Retirement and Unexpected Health Shocks

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Abstract

Is retirement good for your health? This article explores the impact of retirement on unexpected health evolutions. Using data from the annual Household, Income and Labour Dynamics in Australia survey (2001-2014), we construct measures of the mismatch between each person's expected and actual health evolution (hereafter, "health shocks"). We find that after retirement, the probability of negative shocks decreases and the likelihood of positive health shocks increases, for both genders. These shocks translate into variations of life satisfaction in the same direction (i.e. unexpected positive health shocks increase life satisfaction). Other indicators of mental and physical health taken from the SF-36 vary in the same way, i.e. improve unexpectedly after retirement. By definition, health shocks are immune to the problem of reverse causality that could run from health to retirement. Hence, our findings are consistent with a positive impact of retirement on health.

Keywords: Australia; HILDA; Health; Retirement; Health Shocks; Life Satisfaction.

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Ethics approval

Ethics approval is not required since we analyze secondary, existing HILDA data. The HILDA project was initiated and is funded by the Australian Government Department of Social Sciences (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute).

1. Introduction

Workers generally plan to retire as soon as they are entitled to leave with full pension, depending on the legal provisions in vigor. In some countries, they demonstrate massively against any attempt to postpone the legal time of retirement. Obviously, this behavior is based on the expectation that retirement will be a source of greater wellbeing. But is it actually the case? Or do they underestimate the risk of loss of purpose and socialization that comes with withdrawal from the labor market? Behavioral economics has forcefully illustrated the possibility of such incorrect expectations. We suggest to explore this point by looking at the effect of retirement on unexpected health evolutions. By doing so, we avoid confusing the cause and the consequence of retirement, and rule out the possibility of reverse causation whereby people whose health is deteriorating, or who expect it to do so, would choose to retire earlier.

A substantial literature tries to measure the impact of retirement on general, physical and mental health, life satisfaction and lifestyles. The general prior is that retirement should make people happier and healthier, given the deleterious impact of work tiredness on aging workers, not to mention the case of strenuous work. However, for some individuals, retirement may also have a detrimental effect on wellbeing due to social isolation, if the workplace was an important context of socialization for them. Empirically, identifying the causal effect of retirement on health is not straightforward. This is because people's current and expected health state certainly influences their retirement decision, as shown by Siddiqui (1997), Dwyer and Mitchell (1999), McGarry (2004), Au et al. (2005), Cai and Kalb (2006) and Disney et al. (2006). Similarly, Böckerman and Ilmakunnas (2009) show that in Finland workers in poor health self-select into unemployment. Moreover, both retirement and health may depend on unobserved confounding factors, such as time preferences.

To quantify the causal effect of retirement on health and account for endogeneity, most existing studies exploit spatial, time, or social discontinuities concerning the legal full pension eligibility age and use an instrumental variable method. Papers employ data from the U.S. Health and Retirement Survey (HRS), the European Survey on Health, Ageing and Retirement in Europe (SHARE), the European Survey on Income and Living Conditions (SILC), the Household, Income and Labour Dynamics in Australia (HILDA) survey and other country-specific surveys. Surprisingly, although they share the same type of methods and often the same data, their findings are sometimes contradictory.

Several papers document a negative impact of retirement on health outcomes. For instance, using the HRS, Dave et al. (2008) show that health -- measured by difficulties associated with mobility and daily activities, illness conditions and mental health -- deteriorates after retirement. The literature also indicates that retirement exerts a negative effect on body weight for men who retire from strenuous jobs -- but not for women or workers in sedentary jobs -- both in the U.S. (Goldman et al., 2008) and in Europe (Godard, 2016). Some papers focus on the effect of retirement on cognitive abilities. Bonsang et al. (2012) claim that retirement has a negative impact on cognitive functioning using the HRS. Their result is supported by Mazzonna and Peracchi (2012) who employ the SHARE data and show that cognitive abilities decline at a higher pace after retirement. However, it is challenged by Coe et al. (2012) who use the same HRS data. Finally, Behncke (2012) employ the English Longitudinal Study of Ageing (ELSA) and finds that retirement significantly increases the risk of being diagnosed with a chronic condition, such as a severe cardiovascular disease and cancer, as well as other risk factors (e.g. BMI, cholesterol and blood pressure), and that it also worsens self-assessed health (SAH).

However, another series of studies uncovers a positive impact of retirement -- or a negative effect of employment at older ages -- on wellbeing in different countries. Shai (2018) uses data from three Israeli sources and shows that employment at older ages (due to the increase in the mandatory retirement age for males in 2004) is detrimental to health, especially among less-educated workers. Similarly, using HILDA, Zhu (2016) finds that women's health suffered from the increase in the retirement age eligibility for the Australian Age Pension. Conversely, both retirement status and retirement duration seem to exert a positive impact on self-reported health status, as well as on the SF-36 mental and physical components. They also seem to increase regular physical activity and decrease the probability of smoking. Mavromaras et al. (2013) and Atalay and Barrett (2014) come to similar conclusions using Australian data. Other authors provide similar evidence based on the HRS (Insler, 2014), SHARE (Coe and Zamarro, 2011), SILC (Hessel, 2016) and German panel data (Eibich, 2015). In the latter paper, the channel is the relief from work-related stress and strain and the increase in sleep duration and in physical activity. Hallberg et al. (2015) reach the same conclusion using a reform in the retirement age of military officers in Sweden. Finally, some papers release more ambiguous results, with a positive impact of retirement on mental health and a less clear effect on physical health (Johnston and Lee, 2009).

The different conclusions reached by these studies may be due to differences in econometric specifications, control variables and countries of interest, as shown by the exhaustive study by Motegi et al. (2016). In addition, it is also well known that the take-up of reforms is not uniform across individuals. In the case of retirement, people may react in different ways to the change in the official retirement age. Some people may abide by the increase in the official retirement age, with a clear understanding that this will be detrimental -- or beneficial -- to their health. Other may refuse the change and decide to retire earlier, even if this comes at the cost of a lower pension payment. Because of this freedom of choice, the usual instrumental variable strategy may not capture the actual effect of retirement and there may still be a reverse causation bias. By contrast, looking at unexpected health shocks rules out this risk.

We thus depart from the literature and analyze the impact of retirement on unexpected health shocks. We use the SF-36 questionnaire contained in HILDA panel survey. At each wave of the survey, people are asked about their expected health change in the future. They also assess their health evolution over the past year ("reported health transition"). Moreover, each year, respondents answer a standard SAH question and a series of questions that are meant to evaluate their physical and mental health. We use this information to compute the change in SAH, mental and physical health over time for each respondent. By combining information on prospective expectations with information on retrospective (reported or computed) health evolutions, we construct a series of measures of unexpected health shocks. We distinguish positive and negative unexpected shocks. We then estimate the association between retirement and positive/negative shocks. To account for unobserved heterogeneity, we include individual fixed effects in our regression models. As mentioned earlier, several papers use the same HILDA survey to explore the effect of retirement on health. However, they do not make use of the information about health expectations.[1]

Our findings indicate that retirement decreases the likelihood of negative health shocks and increases the likelihood of positive shocks. For men, retirement comes with an unexpected improvement in general, physical and mental health. The same is true for women, except the positive shocks in mental health. For men, retirement increases the probability of a positive health shock by 10% to 14%, depending on specifications; for women, the effect is in an interval of 10% to 13%. We check that reported health transitions are consistent with computed evolutions of other health measures. We also find that health shocks are associated with life satisfaction, i.e. unexpected positive health shocks increase life satisfaction, for both women and men.

[1] They also use a different definition of retirement. For instance, Zhu (2016) defines retirement as not being in the labor force, whereas we consider a person as retired if she does not work and declares to be completely retired.

The paper proceeds as follows. Section 2 describes the HILDA data. Section 3 presents the empirical model and the estimation strategy. Section 4 discusses the findings. Section 5 contains some concluding remarks.

2. Data

The HILDA Survey

We use longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) survey, waves 1 to 14, covering the 2001-2014 period. HILDA has surveyed all adults (aged over 15) within each household yearly since 2001 and it collects an extensive amount of information regarding economic wellbeing, health status, labor market dynamics and family dynamics. Our sample contains 51,000 observations, for about 4,400 women and 4,800 men who were aged 50 to 75 between 2001 and 2014. We observe 737 transitions to retirement for men, and 933 for women.

