserved variables such as an individual's discount factor affecting both the decision to retire and health behaviors. In addition, the retirement variable may be susceptible to error in the way it is measured in panel surveys. In this paper, we address the endogeneity of retirement by using an instrumental variable (IV) approach that exploits the early and normal retirement ages in

[1] The endogeneity of retirement is bolstered by the finding in Zantinge et al. (2013) that how retirement affects drinking depends on whether or not retirement was voluntary or not, especially the fact that those who retired voluntarily did not increase alcohol consumption. Our point is that those who wait until mandatory retirement age are in fact making a choice as clearly as those who retire earlier.

10 European countries as a source of exogenous variation in retirement status, an approach successfully implemented by others (e.g. Coe and Zamarro, 2011; Bonsang et al., 2012; Horner, 2014; Celidoni and Rebba, 2015; Kesavayuth et al., 2015).

In addition to using a recently released wave of SHARE data for 20012/13 (wave 5), our empirical approach differs from Celidoni and Rebba (2015) in three ways. First, we consider the frequency in which individuals engage in certain health behaviors (drinking alcoholic beverages and physical activity) instead of looking only at whether or not they had a particular behavior. Second, our sample consists of respondents who were employed at baseline (wave 1), which allows us to control for people's health behaviors at baseline. Besides shedding some light on individual heterogeneity between those who abstained from a particular health behavior (at the start of the panel) vis-à-vis those who did not, our approach also allows us to better understand whether people can actually *change* their behaviors as a result of retiring. Finally, we consider an additional source of individual heterogeneity – geographic region – that may help us to better understand the impact of retirement on health behaviors.

Our findings provide evidence of substantial heterogeneity in how retirement affects health behaviors. They suggest important differences between individuals who had specific behaviors at baseline and those who did not, particularly for smoking and vigorous physical activity. At the same time, our analysis revealed little evidence of heterogeneity with respect to gender or geographic region.

The paper is organized as follows. Section 2 discusses our empirical model and strategy. Section 3 describes the data. Section 4 presents the results with some further emphasis on heterogeneity. Section 5 extends our analysis in various ways. Section 6 concludes the paper.

2. Empirical Model and Strategy

Let BH_{it} be a health behavior: smoking, physical activity or drinking alcoholic beverages (drinking hereafter), where *i* denotes the set of individuals who are observed at different time-points, *t*.[2] Our empirical model takes the following form:

$$BH_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 BH0_i + \beta_3 (BH0_i \cdot R_{it}) + \beta_4 \boldsymbol{x}_{it} + \beta_5 \boldsymbol{z}_i + a_i + \varepsilon_{it} \qquad (1)$$

where R_{it}, a dummy variable that takes on the value 1 if an individual has retired at time *t*, is the explanatory variable of interest. The individual's health behavior at baseline (wave 1) is indicated by $BH0_i$, $\boldsymbol{x}_{it}$ is a vector of predictor variables that vary over time, $\boldsymbol{z}_i$ is a vector of predictor variables that do not vary over time, a_i is the person-specific error (the individuals' fixed effects), and ε_{it} is the idiosyncratic error. The dependent variable, BH_{it}, is any of our four health behaviors; smoking, physical activity (vigorous and moderate) and drinking.

Our interest is in the coefficient on "retired", β_1, which captures the effect of retirement on health behaviors among individuals who abstained from a particular health behavior at baseline, and on the coefficient β_3, on the interaction term between retirement and baseline health behavior. The sum of the two coefficients, $\beta_1 + \beta_3$, captures the impact of retirement on health behaviors among individuals who had a particular behavior at baseline. In our primary analysis we estimate equation (1) using a within (or fixed effects) estimator, so $BH0_i$ naturally drops out from the estimation, but the interaction term between "retired" and baseline health behavior remains.

[2] As explained below in the data section, BH_{it} is a binary variable (smoker or not) for smoking, measured on a four-point scale frequency for the physical activity behaviors, and a seven point scale for alcohol consumption.

As discussed earlier, there are several reasons why retirement might be endogenous: reverse causality, omitted variables that affect both retirement and health behaviors and/or measurement error in retirement itself. The fixed effects estimator helps to measure the coefficients of interest by eliminating potential bias that may arise from time-constant omitted variables. However, it does address the other potential sources of endogeneity in retirement: time-varying omitted variables, reverse causality and measurement error in retirement itself.

To deal with these issues we use an IV approach. To be valid, our instruments must be highly correlated with the individuals' decision to retire (i.e. relevant), but they must also be distributed independently of the error process (i.e. exogenous). Previous studies have used the eligibility ages for public (old-age) pension as instruments for retirement, showing they are indeed strong predictors of retirement behavior (e.g. Celidoni and Rebba, 2015; Bonsang et al., 2012; Coe and Zamarro, 2011; Mazzonna and Peracchi, 2012, 2014). As such eligibility ages are determined by laws, they apply to all individuals who reach certain age-thresholds. In consequence, being eligible for public pension is exogenous to individual-level characteristics when controlling for age (Horner, 2014).

Our instruments are based on the eligibility ages for early and normal retirement that applied to the 10 European countries of our sample during the period 2006-2013. An individual is considered eligible for public pension if he/she has reached a certain age-threshold according to his/her nationality and gender. Drawing information from the U.S. Social Security Administration (Office of Retirement and Disability Policy) and OECD, our instruments are thus two dummy variables indicating eligibility for early and normal retirement. Table B1 in Appendix B shows that these retirement ages

may differ by country and gender by as much as 6.25 years; and they have changed for some countries over our sample period.

