Pappa Ante Portas:

The Effect of the Husband's Retirement on the Wife's Mental Health[§]

by

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Abstract

The "Retired Husband Syndrome", that affects the mental health of wives of retired men around the world, has been anecdotally documented but never formally investigated. Using Japanese micro-data and the exogenous variation across cohorts in the maximum age of guaranteed employment induced by a 2006 Japanese reform, we estimate that husbands' earlier retirement significantly increases the probability that their wives develop the syndrome. Mechanisms that can explain our result include the higher economic distress and the increased presence of parents in the house induced by the husband's retirement, and its negative effect on the husband's own mental health.

JEL codes: D1, I1, I3, J14, J26
Keywords: retirement, pension reforms, couples, stress, depression, Japan

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[§] *Pappa Ante Portas* is a 1991 German movie directed by Loriot and Renate Westphal-Lorenz, describing the conflicts between a retired husband and his wife and son. The title alludes to *Hannibal ante portas!* ("Hannibal before the gates!"), a Roman call referring to Carthaginian commander Hannibal on his way to Rome in 211.

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1. Introduction

"I am going nuts", "I want to scream", "He is under my feet all the time", "He his driving me crazy", "I'm nervous", "I can't sleep". These expressions, reported by Johnson, 1984, describe the "Retired Husband Syndrome" (RHS hereafter) of some of his middle-aged American female patients married to a retired husband. Johnson's clinical description of the symptoms of this stress-induced condition - suffered by women when their partners give up work - includes headaches, depression, agitation, palpitations, and lack of sleep. These symptoms typically appear after the husband's retirement

Anecdotal evidence on the syndrome has been reported by several leading newspapers and TV networks, including The Washington Post, CBS, the BBC and Forbes.[1] However, in spite of the interest sparked by the media, and of the potential relevance of RHS for the well-being and health of older married women, little empirical evidence exists to date documenting that the husband's retirement has a causal negative effect on the wife's mental health, and establishing how sizeable the eventual effect is.[2]

In this paper, we try to fill this gap. Our empirical investigation focuses on Japan. While stories about the RHS are by no means restricted to a single country, the international press has often looked at Japan, because of its alleged diffusion there.[3] For instance, a BBC report suggests that over 60 percent of older Japanese women are affected by the syndrome.

The diffusion of the RHS in Japan has been often related to its economic and social fabric. Although the labour force participation of married females has increased during the past decades (see Ogawa and Ermisch, 1996; Sasaki, 2002; Abe, 2013), many Japanese married

[1] Laura, R., *Can Your Marriage Survive Retirement?*, Forbes, 1/24/2013; Kenyon, P., *Retired Husband Syndrome*, BBC, 11/13/2006; Faiola, A., *Sick of Their Husbands in Graying Japan,* The Washington Post, 10/17/2005; Tupple, K., *5 Things about Retirement that you aren't Expecting*, CBS News, 4/7/2015.

[2] An important recent exception is Stancanelli, 2014, who studies the effects of retirement on divorce using French data.

[3] In Japanese, this syndrome is called *Shujin Zaitaku Sutoresu Shoukougun (主人在宅ストレス症候群)*, or "stress syndrome from having the husband at home".

women still specialize in household work, including child-care, as full-time housewives.[4] In the strict division of labour within the family that still survives in Japan, wives stay at home and husbands spend their long working hours as well as leisure time after work with colleagues and away from home. After a life apart, and progressive estrangement, many Japanese couples are forced to spend time together after the husband's retirement. This can be a very stressful experience for wives, who have to face the continuous presence of a stranger in the house, as well as the additional burden of his requests.

Our data are drawn from the Preference Parameters Study (PPS), an annual survey conducted by the University of Osaka on a representative sample of the Japanese population, which contains detailed information on individuals and their spouses, including retirement, divorce and self-reported measures of mental health. The causal impact of the husband's retirement on the wife's RHS is identified using the exogenous variation generated by the 2006 revision of the Japanese Elderly Employment Stabilization Law (see Kondo and Shigeoka, 2014, for details), which mandated Japanese employers to guarantee continuous employment between mandatory retirement age (at age 60) and full pension eligibility age. This law created a discontinuity between the cohorts of males born since 1946, who turned 60 in 2006 or later and had the opportunity to continue employment until full pension eligibility age, and the cohorts born between 1940 and 1945, who were guaranteed employment only until mandatory retirement at age 60, before full pension eligibility age. We use the exogenous changes in maximum guaranteed employment age across cohorts as instrument for the husband's retirement, carefully controlling for potentially confounding factors, such as the differences in early life conditions generated by the Second World War.

[4] In a recent study, Steinberg and Nakane, 2012, report that the gender gap in prime – age labour force participation in 2009 was 25 percent in Japan, 14.1 percent in the US and 12.2 percent in Germany. The division of labour within the household in Japan compared to other Asian countries and the U.S. is discussed in Lee and Ono, 2008, Oshio, Nozaki and Kobayashi, 2012, and Tsuya, Bumpass and Choe, 2000, and Estevez-Abe, 2013.