The SF-36

We use information from the 36-item Short Form Health Survey (SF-36) to measure unexpected changes in health. The SF-36 is a patient-reporting outcome measure that quantifies health status. The survey contains 36 questions, which capture eight health concepts -- physical functioning (PF), role functioning/physical (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social role functioning (SF), mental health (MH), and role functioning/emotional (RE) -- as well as reported health transition (see below).

Health Expectations

To construct our variables of interest, we combine information on health expectations and actual health evolutions. The question about overall health expectations is the following:

“*How true of false is [each of] the following statement for you? I expect my health to get worse.*” Respondents must select one of the following answers: “*Definitely true*,” “*Mostly true*,” “*Don’t know*,” “*Mostly false*” and “*Definitely false*” (the name of the variable is gh11c). We recode the variable into three categories: True, Don’t know and False. The question does not explicitly mention any time horizon.

Reported Health Transition

We measure the actual evolution of the respondents’ health in several manners. First, we use the following question on health transition from the SF-36: “*Compared to one year ago, how would you rate your health in general now*?” The response categories are the following: “*Much better now than one year ago*,” “*Somewhat better than one year ago*,” “*About the same as one year ago*,” “*Somewhat worse than one year ago*” and “*Much worse than one year ago*” (the name of the variable is ghrht). We recode the variable into three categories: Worse, Same and Better.

Computed Evolutions of SAH, Physical Health and Mental Health

We also use the SF-36 to construct additional health evolution variables. We employ the following question on SAH: “*In general, would you say that your health is: Excellent, Very good, Good, Fair, Poor*?” We also use the 35 questions from the SF-36 and create a physical component summary (PCS) and a mental component summary (MCS), which are summary measures that capture the two dimensions of the SF-36. For each individual, we then calculate the evolution of SAH, PCS and MCS between t and T (T = t+1 or t+2) and create a series of health evolution variables that indicate whether the respondent’s health worsens, remains stable or improves over time. We assume that PCS worsens between t and T if PCS in T is smaller than PCS in t minus one standard deviation; we consider that PCS remains the same if PCS in T is greater than PCS in t minus one standard deviation and smaller than PCS in t plus one standard deviation; and finally we consider that PCS increases if PCS in T is greater than PCS in t plus one standard deviation. We define indicators of a decrease, stability and improvement in MCS in a similar way.

Unexpected Shocks

We create our shock variables by comparing expectations reported in t with actual evolutions. Actual evolutions are captured either by the "reported health transition" which is reported in t+1, or by the computed evolution of SAH, PCS and MCS between t and T (see Table 1).

[Insert Table 1 here]

Life Satisfaction

Our measure of life satisfaction is based on the classic question: "*How satisfied are you with your life?*" with a scale ranging from 0 ("*Totally dissatisfied"*) to 10 ("*Totally satisfied"*). In our regression sample, the average level of life satisfaction reaches 7.95 for males and 8.01 for females. This question is routinely used in large surveys to measure subjective wellbeing, e.g. in the World Values Survey, the European Social Survey, the British ONS, the German SOEP, Gallup and OECD surveys, for instance.

Retirement and Labor Market Status

Several definitions of retirement are employed in the literature. For instance, Eibich (2015), using the GSOEP, assumes that an individual is "retired" if she reports that she is retired and that she does not work, even part-time, while Zhu (2016), using HILDA, considers that a person is retired if she reports that she is not in the labor force. Here, we adopt a more restrictive definition and focus essentially on "complete retirement." Specifically, the data indicate whether individuals are employed, unemployed or not in the labor force (NLF). In addition, individuals who are over 45 years and who are not working are asked: "*Have you* *retired (completely) from the workforce?*" The response categories are the following: "*Yes*," "*No*" and "*Never in the workforce*." We consider those who answered "*Yes*" to this question as retired people. This question is asked in every wave except in 2003, 2004, 2007 and 2011. In order to avoid losing observations in 2003 and 2004, we assume that if an individual is completely retired in 2002 and in 2005, then she is also completely retired in 2003 and 2004. Similarly, we assume that if she is not completely retired in 2002 and 2005, then she is also not completely retired in 2003 and 2004. We proceed in the exact same way for 2007 and 2011. By combining the answers to these two questions, we create a categorical variable indicating whether the individual is (i) employed (reference category), (ii) unemployed or NLF and not completely retired, (iii) unemployed or NLF and completely retired, and (iv) unemployed or NLF and never in the workforce. We are interested in the association between complete retirement and health shocks. In our regressions, individuals who are employed serve as the reference category.

Descriptive Statistics

Table 2 provides summary statistics for the entire sample (retired or not). Over one third of the sample does not have a precise idea of how their health will change in the future; about one quarter expects a worsening, and over one third expects an improvement or no change. Women are more optimistic than men. Regarding reported health evolution, a large majority (73%) of men acknowledge no change in their health, 10% report an improvement, and 18% a worsening. Women less often report no change. The constructed measures of health evolution tell a similar, although slightly rosier, story. SAH declines for 20% of the sample, remains similar for about 63% and improves for about 17% of them. The measures of PCS and MCS changes are in the same ranges. Note that reported health transitions are consistent with computed evolutions of other health measures: for instance, reporting worse health goes hand in hand with a decrease in the PCS and MCS scores (see Table A1 in the Appendix).

Table 1 also indicates that around 58% of men and 45% of women are employed, and that 34% of males and 44% of females are completely retired. 71% of males and 61% of females are married. The average age in the sample is 60 years for men and 61 years for women. The average number of years of education is 12 years for men and 11 years for women.

[Insert Table 2 here]

3. Empirical Model

In order to analyze the potential effects of retirement on health shocks, we estimate the following baseline model using OLS-Fixed Effects:

$$Y_{i,(t,T)} = LMS_{i,t}.\beta + X_{i,t}.\delta + \rho_t + \alpha_i + \varepsilon_{i,t,T} \qquad \text{with } T = t+1 \text{ or } t+2 \qquad (1)$$

$Y_{i,(t,T)}$ is the outcome variable of interest. In most specifications, it is a dummy variable indicating the nature of the health shock experienced by individual i between t and T (with T = t+1 or t+2). These shocks are constructed using expectation reported in t and evolution between t and T. $LMS_{i,t}$ represents the indicators of labor market status -- not completely retired, completely retired, never in the workforce -- reported in t. β captures the effect of labor market status on shocks. $X_{i,t}$ denotes the following control variables: age, marital status, family size, education and the logarithm of household income. ρ_t represents year dummies, and α_i individual fixed effects.

Note that individuals who report that they are retired on the day of the survey in t, have retired in the course of the preceding year. Their health expectations, also reported in t, are thus posterior to their transition to retirement. This minimizes the risk of reverse causation.

Given that we include individual fixed effects, the impact of “never in the workforce” should not be identified, but a small fraction of respondents do not consistently report that they have never been in the workforce across survey years (measurement error). Education is captured by the number of years of education. For some individuals, it slightly varies across waves, so that its effect is not totally captured by individual fixed effects.

We also explore the effect of labor market status reported in t on health shocks between t+1 and t+2. In that case, expectations are reported in t+1, and health evolutions measure changes between t+1 and t+2. The model can be written in the following way:

$$Y_{i,(t+1,t+2)} = LMS_{i,t}.\beta + X_{i,t}.\delta + \rho_t + \alpha_i + \varepsilon_{i,t,t+1,t+2} \qquad (2)$$

Labor market status is thus reported one year before expectations and two years before health evolution. This makes reverse causation highly unlikely.