Our identification strategy relies on two sources of exogenous variation in the instruments: between- and within-country variation. While between-country variation arises because retirement ages may differ across countries, within-country variation stems from the fact that eligibility ages may have changed over time for some countries. To account for the latter source of exogenous variation in retirement incentives, we consider the pension reforms that were implemented in the different countries over our sample period, drawing again information from the U.S. Social Security Administration and OECD.[3] Indeed, this additional source of variation in the instruments helps to increase the power of our analysis. As the number of instruments exceeds the number of endogenous variables, our model is over-identified and therefore we can test for instrument exogeneity by using the Sargan-Hansen test of over-identifying restrictions.

3. Data

Our data source is the Survey of Health, Ageing, and Retirement in Europe (SHARE). SHARE is a bi-annual, longitudinal data set on a sample of Europeans aged 50 or over, along with their spouses/partners regardless of age. SHARE collects nationally representative data from many European countries and is designed to include cross-nationally comparable information harmonized with the U.S. Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA). Detailed

[3] See also Mazzonna and Peracchi (2014) for a comprehensive account of pension reforms in Europe.

information on the sampling procedure and fieldwork methodology can be found in Börsch-Supan and Jürges (2005).

The first wave (2004/05) of the SHARE survey included data from 11 European countries representing the different regions of Europe: Scandinavia (Denmark and Sweden), Central Europe (Austria, France, Germany, Switzerland, Belgium and the Netherlands) and the Mediterranean (Spain, Italy and Greece). Alongside a wealth of information about health, socio-economic status and family conditions, SHARE collected data on health behaviors in four waves: wave 1 (2004/05), wave 2 (2006/07), wave 4 (2010/11) and wave 5 (20012/13).[4] Because we are interested in how health behaviors may change after people transition to retirement, our sample consists of individuals aged 50-75 who were employed in the first wave. Some individuals might have retired in the subsequent waves. Controlling for individuals' initial health behaviors (wave 1), we use the other three waves (wave 2, 4 and 5) for our empirical analysis, focusing on the countries that contributed to the baseline survey in wave 1.[5] We excluded from the sample individuals with missing answers for the questions required for our analysis. The final sample corresponded to an unbalanced panel of 5,319 unique individuals (2,591 females and 2,728 males) and 11,518 observations. Among these observations, 6,588 observations were from Continental Europe, 3,411 observations were from Scandinavia and 1,519 observations were from the Mediterranean.

[4] See Börsch-Supan (2013a, 2013b, 2013c, 2015) and Börsch-Supan et al. (2013a) for the SHARE dataset.

[5] Wave 3 was not relevant for our purpose as it contains information on retrospective life histories of the respondents. Furthermore, from the countries contributing to the baseline survey, we excluded Greece because it participated in the first and second waves only.

Measures of health behaviors

SHARE contains measures of health behaviors related to smoking, physical activity and drinking. For our outcome variable on smoking, we constructed a dummy variable indicating if an individual is a current smoker. Among the 11,518 observations used in our analysis, 20.47 percent reported being a current smoker.

In SHARE, individuals are also asked about the frequency they participate in physical activity of vigorous or moderate intensity. Vigorous physical activity is assessed with the question "How often do you engage in vigorous physical activity, such as sports, heavy housework, or a job that involves physical labour?" Answers are reported on a 4-point scale that ranges from "more than once a week" to "hardly ever or never". For our analysis, we recoded the responses on a 0-3 scale so that 0 indicates "hardly ever or never" and 3 indicates "more than once a week". Among the 11,518 observations used in our analysis, 28.69 percent reported that they did not participate in any vigorous physical activity. For moderate physical activity, respondents were asked on the same 4-point scale to report how often they engage in activities that require a moderate level of energy such as gardening, cleaning the car, or doing a walk. Answers were again recoded so that 0 indicates "hardly ever or never" and 3 indicates "more than once a week". In our sample, 4.33 percent of the respondents reported that they did not participate in any moderate physical activity.

SHARE also measures drinking behavior of all respondents. Although questions on drinking have been modified over time, a question related to the frequency of drinking was included in all waves. Individuals were asked how often they drunk any alcoholic beverages, like beer, cider, wine, spirits or cocktails, during the last 3 months. Answers were reported on a 7-point scale ranging from "almost every day" to "not at all

in the last 3 months". The answers were recoded from 0 to 6 so that higher numbers indicate more frequent consumption of alcohol. In our sample, 13.91 percent of the respondents said they did not drink any alcoholic beverages at all.

The retirement variable

We define an individual who is currently engaged in paid work or self-employed as "working".[6] For those who reported not to be working, we constructed four dummy variables to distinguish those who were unemployed, permanently sick or disabled, or homemakers from those who were retired. As explained above, we use the eligibility ages for early and normal retirement to construct two instruments for "retired". The instruments were also used in the interaction term between "retired" and baseline health behaviors in estimating equation (1).

Other explanatory variables

Our analysis accounts for the potentially confounding effects of socio-economic variables that may affect both individuals' decision to retire and their health behaviors. Specifically, in equation (1) we included as additional controls age, gender, household income, years of education, household size, marital status (a set of dummy variables with married as a reference category), a dummy variable for those respondents who have worked or are currently working in a physically demanding job, a dummy variable for those who have worked or are currently working in a stressful job, European region

[6] The current definition of retirement is in line with earlier work by Coe et al. (2012), Horner (2014), Kesavayuth et al. (2015), and Mazzonna and Peracchi (2014), among others.

and time (wave) dummies. Table 1 provides descriptive statistics first for the whole sample and then by gender or geographic region of the respondent.