In line with what reported by the press and the clinical literature, we find that the husband's retirement has a causal effect on the wife's RHS symptoms by increasing her stress, depression and inability to sleep, although the effect on depression is imprecisely estimated. The estimated effect is sizeable: conditional on both partners' age, we find that adding one year to the time spent in retirement by the husband increases the probability that the wife develops at least one of the RHS symptoms by 5.7 to 6.8 percentage points, depending on the estimation method. In contrast, when we ask the reverse question, i.e., whether the wife's exit from the labour market impairs the husband's mental health, we find no statistically significant effect.

We explore mechanisms that could help explaining our results. On the one hand, we find that both economic distress – capturing the presence of financial debt, limited financial wealth or relatively low household income – and the presence of parents in the house increase with time since the husband's retirement, suggesting that wives may be particularly affected by resource constraints and / or by the strain of caring for the elderly. On the other hand, we cannot detect in our data statistically significant effects of the husband's retirement on the wife's time spend doing housework.

We also find that the husband's retirement has negative – but smaller and less precisely estimated – effects on his own mental health, indicating that the husband's RHS symptoms may be another candidate mechanism explaining the wife's symptoms. Moreover, we estimate that the negative effect of the husband's retirement on the wife's RHS increases with the age difference between husband and wife and is larger when the wife's personality shows less leadership, suggesting that when the age gap is higher it is more difficult for the wife to adapt smoothly to the husband's retirement, and that wives with a less assertive attitude may have lower bargaining power and thus be more exposed to RHS.

While our evidence is based on data from a single country, we believe that our results have implications for other countries as well. They highlight the importance of studying retirement as a joint process affecting the couple, as failure to consider cross-partner effects may lead to underestimating its negative consequences on mental well-being.

The paper unfolds as follows. Section 2 reviews the relevant economic literature and Sections 3 describes the institutional background. We introduce our data in Section 4 and present our empirical approach and instrumental variables strategy in Section 5. Results are discussed in Sections 6 and 7. Conclusions follow.

2. Literature review

This paper brings together two research strands in the economics of ageing: the analysis of the effects of retirement on the retiring individual's mental health, and the study of the implications of retirement on other individuals, including the partner.

The effects of retirement on the mental well-being of the retiring individual are not yet fully understood. While Charles, 2004, and Johnston and Lee, 2009, report that retirement reduces depression and increases subjective well-being in the US and the UK, other contributions to this literature do not point unambiguously in the same direction. Clark and Fawaz, 2009, for instance, fail to find retirement effects on mental health in Europe. Conversely, De Grip, Lindeboom and Montizaan, 2011, show that a reform of the Dutch pension system reducing the pension rights of public sector workers induced a sharp deterioration of mental health. Kim and Moen, 2002, contrast the positive short-term "honeymoon" effect of retirement on subjective well-being with the negative longer-run effect in the U.S., and Börsch-Supan and Jürges, 2009, find that German early retirees are generally less happy than those still working. In another study using German data, Bonsang and Klein, 2012, estimate a negligible effect of voluntary retirement on overall life

satisfaction and explain this as the result of two opposite effects, the positive effect of higher leisure and the negative effect of lower income.

The effects of retirement could spill-over from the individual to others with whom the individual interacts, for instance the partner. The economic literature has provided so far little evidence on cross-partner retirement effects, by focusing mainly on the joint retirement decision of couples. An early study in this area is Hurd, 1990, who found that in the U.S. the timing of retirement of husbands and wives are positively correlated.

Additional research by Blau, 1998; Blau and Gilleskie, 2006; Casanova, 2010; Gustmann and Steinmeier, 2000, 2004; and Michaud, 2003, models the retirement process in the household and highlights two main channels of cross-partner retirement effects: financial incentives to retire jointly and complementarities in leisure effects, that make retirement more enjoyable with the partner than alone. Coile, 2004a, investigates how couples respond to retirement incentives in the US, and reports that husbands are more responsive to wives' social security incentives than vice-versa. She highlights that complementarities in leisure may be asymmetric across partners, with husbands enjoying joint leisure more than wives do.[5]

In their comparison of the retirement behaviour of British and American couples, Banks, Blundell and Casanova, 2010, find that British men are more likely to react to their wives' retirement incentives than their American counterparts. Conversely, Hospido and Zamarro, 2014, use data for continental Europe and show that while women tend to leave the workforce when their husbands retire, the opposite does not hold.[6] Finally, Stancanelli and Van Soest, 2012a and 2012b, and Stancanelli, 2014, show that reaching minimum retirement

[5] Boyle and Lahey, 2014, study the effects of a mid-1990 expansion of health insurance for U.S. veterans, and show that wives' labour supply increases when public health insurance is provided to husbands, suggesting that financial incentives dominate complementarities in spousal leisure.