We also display the results in the form of an event study: we enlarge the window of analysis and look at the dynamics of health shocks prior and after retirement, using the following regression:

$$\begin{aligned} Y_{i,(t-1,t)} = {} & \beta_{-4}.R_{-4,i,t} + \beta_{-3}.R_{-3,i,t} + \beta_{-2}.R_{-2,i,t} + \beta_{-1}.R_{-1,i,t} \qquad (3) \\ & + \beta_{0}.R_{0,i,t} + \beta_{+1}.R_{+1,i,t} + \beta_{+2}.R_{+2,i,t} + \beta_{+3}.R_{+3,i,t} + \beta_{+4}.R_{+4,i,t} + \beta_{+5}.R_{+5,i,t} \\ & + X_{i,t}.\delta + \rho_t + \alpha_i + \varepsilon_{i,t-1,t} \end{aligned}$$

To pick up anticipation, we split the group of people who are not completely retired into five groups: individuals who will enter retirement in the next 5 years or more, in the next 3-4 years, in the next 2-3 years, in the next 1-2 years and in the next 0-1 year. The corresponding dummy variables are named as R_{-5}, R_{-4}, R_{-3}, R_{-2} and R_{-1}. Individuals who will enter retirement in the next 5 years or more (R_{-5}) serve as the reference category. To estimate adaptation, we divide retirees into six groups: those who have been retired for 0-1 years, 1-2 years, and so on up to those who have been retired for 5 years or more. The corresponding dummy variables are R_0, R_{+1}, R_{+2}, R_{+3}, R_{+4} and R_{+5}.

Equation (3) can only be estimated for a smaller sample than equation (1) due to sometimes missing information (since the data do not always allow to identify the year of retirement). Moreover, we restrict the regression sample to individuals who transition (from being "employed," "not completely retired" or "never in the workforce") to complete retirement at some point during the survey. In particular, we obviously cannot use individuals who are already retired in the first survey year.

Given the differences in labor market histories, the models are estimated for men and women separately. In all specifications models, we compute robust standard errors at the individual level.

4. Main Results

We first look at the effect of labor market status on health expectations and transitions separately (see Table A2 in the Appendix). When they are retired, men more often expect their health to deteriorate, compared to when they are employed (Panel A, column (1)). *De facto*, being retired rather than employed in t increases the likelihood of experiencing a health improvement between t and t+1 (Panel B, column (3)). Specifically, retirement increases the probability of a health improvement by 2.4 percentage points (Panel B, column (3)). Moreover, for males, retirement decreases the probability of a health deterioration (Panel F, column (1)).

For women, while retirement is not significantly correlated with expectations, we find clear evidence that it decreases the likelihood of a health deterioration (Panels B to E, column (4)) and increases that of a health improvement (Panels C, E and F, column (6)).

Table 3 shows our estimates of equation (1). Essentially, the result is that retirement has a positive influence on health shocks for both genders. More precisely, for males, retirement has a negative influence on negative shocks (Panels A and B, column (1)) and a positive influence on positive shocks (Panels A, D, F and G, column (3)). For instance, in Panel A, complete retirement decreases unexpected negative shocks by 2.0 percentage points, i.e. 23.39%, and increases unexpected positive shocks by 3.5 percentage points, i.e. 14.30%. When the effect is significant, the decrease in negative shocks varies between 15.89% and 23.39%, while the increase in positive shocks varies between 9.93% and 14.30%.

Similarly, women experience less negative shocks (Panels A to D, column (4)) and more positive shocks (Panels B and E, column (6)). For instance, retirement goes hand in hand with a 22.59% reduction in unexpected negative shocks for them (Panel A, column (4)).

[Insert Table 3 here]

Rather than measuring shocks between t and T, we now focus on shocks that take place between t+1 and t+2. The results, reported in Table 4, support our previous findings on the favorable impact of retirement on shocks: retirement has a negative impact on negative health shocks (for both genders) and a positive effect on positive shocks (for women). Table A3 in the Appendix shows that these positive health shocks are driven by people's actual health evolutions rather than by a change in their expectations.

[Insert Table 4 here]

These findings are illustrated in Figure 1, which displays estimates of health shocks following equation (3) on the sample of people who retire at some point during the survey. Each point represents the value of the coefficient associated with a specific lag or lead in the regression of health shock. These coefficients are estimated with reference to the situation where people will retire in more than five years (on the horizontal axis, the time line is set to zero five years before retirement). The figure suggests that as men get closer to retirement, they are increasingly likely to experience positive shocks (solid line). The coefficient becomes statistically significant in the year of retirement and remains positive thereafter, with a clear upward trend. For women, the situation is less clear: although there is some evidence that the probability of negative health shocks decreases after retirement, the results are not significant.

[Insert Figure 1 here]

A natural question is whether the effect of retirement depends on the type of occupation, in particular whether it is different for blue-collar and white-collar workers. The impact could also depend on whether the person who retires has a partner, and whether this partner is herself retired or not. As it turns out, although these conditions are indeed correlated with the level of health of respondents, they are not associated with health shocks, i.e. with unexpected changes in health status (these results are not reported for space reasons).

Are these findings specific to retirement? To enquire, we run the same type of event studies to observe the lags and leads of health shocks around the time of an unemployment spell. As shown by Figure 2, there is no clear trend for men. This does not mean that men's health does not change during such episodes; simply, unemployment spells do not increase the likelihood of unexpected health changes. For women, we do not observe any clear trend either. Hence, the pattern that we uncover around the time of retirement is not replicated for unemployment spells.

[Insert Figure 2 here]

We also explore the lags and leads of health shocks around the time of other life events, such as marriage, separation/divorce and widowhood (see Figure A1 in the Appendix). Men experience less positive shocks around the time of marriage, and more positive shocks around the time of separation. There is no evidence that widowhood be associated with shocks for men. For women, both marriage and widowhood increase the probability of negative shocks. There is no (statistically significant) pattern of any type for unanticipated health evolution for women around the time of separation/divorce.

5. Sensitivity Analysis and Additional Results

We analyze the sensitivity of our results and provide some additional results. For space reasons, some related tables do not contain the results for all of our heath shocks measures, but only for the difference between ex-post reported transition and ex-ante expectation.

Restricted Sample

Approximately 750 individuals (corresponding to 5,790 observations) retire several times, or come back to the labor force after retirement. To check the robustness of our results, we create a restricted sample from which these individuals are excluded, and re-estimate equation (1) in this smaller sample. Our results are qualitatively similar, but coefficients are larger and more often significant (Tables A4 and A5 in the Appendix).

Shocks Between t-1 and t

We re-estimate our main model but we now measure health shocks between t-1 and t, rather than between t and T or between t+1 and t+2 (see Table A6 in the Appendix). In this specification, expectations are measured in t-1, while labor market status is reported in t. The shock variable then captures the discrepancy between a person's ex ante expectations formed before a change in her labor market status and her health evolution reported or computed after the change in her labor market status.

Our results are consistent with our previous findings. Retirement systematically increases the likelihood of positive health shocks for men. For women, retirement is associated with an increase in positive shocks when we use the SAH variable.

Additional Controls

As documented in the previous literature, some people retire because of poor health. To account for this, we re-estimate the main model controlling for lagged SAH. Our results are robust to the inclusion of this additional control. For men, complete retirement is associated with positive health shocks, and for women, it is negatively correlated with negative shocks (Table A7 in the Appendix).

Attrition

Attrition may affect the representativeness of our sample and lead to biased estimates of the impact of retirement. To adjust for attrition, we re-estimate our main model using longitudinal weights. The findings are essentially unchanged: retired men experience more unexpected positive shocks, whereas retired women endure less negative shocks (Table A8 in the Appendix).

Shocks and Life Satisfaction

Finally, Table A9 in the Appendix illustrates the correlation between unexpected shocks and life satisfaction. The correlations are unsurprising: people whose health has changed for the better (unexpectedly) are more satisfied with their life than people who experienced a negative shock.

6. Conclusion

This paper examines the impact of retirement on unexpected health changes, using longitudinal data on older Australians, from the 2001-2014 HILDA panel survey. We are interested in health shocks, as measured by the difference between expected health status (reported in t) and health transition (reported later).