4. Results

In Table 2 we report initial estimates for our variables of interest in equation (1) using actual responses, not instruments, for "retired". Columns 1-4 report estimates from a simple random effects model, keeping in baseline behavior. Among those who abstained from a particular health behavior at baseline (i.e. wave 1 health behavior is equal to zero),[7] we find that retirement is positively related to the probability of being a current smoker, the frequency of drinking alcoholic beverages, and the frequency of participating in vigorous or moderate physical activities (all effects at p-values < 0.01). The estimates also suggest some initial evidence of heterogeneity between those who abstained from a particular health behavior at baseline and those who did not; such evidence appears to be most relevant for smoking, vigorous physical activity and drinking. In terms of the main effects of each of the four health behaviors at baseline, we find that they are all positive and statistically significant at p-values < 0.01.

In columns 5-8 of Table 2, we use the fixed effects estimator to correct for potential bias in equation (1) emanating from unobserved heterogeneity at the individual level. The estimates suggest qualitatively similar results to those obtained with random effects. As health behaviors at baseline are recorded only once and therefore are time-invariant, they naturally drop out from the estimations. A Hausman test strongly rejects the null hypothesis that the coefficient estimates obtained from the fixed and random

[7] For physical activities this indicates "hardly ever or never", and for drinking behavior it indicates "not at all in the last 3 months".

effects models do not systematically differ with respect to smoking and physical activity (vigorous or moderate); though it fails to reject the null hypothesis for drinking behavior.[8] This implies that for smoking and physical activities the fixed effects estimator is likely the correct choice, while the use of fixed effects is still permissible when estimating equation (1) for drinking.

We next account for the possible endogeneity of retirement by using the IV approach outlined in section 3.[9] Based on the first-stage regression results, Table 3 shows that the Kleibergen-Paap under-identification LM test rejects the null hypothesis, suggesting that our instruments are adequate to identify the model. However, as suggested by Bound et al. (1995), Staiger and Stock (1997) and others, the problem of weak instruments may still be present. We thus consider the first-stage F statistics for the joint significance of the excluded instruments. They are all above the rule-of-thumb value of 10 suggested by Staiger and Stock (1997), and therefore indicate rejection of the null hypothesis of weak IVs.[10] Similarly, the Kleibergen-Paap weak-identification Wald F test rejects the null hypothesis of weak IVs, thus providing further evidence in support of our empirical approach.[11]

[8] The corresponding chi-square statistics are 42.43 (p-values < 0.0003), 45.90 (p-values < 0.0001), 42.27 (p-values < 0.0004) and 0.1604 (p-values < 0.1604) in the smoking, vigorous physical activity, moderate physical activity and drinking regression equations, respectively.

[9] The estimates are obtained via the Stata module xtivreg2 of Baum et al. (2010).

[10] The first-stage F statistics for the joint significance of the excluded instruments in the retirement regressions for smoking, vigorous physical activity, moderate physical activity, and drinking are 162.77, 162.69, 162.27, and 162.32, respectively. In the first-stage regressions of the interaction terms Retired x Wave 1 smoking behavior, Retired x Wave 1 vigorous activities frequency, Retired x Wave 1 moderate activities frequency and Retired x Wave 1 alcoholic beverage consumption frequency, the corresponding F statistics for the excluded instruments are 173.89, 302.68, 220.10 and 143.52.

[11] As suggested by Baum et al. (2007), comparing the rk Wald F statistic against the critical values compiled by Stock and Yogo (2005) can provide suggestive evidence in the presence of non-i.i.d. errors, though the rule-of-thumb value of 10 (Staiger and Stock, 1997) can also be used as an alternative.

The IV estimates are all qualitatively similar to those using actual response; however, correcting for possible endogeneity strongly increases the magnitude of all relationships. Our IV estimates reported in columns 1-4 of Table 3 suggest that, among those who abstained from a particular health behavior at baseline, retirement increases the probability of being a current smoker by about 5.23% points (at p-values < 0.05). It also increases the frequency of vigorous physical activity by about 0.45 standard deviations (at p-values < 0.01), the frequency of moderate physical activity by 0.76 standard deviations (at p-values < 0.05), as well as the frequency of consuming alcoholic beverages by 0.22 standard deviations (at p-values < 0.01).

Our estimates in columns 1-4 of Table 3 also provide some evidence that having a behavior at baseline may mitigate how retirement impacts that behavior. More specifically, there is a negative coefficient on the interaction between retirement and wave 1 smoking behavior (at p-values < 0.01). This implies that the positive effect of retirement on smoking is completely offset for those who smoked at baseline, that is, 0.0523 – 0.400 = – 0.3477. The estimates also show a negative coefficient on the interaction between retirement and baseline vigorous activity (at p-values < 0.01), indicating that the estimated retirement effect is smaller in magnitude by about one third for those who did vigorous activities, although it still remains positive, i.e. 0.569 – 0.194 = 0.375. There is also weak evidence (p-value < 0.1) that a small attenuation exists for the effect of retirement on drinking if the respondent reported drinking at baseline.

Overall, we find evidence of a difference between those who abstained from a particular health behavior at baseline vis-à-vis those who did not; such heterogeneity appears to matter most significantly for the health behaviors of smoking and vigorous

physical activity, less so for drinking, and not for moderate physical activity. Specifically, among those who had a particular behavior at baseline, we found that retirement decreases their tendency to smoke; it also implies a comparatively smaller increase in their tendency to participate in vigorous activities. Importantly, across all our regressions, the Sargan-Hansen test of the over-identifying restrictions does not reject the null hypothesis that our IVs are valid, thus lending support for our empirical findings.