Evaluating the causal impact of retirement on health is not straightforward. Workers could retire because their health is deteriorating and they anticipate that this degradation will worsen, rendering work increasingly difficult. The usual route followed by social scientists, in order to overcome this reverse causation problem, consists in exploiting reforms of the legal retirement age and looking at the impact of an additional year of activity on workers affected by the reform. However, this method also has some limitations, because of possible non-compliance and because of the specific frustration that workers hit by the reform can feel. Moreover, the conclusions of these studies are somewhat contradictory. Some point to the beneficial effect of retirement on health while others uncover a detrimental effect. We use another route, which consists in identifying the influence of retirement on unexpected health shocks. Because these health shocks are unexpected and are measured after the retirement transition, this rules out the risk of reverse causality. We observe a decrease in negative shocks and a rise in positive shocks around the time of retirement for both genders. These results are found for a variety of health measures. Moreover they are economically significant as the effects vary between 10% and 23%, depending on specifications. For men, these shocks are driven by more negative expectations, less negative health deteriorations and more positive health improvements, whereas for women, they are solely due to less negative health decreases and more positive health increases. Such positive shocks do not happen upon unemployment spells. Finally, we fail to uncover any difference in the impact of retirement across occupations or marital statuses of workers.

Due to the increase in the length of life expectancy, developed countries have recently had to reform their retirement systems and postpone the age of retirement. This paper implies that such reforms, although necessary, come at a cost in terms of wellbeing and health.

References

Atalay, K., & Barrett, G. F. (2014). The causal effect of retirement on health: New evidence from Australian pension reform. *Economics Letters*, 125(3), 392-395.

Au, D. W. H., Crossley, T. F., & Schellhorn, M. (2005). The effect of health changes and long-term health on the work activity of older Canadians. *Health Economics*, 14(10), 999-1018.

Behncke, S. (2012). Does retirement trigger ill health? *Health Economics*, 21(3): 282-300.

Böckerman, P. & Ilmakunnas, P. (2009). Unemployment and self-assessed health: Evidence form panel data. *Health Economics*, 18(2): 161-179.

Bonsang, E., Adam, S., & Perelman, S. (2012). Does retirement affect cognitive functioning? *Journal of Health Economics*, 31(3): 490-501.

Cai, L., & Kalb, G. (2006). Health status and labour force participation: Evidence from Australia. *Health Economics*, 15(3), 241-261.

Coe, N. B., von Gaudecker, H. M., Lindeboom, M., & Maurer, J. (2012). The effect of retirement on cognitive functioning. *Health Economics*, 21(8), 913-927.

Coe, N. B., & Zamarro, G. (2011). Retirement effects on health in Europe. *Journal of Health Economics*, 30(1), 77-86.

Dave, D., Rashad, I., & Spasojevic, J. (2008). The effects of retirement on physical and mental health outcomes. *Southern Economic Journal*, 75(2): 497-523.

Disney, R., Emmerson, C., & Wakefield, M. (2006). Ill health and retirement in Britain: A panel data-based analysis. *Journal of Health Economics*, 25(4), 621-649.

Dwyer, D. S. & Mitchell, O. S. (1999). Health problems as determinants of retirement: Are self-rated measures endogenous? *Journal of Health Economics*, 18(2): 173-193.

Eibich, P. (2015). Understanding the effect of retirement on health: Mechanisms and heterogeneity. *Journal of Health Economics*, 43: 1-12.

Godard, M. (2016). Gaining weight through retirement? Results from the SHARE survey. *Journal of Health Economics*, 45: 27-46.

Goldman, D., Lakdawalla, D., & Zheng, Y. (2008). Retirement and weight, mimeo. Available at: http://www.aeaweb.org/assa/2009/retrieve.php?pdfid=219.

Hallberg, D., Johansson, P., & Josephson, M. (2015). Is an early retirement offer good for your health? Quasi-experimental evidence from the army. *Journal of Health Economics*, 44, 274-285.

Hessel, P. (2016). Does retirement (really) lead to worse health among European men and women across all educational levels? *Social Science & Medicine*, 151, 19-26.

Insler, M. (2014). The health consequences of retirement. *Journal of Human Resources*, 49(1), 195-233.

Johnston, D. W., & Lee, W. S. (2009). Retiring to the good life? The short-term effects of retirement on health. *Economics Letters*, 103(1), 8-11.

Mavromaras, K., Richardson, S., & Zhu, R. (2013). Age pension, age eligibility, retirement and health outcomes in Australia. *National Institute of Labour Studies WP*, (201).

Mazzonna, F. & Peracchi, F. (2012). Ageing, cognitive abilities and retirement. *European Economic Review*, 56(4): 691-710.

McGarry, K. (2004). Health and retirement do changes in health affect retirement expectations? *Journal of Human Resources*, 39(3), 624-648.

Motegi, H., Nishimura, Y., & Oikawa, M. (2016). What explains the difference in the effect of retirement on health? Evidence from Global Aging Data. MRPA Working Paper no. 73963.

Shai, O. (2018). Is retirement good for men's health? Evidence using a change in the retirement age in Israel. *Journal of Health Economics*, 57, 15-30.

Siddiqui, S. (1997). The impact of health on retirement behaviour: Empirical evidence from West Germany. *Health Economics*, 6(4), 425-438.

Zhu, R. (2016). Retirement and its consequences for women's health in Australia. *Social Science & Medicine*, 163: 117-125.

TABLES

Table 1. Construction of the shock variables

Variable label	Definition
Unexpected negative shock between t and T	Doesn't know whether health will get worse (reported in t) & Health gets worse between t and T
	Expects same or better health (reported in t) & Health gets worse between t and T
Unexpected same shock between t and T	Doesn't know whether health will get worse (reported in t) & Health remains the same between t and T
Unexpected positive shock between t and T	Expects worse health (reported in t) & Health remains the same between t and T
	Expects worse health (reported in t) & Health improves between t and T
	Doesn't know whether health will get worse (reported in t) & Health improves between t and T
Expected negative change between t and T	Expects worse health (reported in t) & Health gets worse between t and T
Expects same or better health (reported in t) & Health remains the same between t and T	
Expects same or better health (reported in t) & Health improves between t and T	

Notes. T = t+1 or t+2.

Table 2. Descriptive statistics, for ages 50-75

Variables	Males Proportion (%) or mean	(Standard error)	Females Proportion (%) or mean	(Standard error)
Health expectations, reported in t				
Expects worse health	30.01%		22.07%	
Doesn't know whether health will get worse	36.68%		38.42%	
Expects same or better health	33.31%		39.51%	
Reported health transition between t and t+1, reported in t+1				
Health is worse	17.80%		19.90%	
Health is the same	72.66%		67.37%	
Health is better	9.54%		12.74%	
Computed evolution of Self-Assessed Health (SAH) between t and t+1				
SAH is worse	19.86%		19.93%	
SAH is the same	63.02%		62.36%	
SAH is better	17.13%		17.71%	
Computed evolution of the Physical Component Summary (PCS) between t and t+1				
PCS is worse	17.66%		18.87%	
PCS is the same	67.51%		64.99%	
PCS is better	14.83%		16.14%	
Computed evolution of the Mental Component Summary (MCS) between t and t+1				
MCS is worse	15.45%		17.89%	
MCS is the same	69.48%		63.87%	
MCS is better	15.07%		18.24%	
Life satisfaction	7.95	(1.51)	8.01	(1.58)
Labor market status, reported in t				
Employed	57.58%		45.11%	
Not completely retired	5.22%		6.22%	
Completely retired	34.28%		44.44%	
Never in the workforce	0.04%		1.51%	
Control variables, reported in t				
Age	60.47	(7.22)	60.56	(7.29)
Married	70.88%		61.31%	
De facto	8.01%		6.15%	
Separated	12.45%		16.74%	
Widowed	2.48%		11.00%	
Household size	2.48	(1.21)	2.25	(1.09)
Years of education	12.05	(2.86)	11.49	(2.87)
Log (household income+1)	4.15	(0.77)	4.00	(0.79)
Observations	23,787		24,986	

Notes. Standard errors for continuous variables are reported in parentheses. PCS and MCS are summary scores derived from the SF-36 questionnaire, following the recommended guidelines.