We now look for evidence of other sources of heterogeneity in how retirement impacts health behaviors. We first estimated our model separately by gender. The estimates reported in Table 3 suggest that retirement affects smoking among females who were non-smokers, but not males. However, for both males and females, there is still a negative coefficient on the interaction between retirement and baseline smoking behavior. While retirement increases drinking among males who abstained from alcohol at baseline, it does not appear to have a similar significant impact among their female counterparts. To examine whether these observations also represent actual differences between genders, we used a two sample z-test for which the null hypothesis is that there are no observed differences.[12] For three out of four behaviors, the z-test statistic indicated the estimated effect of retirement on health behaviors did not differ between the male and female subgroups. The only exception was alcohol consumption: the

[12] Because of sufficiently large sample sizes for the male and female subgroups, the Central Limit Theorem permits calculation of the z score as opposed to the t score. The corresponding z-test statistic is approximately normally distributed, suggesting that, at the 95% confidence level, the critical values of z are -1.96 and 1.96, with rejection rule $z < -1.96$ or $z > 1.96$.

positive retirement impact among those who abstained from alcohol at baseline was relevant for males but not for females.[13]

Table 4 separates the data by geographic region of the respondent. Doing so allows us to assess whether cultural, institutional or other potential differences across regions of Europe might be important for our findings on the effects of retirement on health behaviors. We split our sample to Scandinavia (Denmark and Sweden), Continental Europe (Austria, France, Germany, Switzerland, Belgium and the Netherlands) and the Mediterranean (Spain and Italy).[14] To test for statistically significant differences in the observed estimates we conducted a two sample z-test between two of the three geographic regions at a time. Overall, we find little evidence of statistical differences in the retirement effects on health behaviors across the main European regions. The only exception appears to be current smoking: among non-smokers at baseline, retirement has a bigger positive impact on current smoking for respondents from Mediterranean countries compared to those residing in Scandinavia.[15] These results thus suggest that the equations relating health behaviors and retirement have a very similar structure with respect to gender and geographic region.

[13] The corresponding z-test statistic is -2.975.

[14] Splitting our sample at the same time by gender and geographic region was not feasible because of relatively small sample sizes and potential weak instruments problems.

[15] When comparing Scandinavia with the Mediterranean countries, the corresponding z-test statistic is -2.021, thus being lower than the critical threshold of -1.96 at the 95% confidence level.

5. Robustness

We examine the robustness of our results to issues related to non-linear effects of age, the age group of older respondents, attrition bias, and the approach for IV estimation.

The analysis to this point has assumed that age enters linearly the regression equations of health behaviors. Given that the window of relevant ages is relatively short with respondents aged from 50 to 75, this assumption is not unreasonable, as noted by Coe and Zamarro (2011) and Mazzonna and Peracchi (2014), among others. Nevertheless, we estimated our model adding a quadratic and a cubed term to the linear age term. As reported in Table A1 our findings remain mostly unchanged. With the exception of smoking, the main effects of retirement continue to be positive and statistically significant at conventional levels. The estimated coefficients on the interaction terms between retirement and baseline smoking or vigorous physical activity also remain negative and statistically significantly different from zero (at p-values < 0.01).

To examine further the role of the age variable in our model, we carried out an additional robustness check, this time reducing the upper bound of the range of relevant ages, and including individuals aged from 50 to 70 only. We thus excluded respondents above 70, hypothesizing that they may have a substantially lower incentive to make any adjustments to their health behavior, as their time horizon is relatively shorter. The estimates reported in Table A2 are quantitatively and qualitatively similar to our previous IV results, thus lending support for our earlier findings.

Attrition is a common concern in panel surveys. It may lead to biased estimates if the reason for leaving the sample is correlated with the idiosyncratic error, ε_{it}. For instance, it could be that individuals who make less healthy lifestyle choices are more

prone to becoming ill, thus leaving the panel more often than their more health-conscious counterparts. Using the fixed effects estimator has the advantage of allowing attrition to be correlated with the individual fixed effects, a_i. What this implies is that if attrition can be explained by such time-invariant characteristics of the individuals, a reasonable assumption is short panels (Wooldridge, 2010), then the corresponding fixed effects estimates would be unbiased. Nevertheless, we checked the robustness of our results to the presence of attrition bias by re-estimating equation (1) using only respondents who participated in all four waves of the SHARE survey. The estimates in Table A3 are very similar to our IV results reported earlier in Table 3. The main effect of retirement on smoking continues to be positive, although it is now statistically insignificant at conventional levels. However, the other main effects of retirement on physical activity – both vigorous and moderate – and drinking remain positive and statistically significant throughout. We also continue to find statistically significant interaction effects for smoking and vigorous physical activity, in line with our previous findings.

Finally, we examined the robustness of our results by using an alternative approach for IV estimation; the two-stage residual inclusion (2SRI) estimator, which has also been shown to be consistent for nonlinear models (see Terza et al., 2008). According to this approach, in the first stage, each endogenous variable is regressed on the included exogenous variables and the excluded instruments, controlling for fixed effects as we did for our previous IV regression equations. In the second stage, the endogenous variables are not replaced, and instead the first stage residuals are included as additional regressors (Terza et al., 2008). After this adjustment, conditioning on the first stage residuals, retirement and retirement interacted with initial health behaviors

are considered to be exogenous in the second stage regressions. To estimate the second stage, we used a fixed effects logit model for the binary indicator on smoking, and a random effects ordered logit model for the frequency of physical activity and drinking. For contrast, and to allow comparison with our previous findings, we also provided estimates based on linear fixed effects models in stage two of the 2SRI approach. The estimates reported in Table A4 are largely consistent with our previous findings. With the exception of moderate physical activity in the random effects ordered logit model, the main effects of retirement continue to be positive and statistically significant at conventional levels. We also continue to find statistically significant and negative interaction effects for smoking and vigorous physical activity, consistent with our previous findings.

6. Conclusion

In this paper, we examined whether and to what extent retirement changes people's health behaviors. Drawing data from SHARE on a representative sample of older men and women from 10 European countries, we used the early and normal retirement ages as a source of exogenous variation in retirement status. We showed that, among those who abstained from a behavior at baseline, retirement increases the frequency of physical activity and the frequency of drinking alcoholic beverages, but not necessarily the tendency to smoke, consistent with the previous findings in this area. However, among those who had a behavior at baseline, we find that retirement decreases their tendency to smoke and also implies a comparatively smaller increase in vigorous activities. This finding is somewhat different from earlier studies as the current paper considered individuals who were working at baseline and controlled for their

initial health behaviors, thus going beyond an average effect by making a distinction between respondents who had a specific behavior vis-à-vis those who did not. We further examined whether and to what extent these results might be similar across genders and the main geographic regions of Europe, finding only little evidence of potentially heterogeneous effects.

One might ask what are the possible mechanisms that might help to explain retirement affecting health behavior? For instance, what might explain the increase in physical activity after retirement? One possible explanation is the availability of more free time after retirement. The opportunity cost of time is also lower, and individuals no longer have to trade work for leisure, as their incomes from pension are fixed (Eibich, 2015). Although income is also lower after retirement and the time horizon tends to become shorter (Grossman, 1972), it appears that, on the whole, the lower opportunity cost of time outweighs the negative effects, thus suggesting an increase in physical activity after retirement for both males and females. A similar explanation might also apply to drinking: the increase in drinking after retirement might reflect various factors including a lower opportunity cost of time as well as peer effects (Zantinge et al., 2013).[16]

And what might be the reason why individuals who smoked at baseline become less likely to be smokers after retirement? One possible explanation is that smoking was used as a mechanism for coping with the demands of a stressful job (Eibich, 2015; Zantinge et al., 2013). After retiring, however, this coping mechanism was no longer useful in people's lives and therefore led to a decrease in the probability of being a

[16] It is worth noting that the variable on drinking asked in SHARE does not capture the amount of alcohol consumption. Hence, provided that individuals drink small or moderate amounts, alcohol consumption may not necessarily imply adverse health effects (Eibich, 2015; Ziebarth and Grabka, 2009).

current smoker observed in our data. Although such explanation might seem plausible, our model also included two key explanatory variables related to the potential stresses of a job; that is, a dummy variable on whether an individual was working on a physically demanding job, as well as a dummy variable on whether the individual was working in a stressful job. However, we find little evidence that these variables may play a role here; in the smoking regression equation, the estimated coefficient on whether an individual was working in a stressful job is marginally significant at the 10% level. This implies that it might not be entirely the role of smoking to provide relief from work-related strain that could help explain a lower tendency to smoke after retirement. Other explanations might also be possible: the availability of time in retirement, as well as peer effects that may have affected how individuals view smoking and therefore their smoking behavior as they transition from work to retirement (Zantinge et al., 2013).

Complementing previous work in economics, these findings may be useful for informing policy choices. Knowing which individuals are likely to change their health behaviors after retirement is one of the key elements of optimal policy design. From earlier studies in this area, we also know that individuals tend to be more receptive to health messages during the major life-course transition to retirement (Zantinge et al., 2013; de Hollander et al., 2006). Our findings may therefore be useful for retirement preparation courses and in people's own planning towards healthier lifestyle choices after retirement. When preparing for retirement, as our analysis indicates, it seems important to account for the potential role of health behaviors while one was in full-time employment, though other factors including gender and the specific geographic region of Europe seem to play a relatively less important role. Given there are only a handful

of related studies, new research is certainly welcome to further our understanding of individual heterogeneity in the important link between retirement and health behaviors.

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Tables

Table 1 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
		Full Sample			Males			Females	
Being a current smoker	11,518	0.2047	0.4035	5,902	0.2174	0.4125	5,616	0.1914	0.3935
Moderate activities frequency	11,518	2.6550	0.7541	5,902	2.6566	0.7524	5,616	2.6533	0.7559
Vigorous activities frequency	11,518	1.8196	1.2915	5,902	1.9029	1.2666	5,616	1.7320	1.3115
Alcoholic beverage consumption frequency	11,518	3.2004	2.0037	5,902	3.5940	2.0047	5,616	2.7867	1.9176
Being retired	11,518	0.3507	0.4772	5,902	0.3763	0.4845	5,616	0.3237	0.4679
Being a current smoker in wave 1	11,518	0.2412	0.4278	5,902	0.2562	0.4366	5,616	0.2254	0.4179
Moderate activities frequency in wave 1	11,518	2.6432	0.7436	5,902	2.6305	0.7273	5,616	2.6565	0.7601
Vigorous activities frequency in wave 1	11,518	1.9799	1.2339	5,902	2.0703	1.1942	5,616	1.8848	1.2675
Alcoholic beverage consumption frequency in wave 1	11,518	3.2592	1.9665	5,902	3.6618	1.9269	5,616	2.8360	1.9186
Female	11,518	0.4876	0.4999	5,902	0	0	5,616	1	0
Age at the time of interview	11,518	60.9141	4.9334	5,902	61.3688	4.8866	5,616	60.4362	4.9375
Is/was working in physical demanding job	11,518	0.4209	0.4937	5,902	0.4146	0.4927	5,616	0.4275	0.4948
Is/was working in stressful job	11,518	0.4673	0.4989	5,902	0.4705	0.4992	5,616	0.4639	0.4987
Household size	11,518	2.2060	0.8809	5,902	2.3197	0.9219	5,616	2.0865	0.8187
Years of education	11,518	12.5330	4.0148	5,902	12.5683	4.2083	5,616	12.4959	3.8010
Gross household income (1000 euros)	11,518	38.4633	44.3401	5,902	39.4966	44.5321	5,616	37.3774	44.1153
Married or living as a couple	11,518	0.7972	0.4021	5,902	0.8409	0.3658	5,616	0.7512	0.4323
Divorced	11,518	0.0949	0.2931	5,902	0.0732	0.2605	5,616	0.1177	0.3223
Never been married	11,518	0.0589	0.2354	5,902	0.0583	0.2343	5,616	0.0595	0.2365
Widowed	11,518	0.0479	0.2136	5,902	0.0268	0.1614	5,616	0.0702	0.2554
Continental Europe	11,518	0.5720	0.4948	5,902	0.5723	0.4948	5,616	0.5716	0.4949
Scandinavia	11,518	0.2961	0.4566	5,902	0.2747	0.4464	5,616	0.3187	0.4660
Mediterranean	11,518	0.1319	0.3384	5,902	0.1530	0.3600	5,616	0.1097	0.3125