Table 3. Effect of retirement (reported in t) on health shocks (between t and T), in the full sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Males Unexpected negative	Males Unexpected same	Males Unexpected positive	Females Unexpected negative	Females Unexpected same	Females Unexpected positive
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel A. Shock between t and t+1, constructed as the difference between reported health transition between t and t+1 and expectation reported in t						
Completely retired (t)	-0.020**	-0.000	0.035***	-0.025***	0.030**	0.005
	(0.010)	(0.015)	(0.013)	(0.010)	(0.013)	(0.012)
	[-23.39%]		[14.30%]	[-22.59%]	[11.31%]	
Panel B. Shock between t and t+1, constructed as the difference between computed evolution of SAH between t and t+1 and expectation reported in t						
Completely retired (t)	-0.023**	-0.002	0.023	-0.023**	0.004	0.024**
	(0.012)	(0.013)	(0.014)	(0.011)	(0.013)	(0.012)
	[-15.89%]			[-14.16%]		[9.73%]
Panel C. Shock between t and t+2, constructed as the difference between computed evolution of SAH between t and t+2 and expectation reported in t						
Completely retired (t)	-0.024	0.008	0.012	-0.028**	0.017	0.015
	(0.015)	(0.015)	(0.016)	(0.014)	(0.014)	(0.014)
				[-15.58%]		
Panel D. Shock between t and t+1, constructed as the difference between evolution of the PCS between t and t+1 and expectation reported in t						
Completely retired (t)	-0.005	-0.030**	0.031**	-0.023**	0.005	0.009
	(0.011)	(0.014)	(0.014)	(0.011)	(0.013)	(0.013)
		[-12.15%]	[10.38%]	[-15.57%]		
Panel E. Shock between t and t+2, constructed as the difference between evolution of the PCS between t and t+2 and expectation reported in t						
Completely retired (t)	-0.019	0.009	0.025	-0.009	-0.015	0.030**
	(0.013)	(0.016)	(0.016)	(0.014)	(0.015)	(0.015)
						[13.08%]
Panel F. Shock between t and t+1, constructed as the difference between evolution of the MCS between t and t+1 and expectation reported in t						
Completely retired (t)	0.002	-0.018	0.039***	-0.013	-0.006	0.013
	(0.010)	(0.015)	(0.014)	(0.011)	(0.014)	(0.013)
			[13.11%]			
Panel G. Shock between t and t+2, constructed as the difference between evolution of the MCS between t and t+2 and expectation reported in t						
Completely retired (t)	-0.007	-0.007	0.029*	-0.011	-0.004	0.020
	(0.011)	(0.016)	(0.016)	(0.011)	(0.015)	(0.014)
			[9.93%]			
Observations	17,839	17,839	17,839	19,613	19,613	19,613
Number of persons	3,300	3,300	3,300	3,651	3,651	3,651

Notes. Each panel corresponds to a specific regression. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, the number of years of education, the logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses. Effects in percentage in brackets. *** p<0.01, ** p<0.05, * p<0.1.

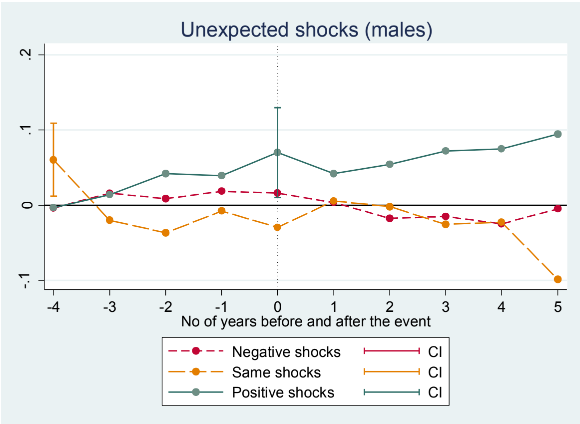
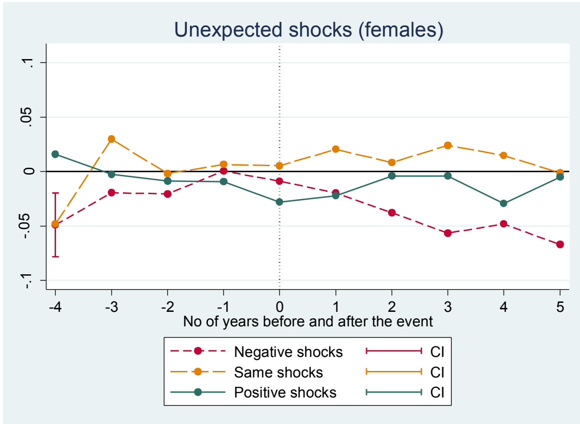
Table 4. Effect of retirement (reported in t) on health shocks (between t+1 and t+2), in the full sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Males Unexpected negative	Males Unexpected same	Males Unexpected positive	Females Unexpected negative	Females Unexpected same	Females Unexpected positive
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel A. Shock between t+1 and t+2, constructed as the difference between reported health transition between t+1 and t+2 and expectation reported in t+1						
Completely retired (t)	-0.012	0.003	0.022	-0.026**	0.020	-0.005
	(0.011)	(0.015)	(0.015)	(0.011)	(0.014)	(0.012)
				[-23.13%]		
Panel B. Shock between t+1 and t+2, constructed as the difference between computed evolution of SAH between t+1 and t+2 and expectation reported in t+1						
Completely retired (t)	-0.013	-0.004	0.009	-0.033**	-0.003	0.028**
	(0.014)	(0.015)	(0.016)	(0.014)	(0.014)	(0.014)
				[-19.26%]		[11.74%]
Panel C. Shock between t+1 and t+2, constructed as the difference between evolution of the PCS between t+1 and t+2 and expectation reported in t+1						
Completely retired (t)	-0.031**	0.012	0.019	-0.006	-0.021	0.027*
	(0.013)	(0.015)	(0.017)	(0.014)	(0.014)	(0.014)
	[-24.36%]					[11.88%]
Panel D. Shock between t+1 and t+2, constructed as the difference between evolution of the MCS between t+1 and t+2 and expectation reported in t+1						
Completely retired (t)	-0.008	-0.000	0.020	-0.021*	0.002	-0.002
	(0.011)	(0.016)	(0.017)	(0.011)	(0.015)	(0.014)
				[-15.52%]		
Observations	17,203	17,203	17,203	18,836	18,836	18,836
Number of persons	3,171	3,171	3,171	3,517	3,517	3,517

Notes. Each panel corresponds to a specific regression. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, the number of years of education, the logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses. Effects in percentage in brackets.
*** p<0.01, ** p<0.05, * p<0.1.

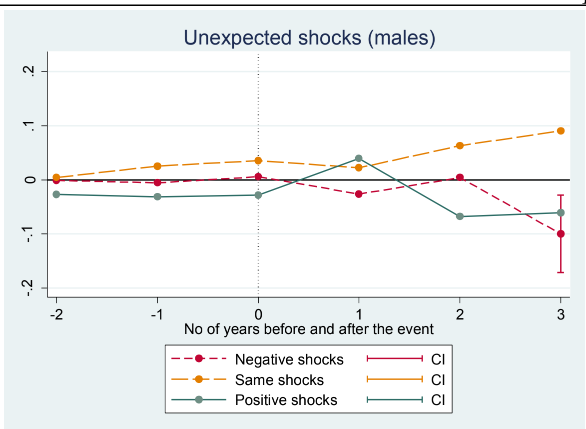
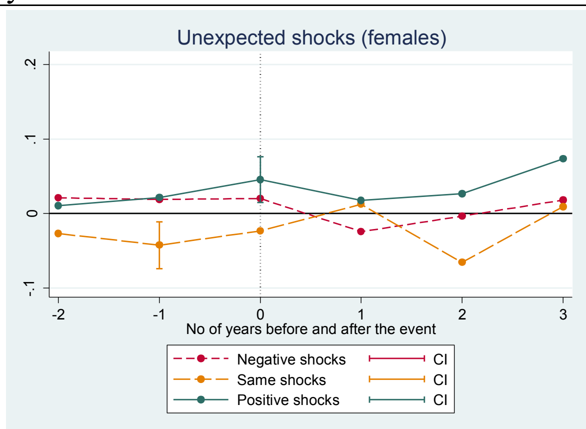
FIGURES

Figure 1. Expectation, transition and shocks around the time of complete retirement

Males	Females
	

Notes. The sample contains individuals aged 50-75 who transition to complete retirement. The shock variable in t is constructed as the difference between reported health transition between t-1 and t and expectation reported in t-1. Individuals who are observed 5 years or more before complete retirement serve as the reference category. Confidence intervals (at the 10% level) are represented only when the coefficient is statistically significant.

Figure 2. Shocks around the time of an unemployment spell

Males	Females
Unemployment	
	

Notes. The sample contains individuals less than 55 years of age. The shock variable in t is constructed as the difference between reported health transition between t-1 and t and expectations reported in t-1. Individuals observed 3 years or more before unemployment serve as the reference category. Confidence intervals (at the 10% level) are represented only when the coefficient is statistically significant.

APPENDIX (online-only supplementary material)

Table A1. Consistency check of self-reported health transition. Bivariate statistics

	Males			Females		
	Reported health transition between t and t+1, reported in t+1			Reported health transition between t and t+1, reported in t+1		
	Worse	Same	Better	Worse	Same	Better
Computed evolution of the physical component summary (PCS) between t and t+1	-3.566	0.031	1.779	-3.706	0.005	2.276
Computed evolution of the mental component summary (MCS) between t and t+1	-1.979	0.224	1.427	-1.966	0.189	2.145

Table A2. Retirement (reported in t), health expectation (reported in t) and health evolution (between t and T), in the full sample

	(1) Males	(2) Males	(3) Males	(4) Females	(5) Females	(6) Females
EXPECTATION						
	Expects worse health	Doesn't know whether health will get worse	Expects same or better health	Expects worse health	Doesn't know whether health will get worse	Expects same or better health
Panel A. Expectation, reported in t						
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Completely retired (t)	0.021*	-0.007	-0.014	-0.001	0.016	-0.015
	(0.012)	(0.014)	(0.012)	(0.010)	(0.013)	(0.011)
Observations	26,377	26,377	26,377	28,922	28,922	28,922
Number of persons	4,415	4,415	4,415	4,778	4,778	4,778
EVOLUTION						
	Worse	Same	Better	Worse	Same	Better
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel B. Reported health transition between t and t+1, reported in t+1						
Completely retired (t)	-0.020	-0.004	0.024**	-0.032***	0.016	0.016
	(0.013)	(0.015)	(0.010)	(0.011)	(0.014)	(0.011)
Panel C. Computed evolution of Self-Assessed Health (SAH) between t and t+1						
Completely retired (t)	-0.015	0.014	0.001	-0.027**	0.006	0.021*
	(0.013)	(0.017)	(0.011)	(0.012)	(0.016)	(0.011)
Panel D. Computed evolution of Self-Assessed Health (SAH) between t and t+2						
Completely retired (t)	-0.011	0.000	0.011	-0.037**	0.029*	0.007
	(0.016)	(0.019)	(0.014)	(0.015)	(0.018)	(0.014)
Panel E. Computed evolution of the Physical Component Summary (PCS) between t and t+1						
Completely retired (t)	0.000	-0.019	0.019	-0.022*	0.002	0.021*
	(0.012)	(0.017)	(0.012)	(0.012)	(0.016)	(0.011)
Panel F. Computed evolution of the Physical Component Summary (PCS) between t and t+2						
Completely retired (t)	-0.030*	0.018	0.012	-0.015	-0.015	0.030**
	(0.016)	(0.018)	(0.013)	(0.015)	(0.017)	(0.013)
Panel G. Computed evolution of the Mental Component Summary (MCS) between t and t+1						
Completely retired (t)	-0.004	-0.014	0.018	-0.015	0.007	0.007
	(0.011)	(0.016)	(0.012)	(0.012)	(0.016)	(0.012)
Panel H. Computed evolution of the Mental Component Summary (MCS) between t and t+2						
Completely retired (t)	-0.010	0.012	-0.001	-0.016	0.010	0.006
	(0.013)	(0.016)	(0.014)	(0.013)	(0.016)	(0.014)
Observations	17,864	17,864	17,864	19,662	19,662	19,662
Number of persons	3,301	3,301	3,301	3,653	3,653	3,653

Notes. Each panel corresponds to a specific regression. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A3. Retirement (reported in t), health expectation (reported in t+1) and health evolution (between t+1 and t+2), in the full sample

	(1) Males	(2) Males	(3) Males	(4) Females	(5) Females	(6) Females
EXPECTATION						
	Expects worse health	Doesn't know whether health will get worse	Expects same or better health	Expects worse health	Doesn't know whether health will get worse	Expects same or better health
Panel A. Expectation, reported in t+1						
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Completely retired (t)	0.012	-0.006	-0.006	0.005	-0.005	-0.000
	(0.013)	(0.015)	(0.013)	(0.011)	(0.013)	(0.011)
Observations	22,664	22,664	22,664	24,972	24,972	24,972
Number of persons	3,845	3,845	3,845	4,211	4,211	4,211
EVOLUTION						
	Worse	Same	Better	Worse	Same	Better
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel B. Reported health transition between t+1 and t+2, reported in t+2						
Completely retired (t)	-0.013	0.014	-0.001	-0.027**	0.034**	-0.007
	(0.013)	(0.015)	(0.010)	(0.013)	(0.015)	(0.011)
Panel C. Computed evolution of Self-Assessed Health (SAH) between t+1 and t+2						
Completely retired (t)	-0.011	0.000	0.011	-0.037**	0.029*	0.007
	(0.016)	(0.019)	(0.014)	(0.015)	(0.018)	(0.014)
Panel D. Computed evolution of the Physical Component Summary (PCS) between t+1 and t+2						
Completely retired (t)	-0.030*	0.018	0.012	-0.015	-0.015	0.030**
	(0.016)	(0.018)	(0.013)	(0.015)	(0.017)	(0.013)
Panel E. Computed evolution of the Mental Component Summary (MCS) between t+1 and t+2						
Completely retired (t)	-0.010	0.012	-0.001	-0.016	0.010	0.006
	(0.013)	(0.016)	(0.014)	(0.013)	(0.016)	(0.014)
Observations	17,864	17,864	17,864	19,662	19,662	19,662
Number of persons	3,301	3,301	3,301	3,653	3,653	3,653

Notes. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table A4. Retirement (reported in t), health expectation (reported in t) and health evolution (between t and T), in the restricted sample

	(1) Males	(2) Males	(3) Males	(4) Females	(5) Females	(6) Females
EXPECTATION						
	Expects worse health	Doesn't know whether health will get worse	Expects same or better health	Expects worse health	Doesn't know whether health will get worse	Expects same or better health
Panel A. Expectation, reported in t						
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Completely retired (t)	0.035**	-0.016	-0.019	0.005	0.009	-0.015
	(0.014)	(0.017)	(0.015)	(0.013)	(0.016)	(0.014)
Observations	23,787	23,787	23,787	24,986	24,986	24,986
Number of persons	4,123	4,123	4,123	4,292	4,292	4,292
EVOLUTION						
	Worse	Same	Better	Worse	Same	Better
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel B. Reported health transition between t and t+1, reported in t+1						
Completely retired (t)	-0.018	-0.010	0.028**	-0.035**	0.028	0.007
	(0.015)	(0.018)	(0.012)	(0.015)	(0.017)	(0.013)
Panel C. Computed evolution of Self-Assessed Health (SAH) between t and t+1						
Completely retired (t)	-0.009	0.005	0.004	-0.029**	0.025	0.004
	(0.015)	(0.021)	(0.013)	(0.014)	(0.019)	(0.013)
Panel D. Computed evolution of Self-Assessed Health (SAH) between t and t+2						
Completely retired (t)	-0.002	0.003	-0.001	-0.051***	0.053**	-0.001
	(0.021)	(0.024)	(0.016)	(0.019)	(0.022)	(0.017)
Panel E. Computed evolution of the Physical Component Summary (PCS) between t and t+1						
Completely retired (t)	-0.018	-0.000	0.018	-0.017	0.000	0.017
	(0.015)	(0.020)	(0.014)	(0.015)	(0.019)	(0.013)
Panel F. Computed evolution of the Physical Component Summary (PCS) between t and t+2						
Completely retired (t)	-0.038**	0.026	0.013	-0.009	-0.025	0.033**
	(0.019)	(0.022)	(0.016)	(0.019)	(0.021)	(0.016)
Panel G. Computed evolution of the Mental Component Summary (MCS) between t and t+1						
Completely retired (t)	-0.012	-0.007	0.019	-0.010	0.018	-0.008
	(0.013)	(0.020)	(0.014)	(0.014)	(0.019)	(0.014)
Panel H. Computed evolution of the Mental Component Summary (MCS) between t and t+2						
Completely retired (t)	-0.029*	0.039**	-0.010	0.003	0.005	-0.008
	(0.016)	(0.020)	(0.018)	(0.015)	(0.020)	(0.017)
Observations	15,922	15,922	15,922	16,822	16,822	16,822
Number of persons	3,033	3,033	3,033	3,212	3,212	3,212