Continued

Table 1 (continued)

Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
	Continental Europe			Scandinavia			Mediterranean		
Being a current smoker	6,588	0.2081	0.4060	3,411	0.1797	0.3840	1,519	0.2462	0.4309
Moderate activities frequency	6,588	2.6349	0.7498	3,411	2.7930	0.5812	1,519	2.4319	1.0107
Vigorous activities frequency	6,588	1.8468	1.2755	3,411	1.9232	1.2677	1,519	1.4687	1.3543
Alcoholic beverage consumption frequency	6,588	3.3274	2.0414	3,411	3.0281	1.5612	1,519	3.0362	2.5961
Being retired	6,588	0.3484	0.4765	3,411	0.3371	0.4728	1,519	0.3910	0.4881
Being a current smoker in wave 1	6,588	0.2291	0.4203	3,411	0.2375	0.4256	1,519	0.3022	0.4594
Moderate activities frequency in wave 1	6,588	2.6230	0.7407	3,411	2.8127	0.5130	1,519	2.3502	1.0349
Vigorous activities frequency in wave 1	6,588	1.9725	1.2243	3,411	2.1404	1.1525	1,519	1.6511	1.3772
Alcoholic beverage consumption frequency in wave 1	6,588	3.3582	2.0183	3,411	2.9906	1.4960	1,519	3.4325	2.5303
Female	6,588	0.4872	0.4999	3,411	0.5248	0.4995	1,519	0.4055	0.4912
Age at the time of interview	6,588	60.2715	4.7156	3,411	61.9932	5.1304	1,519	61.2780	4.9489
Is/was working in physical demanding job	6,588	0.4139	0.4926	3,411	0.3899	0.4878	1,519	0.5207	0.4997
Is/was working in stressful job	6,588	0.4466	0.4972	3,411	0.4802	0.4997	1,519	0.5280	0.4994
Household size	6,588	2.1749	0.8496	3,411	1.9906	0.6663	1,519	2.8249	1.1251
Years of education	6,588	12.7424	3.9656	3,411	13.1478	3.3744	1,519	10.2442	4.7109
Gross household income (1000 euros)	6,588	50.3678	49.9992	3,411	18.3440	22.5154	1,519	32.0116	36.9248
Married or living as a couple	6,588	0.7849	0.4109	3,411	0.7954	0.4035	1,519	0.8545	0.3527
Divorced	6,588	0.1005	0.3007	3,411	0.1067	0.3088	1,519	0.0441	0.2054
Never been married	6,588	0.0562	0.2303	3,411	0.0616	0.2404	1,519	0.0645	0.2458
Widowed	6,588	0.0577	0.2332	3,411	0.0346	0.1828	1,519	0.0355	0.1852
Continental Europe	6,588	1	0	3,411	0	0	1,519	0	0
Scandinavia	6,588	0	0	3,411	1	0	1,519	0	0
Mediterranean	6,588	0	0	3,411	0	0	1,519	1	0

Table 2 Random vs. Fixed Effects Estimates

	Random Effects				Fixed Effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cursmoke	Vigorous	Moderate	Drinking	Cursmoke	Vigorous	Moderate	Drinking
Retired	0.0207***	0.182***	0.195***	0.378***	0.0312***	0.258***	0.189**	0.385***
	(0.00781)	(0.0496)	(0.0552)	(0.0615)	(0.0100)	(0.0710)	(0.0814)	(0.0803)
Wave 1 Behavior	0.703***	0.328***	0.224***	0.666***				
	(0.00887)	(0.0129)	(0.0127)	(0.0106)				
Retired x Wave 1 Behavior	-0.147***	-0.143***	-0.0541***	-0.0744***	-0.202***	-0.138***	-0.0524*	-0.0748***
	(0.0132)	(0.0195)	(0.0197)	(0.0147)	(0.0173)	(0.0280)	(0.0290)	(0.0194)
Constant	0.182***	1.799***	2.136***	1.109***	-0.607	-4.627	2.849	1.388
	(0.0572)	(0.232)	(0.143)	(0.303)	(0.919)	(4.346)	(2.683)	(4.717)
Observations	11518	11518	11518	11518	11518	11518	11518	11518

Note: *** p<0.001, ** p<0.05 and * p<0.1. Robust standard errors are in parenthesis. Control variables include household gross income, age, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions.