Notes. In the restricted sample, we drop individuals who retire several times or come back to work after retirement. Each panel corresponds to a specific regression. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Table A5. Effect of retirement (reported in t) on health shocks (between t and T), in the restricted sample

	(1) Males	(2) Males	(3) Males	(4) Females	(5) Females	(6) Females
	Unexpected negative	Unexpected same	Unexpected positive	Unexpected negative	Unexpected same	Unexpected positive
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel A. Shock between t and t+1, constructed as the difference between reported health transition between t and t+1 and expectation reported in t						
Completely retired	-0.025**	-0.008	0.050***	-0.040***	0.040**	-0.002
(t)	(0.011)	(0.017)	(0.016)	(0.012)	(0.017)	(0.015)
Panel B. Shock between t and t+1, constructed as the difference between Self-Assessed Health (SAH) evolution between t and t+1 and expectation reported in t						
Completely retired	-0.018	-0.012	0.049***	-0.024*	-0.001	0.038**
(t)	(0.014)	(0.017)	(0.017)	(0.014)	(0.016)	(0.015)
Panel C. Shock between t and t+2, constructed as the difference between Self-Assessed Health (SAH) evolution between t and t+2 and expectation reported in t						
Completely retired	-0.024	0.010	0.024	-0.035**	0.010	0.033*
(t)	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)
Panel D. Shock between t and t+1, constructed as the difference between the Physical Component Summary (PCS) evolution between t and t+1 and expectation reported in t						
Completely retired	-0.024*	-0.028	0.049***	-0.027*	0.009	0.008
(t)	(0.012)	(0.017)	(0.017)	(0.014)	(0.016)	(0.015)
Panel E. Shock between t and t+2, constructed as the difference between the Physical Component Summary (PCS) evolution between t and t+2 and expectation reported in t						
Completely retired	-0.030*	0.018	0.038**	-0.012	-0.029	0.037**
(t)	(0.016)	(0.019)	(0.019)	(0.018)	(0.018)	(0.019)
Panel F. Shock between t and t+1, constructed as the difference between the Mental Component Summary (MCS) evolution between t and t+1 and expectation reported in t						
Completely retired	-0.009	-0.030*	0.059***	-0.018	-0.009	0.005
(t)	(0.012)	(0.018)	(0.017)	(0.013)	(0.017)	(0.016)
Panel G. Shock between t and t+2, constructed as the difference between the Mental Component Summary (MCS) evolution between t and t+2 and expectation reported in t						
Completely retired	-0.021	-0.005	0.057***	-0.004	-0.025	0.018
(t)	(0.013)	(0.020)	(0.019)	(0.014)	(0.019)	(0.018)
Observations	15,900	15,900	15,900	16,783	16,783	16,783
Number of persons	3,033	3,033	3,033	3,210	3,210	3,210

Notes. In the restricted sample, we drop individuals who retire several times or come back to work after retirement. Each panel corresponds to a specific regression. The following control variables are included: not completely retired (t) and never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Table A6. Effect of retirement (reported in t) on health shocks (between t-1 and t), in the full sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Males Unexpected negative	Males Unexpected same	Males Unexpected positive	Females Unexpected negative	Females Unexpected same	Females Unexpected positive
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Panel A. Shock between t-1 and t, constructed as the difference between reported health transition between t-1 and t and expectation reported in t-1						
Completely retired (t)	-0.003	-0.021	0.041***	0.003	0.016	-0.017
	(0.009)	(0.014)	(0.013)	(0.009)	(0.013)	(0.011)
Observations	22,836	22,836	22,836	25,165	25,165	25,165
Number of persons	3,905	3,905	3,905	4,269	4,269	4,269
Panel B. Shock between t-1 and t, constructed as the difference between computed evolution of SAH between t-1 and t and expectation reported in t-1						
Completely retired (t)	0.002	-0.003	0.029**	-0.013	-0.003	0.020*
	(0.011)	(0.014)	(0.014)	(0.011)	(0.013)	(0.012)
Observations	22,536	22,536	22,536	24,720	24,720	24,720
Number of persons	3,891	3,891	3,891	4,249	4,249	4,249
Panel C. Shock between t-1 and t, constructed as the difference between evolution of the PCS between t-1 and t and expectation reported in t-1						
Completely retired (t)	0.012	-0.025*	0.037***	-0.005	0.008	-0.001
	(0.010)	(0.014)	(0.014)	(0.010)	(0.013)	(0.012)
Observations	21,718	21,718	21,718	23,864	23,864	23,864
Number of persons	3,818	3,818	3,818	4,179	4,179	4,179
Panel D. Shock between t-1 and t, constructed as the difference between evolution of the MCS between t-1 and t and expectation reported in t-1						
Completely retired (t)	0.002	-0.033**	0.053***	0.009	-0.016	0.011
	(0.010)	(0.014)	(0.014)	(0.010)	(0.013)	(0.012)
Observations	21,718	21,718	21,718	23,864	23,864	23,864
Number of persons	3,818	3,818	3,818	4,179	4,179	4,179

Notes. Each panel corresponds to a specific regression. Controls for not completely retired (t) and for never in the workforce (t) are included. The following control variables are included: age, age square, marital status, household size, the number of years of education, the logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table A7. Main model including lagged self-assessed health, in the restricted sample

	(1) Males	(2) Males	(3) Males	(4) Females	(5) Females	(6) Females
	Unexpected negative	Unexpected same	Unexpected positive	Unexpected negative	Unexpected same	Unexpected positive
Shock between t and t+1, constructed as the difference between reported health transition between t and t+1 and expectation reported in t						
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Completely retired (t)	-0.019	-0.004	0.041**	-0.036***	0.034*	-0.000
	(0.012)	(0.019)	(0.017)	(0.014)	(0.018)	(0.016)
Self-Assessed Health: Poor (t-1)	-0.030	-0.027	0.117***	-0.124***	-0.019	0.142***
	(0.023)	(0.024)	(0.030)	(0.022)	(0.022)	(0.028)
Self-Assessed Health: Fair (t-1)	-0.029**	0.001	0.045***	-0.069***	-0.010	0.084***
	(0.012)	(0.016)	(0.017)	(0.013)	(0.016)	(0.015)
Self-Assessed Health: Good (t-1)	-0.001	-0.009	0.028***	-0.020***	0.012	0.028***
	(0.007)	(0.011)	(0.010)	(0.007)	(0.011)	(0.009)
Self-Assessed Health: Very good (t-1)	Ref	Ref	Ref	Ref	Ref	Ref
Self-Assessed Health: Excellent (t-1)	0.001	-0.008	-0.050***	0.016	-0.025*	-0.015
	(0.007)	(0.016)	(0.016)	(0.011)	(0.015)	(0.010)
Observations	17,054	17,054	17,054	18,008	18,008	18,008
Number of persons	3,156	3,156	3,156	3,310	3,310	3,310

Notes. In the restricted sample, we drop individuals who retire several times or come back to work after retirement. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income and year dummies. Fixed effects are included. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table A8. Main model using longitudinal weights, in the restricted sample

	(1) Males	(2) Males	(3) Males	(4) Females	(5) Females	(6) Females
	Unexpected negative	Unexpected same	Unexpected positive	Unexpected negative	Unexpected same	Unexpected positive
Shock between t and t+1, constructed as the difference between reported health transition between t and t+1 and expectation reported in t						
Employed (t)	Ref	Ref	Ref	Ref	Ref	Ref
Completely retired (t)	-0.009	-0.016	0.041**	-0.041**	0.061***	-0.007
	(0.015)	(0.023)	(0.020)	(0.016)	(0.021)	(0.018)
Observations	13,878	13,878	13,878	14,927	14,927	14,927
Number of persons	1,776	1,776	1,776	1,911	1,911	1,911