Table 3 Fixed Effects IV Estimates

	Full Sample			
	(1)	(2)	(3)	(4)
	Cursmoke	Vigorous	Moderate	Drinking
Retired	0.0523**	0.569***	0.572**	0.446***
	(0.0245)	(0.155)	(0.223)	(0.164)
Retired x Wave 1 Behavior	-0.400***	-0.194***	-0.107	-0.0672*
	(0.0477)	(0.0483)	(0.0709)	(0.0401)
Observations	10035	10035	10035	10035
Underidentification test (Kleibergen-Paap rk LM statistic)				
Chi-sq(3)	514.964	529.735	537.899	531.638
P-val	0.0000	0.0000	0.0000	0.0000
Weak identification test (Kleibergen-Paap rk Wald F statistic)				
F statistics	151.717	157.961	158.852	156.306
Overidentification test of all instruments				
Hansen J statistics	4.339	1.470	1.733	1.089
P-val	0.1142	0.4794	0.4204	0.5801

Continued

Table 3 (continued)

	Males				Females			
	(5) Cursmoke	(6) Vigorous	(7) Moderate	(8) Drinking	(9) Cursmoke	(10) Vigorous	(11) Moderate	(12) Drinking
Retired	0.0316	0.791***	0.501*	1.133***	0.0672**	0.424**	0.661**	0.0784
	(0.0426)	(0.254)	(0.300)	(0.290)	(0.0288)	(0.195)	(0.321)	(0.204)
Retired x Wave 1 Behavior	-0.473***	-0.194***	-0.0481	-0.113**	-0.332***	-0.197***	-0.161	-0.0746
	(0.0739)	(0.0734)	(0.0938)	(0.0566)	(0.0606)	(0.0646)	(0.103)	(0.0600)
Observations	5127	5127	5127	5127	4908	4908	4908	4908
Underidentification test (Kleibergen-Paap rk LM statistic)								
Chi-sq(3)	186.422	199.597	201.808	202.539	346.779	333.838	335.794	321.913
P-val	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Weak identification test (Kleibergen-Paap rk Wald F statistic)								
F statistics	52.321	56.174	56.656	56.890	110.653	107.351	105.816	100.676
Overidentification test of all instruments								
Hansen J statistics	0.956	0.970	2.515	1.580	5.801	5.546	2.446	0.389
P-val	0.6201	0.6156	0.2844	0.4538	0.0550	0.0625	0.2944	0.8234

Note: *** p<0.001, ** p<0.05 and * p<0.1. Robust standard errors are in parenthesis. Control variables include household gross income, age, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions.

Table 4: Fixed Effects IV Estimates by Region of Europe

	Continental Europe				Scandinavia				Mediterranean			
	(1) Cursmoke	(2) Vigorous	(3) Moderate	(4) Drinking	(5) Cursmoke	(6) Vigorous	(7) Moderate	(8) Drinking	(9) Cursmoke	(10) Vigorous	(11) Moderate	(12) Drinking
Retired	0.0847**	0.433*	0.899***	0.226	0.00472	0.800***	0.0771	0.342	0.165**	0.286	0.143	0.76
	(0.038)	(0.236)	(0.283)	(0.246)	(0.034)	(0.243)	(0.402)	(0.229)	(0.078)	(0.355)	(0.580)	(0.566)
Retired x Wave 1 Behavior	-0.333***	-0.193***	-0.202**	-0.0337	-0.478***	-0.250***	0.0197	-0.0872	-0.439***	-0.249*	0.0536	-0.0966
	(0.0576)	(0.066)	(0.088)	(0.045)	(0.093)	(0.083)	(0.133)	(0.077)	(0.132)	(0.136)	(0.181)	(0.117)
Observations	5648	5648	5648	5648	3024	3024	3024	3024	1363	1363	1363	1363
Underidentification test (Kleibergen-Paap rk LM statistic)												
Chi-sq(3)	250.402	251.767	252.528	252.66	135.771	244.299	238.757	150.278	45.513	60.037	68.485	73.644
P-val	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Weak identification test (Kleibergen-Paap rk Wald F statistic)												
F statistics	72.028	72.329	72.587	72.578	47.562	85.746	80.868	46.001	14.416	19.893	21.525	24.1
Overidentification test of all instruments												
Hansen J statistics	1.726	0.499	0.059	1.594	6.293	2.46	1.479	6.745	0.114	1.3	4.028	6.104
P-val	0.4218	0.7794	0.9709	0.4507	0.043	0.2923	0.4774	0.0343	0.9447	0.522	0.1335	0.0473

Note: *** p<0.001, ** p<0.05 and * p<0.1. Robust standard errors are in parenthesis. Control variables include household gross income, age, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions.

Appendix A

Table A1: Fixed Effects IV Estimates with non-linear age trend

	Full Sample			
	(1) Cursmoke	(2) Vigorous	(3) Moderate	(4) Drinking
Retired	0.0408	0.773***	0.599**	0.644***
	(0.0393)	(0.221)	(0.249)	(0.231)
Retired x Wave 1 Behavior	-0.401***	-0.191***	-0.104	-0.0682*
	(0.0478)	(0.0488)	(0.0709)	(0.0401)
Observations	10035	10035	10035	10035
Underidentification test (Kleibergen-Paap rk LM statistic)				
Chi-sq(3)	225.555	225.349	227.782	227.192
P-val	0.0000	0.0000	0.0000	
Weak identification test (Kleibergen-Paap rk Wald F statistic)				
F statistics	61.461	61.889	62.334	61.859
Overidentification test of all instruments				
Hansen J statistics	3.451	2.152	1.742	1.565
P-val	0.1781	0.3409	0.4186	0.4574

Note: *** p<0.001, ** p<0.05 and * p<0.1. Robust standard errors are in parenthesis. Control variables include household gross income, age, age^2 and age^3, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions.