Notes. In the restricted sample, we drop individuals who retire several times or come back to work after retirement. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income and year dummies. Fixed effects are included. Longitudinal weights are also included. Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Table A9. Effect of health shocks on life satisfaction, in the full sample

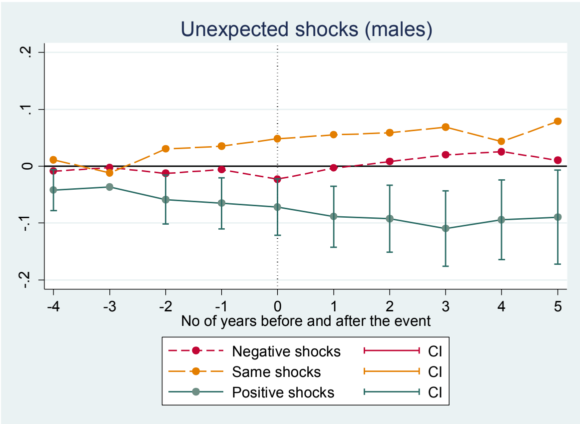
	(1) Males	(2) Males	(3) Males	(4) Males	(5) Females	(6) Females	(7) Females	(8) Females
Explained variable	Life satisfaction (t)	Life satisfaction (t)	Life satisfaction (t)	Life satisfaction (t)	Life satisfaction (t)	Life satisfaction (t)	Life satisfaction (t)	Life satisfaction (t)
	Unexpected shock (and other changes) between t-1 and t, constructed as the difference between expectation reported in t-1 and…							
	reported health transition, reported in t	computed evolution of SAH between t-1 and t	computed evolution of PCS between t-1 and t	computed evolution of MCS between t-1 and t	reported health transition between t-1 and t	computed evolution of SAH between t-1 and t	computed evolution of PCS between t-1 and t	computed evolution of MCS between t-1 and t
Unexpected shock (and other changes)								
Unexpected negative	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Unexpected same	0.264*** (0.031)	0.089*** (0.023)	0.072*** (0.025)	0.252*** (0.029)	0.338*** (0.032)	0.099*** (0.025)	0.068*** (0.026)	0.282*** (0.030)
Unexpected positive	0.242*** (0.032)	0.104*** (0.025)	-0.008 (0.026)	0.195*** (0.030)	0.399*** (0.037)	0.140*** (0.026)	0.019 (0.027)	0.315*** (0.031)
Expected negative: Expects worse health & Health is worse	-0.071 (0.046)	-0.113*** (0.042)	-0.081* (0.046)	-0.044 (0.050)	0.019 (0.049)	-0.013 (0.051)	0.014 (0.049)	-0.007 (0.055)
Expected same or better health & Health is the same	0.261*** (0.032)	0.129*** (0.024)	0.064** (0.025)	0.238*** (0.029)	0.347*** (0.033)	0.117*** (0.023)	0.099*** (0.024)	0.327*** (0.028)
Expected same or better health & Health is better	0.333*** (0.042)	0.172*** (0.029)	0.037 (0.037)	0.314*** (0.043)	0.475*** (0.041)	0.205*** (0.030)	0.017 (0.036)	0.317*** (0.035)
Observations	22,831	22,531	21,713	21,713	25,150	24,705	23,849	23,849
Number of persons	3,905	3,891	3,818	3,818	4,269	4,249	4,179	4,179

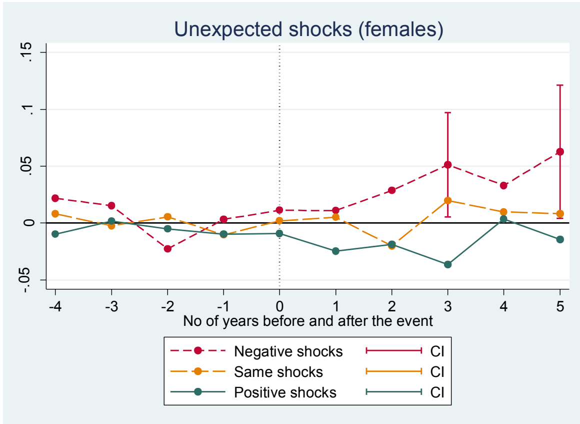
Notes. The following control variables are included: not completely retired (t), never in the workforce (t), age, age square, marital status, household size, number of years of education, logarithm of household income, labor market status, and year dummies. Fixed effects are included. Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Figure A1. Shocks around the time of marriage, separation / divorce and widowhood

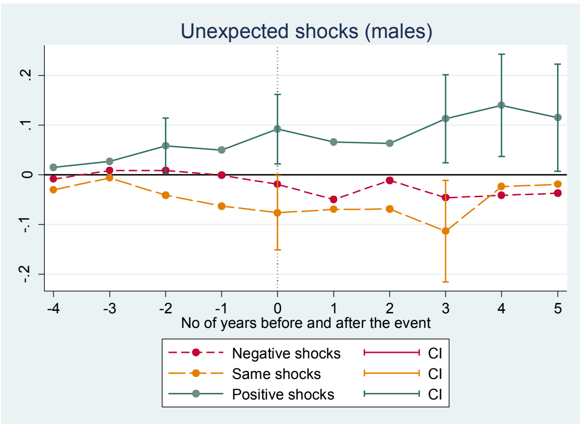
Males	Females

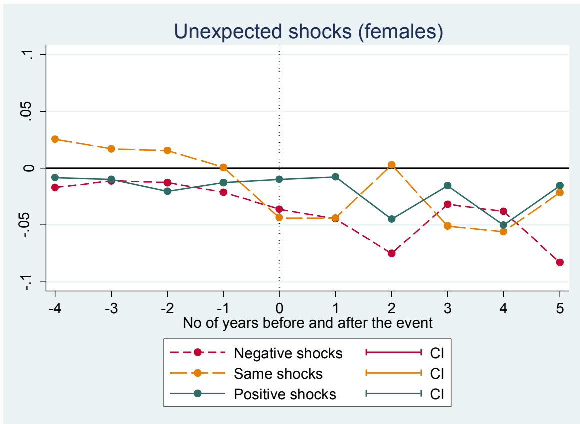
Marriage



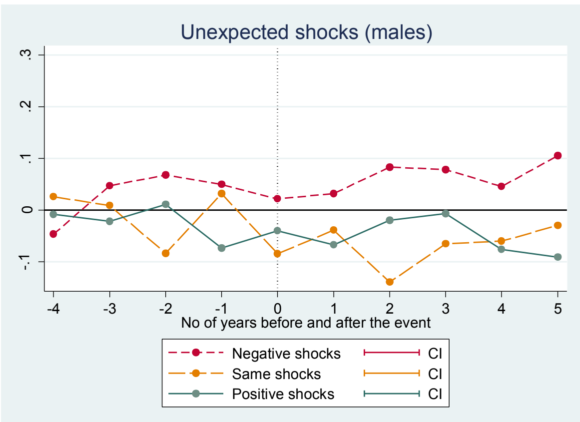


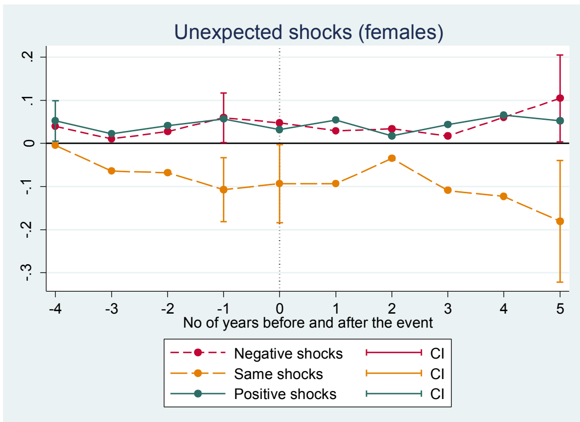
Separation/divorce





Widowhood





Notes. The samples contain individuals of all ages. Individuals observed 5 years or more before marriage, separation/divorce and widowhood serve as the reference category. Confidence intervals (at the 10% level) are represented only when the coefficient is statistically significant.