Table A2: Fixed Effects IV Estimates for 50-70 year old respondents

	(1) Cursmoke	(2) Vigorous	(3) Moderate	(4) Drinking
Retired	0.0545**	0.501***	0.527**	0.432**
	(0.0256)	(0.157)	(0.225)	(0.168)
Retired x Wave 1 Behavior	-0.395***	-0.188***	-0.0956	-0.0721*
	(0.0482)	(0.0488)	(0.0716)	(0.0409)
Observations	9417	9417	9417	9417
Underidentification test (Kleibergen-Paap rk LM statistic)				
Chi-sq(3)	485.093	500.166	508.651	504.394
P-val	0.0000	0.0000	0.0000	0.0000
Weak identification test (Kleibergen-Paap rk Wald F statistic)				
F statistics	142.178	148.313	149.499	147.536
Overidentification test of all instruments				
Hansen J statistics	4.921	1.455	1.982	0.810
P-val	0.0854	0.4832	0.3712	0.6671

Note: *** p<0.001, ** p<0.05 and * p<0.1. Robust standard errors are in parenthesis. Control variables include household gross income, age, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions.

Table A3: Fixed Effects IV Estimates with a Balanced Panel

	Full Sample			
	(1)	(2)	(3)	(4)
	Cursmoke	Vigorous	Moderate	Drinking
Retired	0.0421	0.607***	0.545**	0.598***
	(0.0263)	(0.177)	(0.275)	(0.187)
Retired x Wave 1 Behavior	-0.380***	-0.207***	-0.0864	-0.0719
	(0.0540)	(0.0563)	(0.0877)	(0.0469)
Observations	7089	7089	7089	7089
Underidentification test (Kleibergen-Paap rk LM statistic)				
Chi-sq(3)	423.682	426.981	413.736	424.404
P-val	0.0000	0.0000	0.0000	0.0000
Weak identification test (Kleibergen-Paap rk Wald F statistic)				
F statistics	125.724	128.525	122.232	126.644
Overidentification test of all instruments				
Hansen J statistics	2.075	0.263	1.487	1.106
P-val	0.3544	0.8767	0.4754	0.5751

Note: *** p<0.001, ** p<0.05 and * p<0.1. Robust standard errors are in parenthesis. Control variables include household gross income, age, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions.

Table A4: Two Stage Residual Inclusion Method for IV Estimation

	Full Sample							
	(1) Cursmoke Linear FE	(2) Cursmoke-Logit FE	(3) Vigorous Linear FE	(4) Vigorous-Ologit RE	(5) Moderate Linear FE	(6) Moderate-Ologit RE	(7) Drinking Linear FE	(8) Drinking-Ologit RE
Retired	0.0523**	2.415***	0.569***	0.601***	0.572***	0.456	0.446***	0.759***
	(0.0241)	(0.689)	(0.152)	(0.220)	(0.220)	(0.398)	(0.152)	(0.247)
Retired x Wave 1 behavior	-0.400***	-4.300***	-0.194***	-0.354***	-0.107	-0.0607	-0.0672*	-0.133**
	(0.0471)	(0.603)	(0.0449)	(0.0618)	(0.0696)	(0.120)	(0.0399)	(0.0583)
Residuals	-0.0427*	-2.228***	-0.415**	-0.338	-0.471*	0.0714	-0.0635	-0.112
	(0.0246)	(0.774)	(0.166)	(0.242)	(0.246)	(0.465)	(0.191)	(0.287)
Interaction residuals	0.290***	3.309***	0.0928*	0.104	0.0756	-0.0358	-0.0102	0.0123
	(0.0540)	(0.720)	(0.0539)	(0.0776)	(0.0801)	(0.152)	(0.0466)	(0.0728)
Wave 1 behavior				0.659***		0.685***		1.276***
				(0.0294)		(0.0500)		(0.0350)
Observations	11518	1347	11518	11518	11518	11518	11518	11518

Note: *** p<0.001, ** p<0.05 and * p<0.1. Standard errors are in parenthesis (bootstrapped SE for (1), (3), (5), (7), conventional SE for (2), and robust SE for (4), (6), (8)). Control variables include household gross income, age, years of education, household size, and dummy variables indicating whether the respondent is unemployed, home maker, disabled, is/ was working in physically demanding job, is/ was working in stressful job, gender, marital status, European regions, and time (waves). Wave 1 behavior corresponds to the particular behavior used as a dependent variable in each of the regressions

Appendix B

Table B1: Old-age pension eligible age by gender in 10 European countries

Country	Old-age pension eligible age for males						Old age pension eligible age for females					
	2004	2006	2008	2010	2012	2014	2004	2006	2008	2010	2012	2014
Austria	65	65	65	65	65	65	60	60	60	60	60	60
Belgium	65	65	65	65	65	65	63	64	64	65	65	65
Denmark	65	65	65	65	65	65	65	65	65	65	65	65
France	60	60	60	60	60	61.17	60	60	60	60	60	61.17
Germany	65	65	65	65	65.08	65.25	65	65	65	65	65.08	65.25
Italy	65	65	65	65	66	66.25	60	60	60	60	62	62.25
Netherlands	65	65	65	65	65	65.17	65	65	65	65	65	65.17
Spain	65	65	65	65	65	65.17	65	65	65	65	65	65.17
Sweden	65	65	65	65	65	65	65	65	65	65	65	65
Switzerland	65	65	65	65	65	65	63	64	64	64	64	64

Source: Combined from the following sources: (i) Table 7 in Fonseca et al. (2014), Michigan Retirement Research Center Working Paper (WP 2014-310), (ii) U.S. Social Security database, and (iii) OECD pension at a glance reports 2013 for 2012-14 data points.