[6] Bloemen, Hochguertel and Zweerink, 2014, present similar evidence for the Netherlands.

age in France has cross-partner effects on time use, home production and the incidence of divorce.[7]

There are also studies documenting that cross-partner effects originate from other life events, most notably unemployment. For instance, Charles and Stephens, 2004, find that unemployment has a positive effect on divorce rates in the U.S., and Marcus, 2013, reports that unemployment in Germany reduces the spouse's as much as the individual's happiness.

In one of the few Japanese studies we are aware of, Sugisawa, Sugisawa, Nakatani and Shibata, 1997, use a representative sample of Japanese individuals aged 60+ and find no evidence that retirement is significantly related to either mental health or to the degree of social participation. In a more recent study, Hashimoto, 2013, uses the Japanese Study of Ageing and Retirement (JSTAR) and finds that both psychological distress and cognitive functioning decline after retirement for men but not for women. These two studies have two common features:[8] a) they consider the effects of retirement on the retiring individual's health but ignore the effects on the partner; b) by failing to address the endogeneity of the retirement decision in health regressions, they cannot recover causal effects. These are important shortcomings, that we address in the current study.[9]

3. Institutional Background

In Japan, long term employment contracts typically terminate with mandatory retirement. Because of population ageing, the government established in 1986 that firms had to extend

[7] Descriptive studies on the cross-partner health effects of retirement have been conducted by psychologists (see Smith and Moen, 2003, Szinovacz, 1980, Szinovacz and Davey, 2004, 2005).

[8] The former study is based on a small sample of 178 individuals and the second study uses a larger sample from JSTAR, that collects data for a subset of Japanese regions only.

[9] Zhao, Noguchi and Konishi, 2012, and Motegi, Nishimura and Terada, 2014, study the effect of retirement on life style habits, including drinking, smoking and exercise, and show that while people reduce smoking and alcohol intake after retirement, the frequency of exercise seems unchanged.

mandatory retirement age from 55 to 60 (Shimizutani and Oshio, 2010), but tolerated ages below 60 until 1998 (Kondo and Shigeoka, 2014). Starting from 2013, mandatory age is expected to increase to 61, and will eventually reach age 65 by 2025.

The two-tier pension scheme for private sector employees – see Okumura and Usui, 2014, for an overview - was reformed by the 2001 Pension Reform Act, which gradually increased the minimum eligibility age for full pension benefits above mandatory retirement age. For men, and starting in 2001, the cohorts born between 1941 and 1943 could draw the flat-rate pension benefit (first tier) only from age 61, while retaining the right to draw the wage proportional benefit (second-tier) from age 60. Younger male cohorts were progressively exposed to even higher increases in the minimum eligible age for the flat-rate component of pension benefits, until age 65 was reached in 2013 for the cohorts born in 1949 or later (see Table 1 in Okumura and Usui, 2014 for further details).[10]

Before 2006, the increase in the minimum eligible age for the first tier of pension benefits was not accompanied by changes in mandatory retirement age. Therefore, individuals belonging to the exposed cohorts reached mandatory retirement age without being able to draw full pension benefits. To address this problem, in 2006 the Japanese government passed a revision of the Elderly Employment Stabilization Law (EESL), which mandated firms to introduce measures to guarantee employment until eligibility for full pension benefits was reached. This additional reform affected private sector employees born from 1946 onwards, by raising the maximum age of guaranteed employment from 60 to 63 for those born in 1946, to 64 for those born between 1947 and 1948, and to 65 for those born from 1949 onwards (see Kondo and Shigeoka, 2014, Table 2).

We show in Table 1 mandatory retirement age, the age until which employers are legally obliged to continue employment and the eligibility age for the flat-rate pension benefit for the

[10] See also Ichimura and Shimizutani, 2012. Kondo and Shigeoka, 2014, report that the average share of the first tier component to total pension benefits is equal to 37.5 percent.

cohorts born between 1940 and 1952. To illustrate with an example the consequences of the EESL revision, consider two employees born in 1945 and 1946. For the former, maximum guaranteed employment and full pension eligibility age were 60 and 63 respectively. For the latter, both ages were set at 63.

Firms could comply with the employment guarantee either by raising mandatory retirement age, a costly option given the steeply rising age-earnings profiles in Japan, or by re-employment after mandatory retirement until guaranteed age, typically at a lower wage. To further encourage retention, the government provided a subsidy to employers who offered re-employment to all retiring employees.[11] Not surprisingly, as of 2008 roughly 15 percent of employers chose to extend mandatory retirement, and the remaining 85 percent selected re-employment.

Importantly, the practice of re-employing workers after mandatory retirement pre-dates the revision of the Law. According to the "Personnel Management Survey" (*Koyo Kanri Chosa*) conducted in 2004, 67.5 percent of Japanese firms had a re-employment system after mandatory retirement. Of these, however, only 15.7 percent continued to employ all those who wished to be employed after reaching age 60. Employment opportunities for older workers increased after the EESL revision, which also compelled firms with more than 50 employees to report on the implementation of measures for continued employment in June of each year.

By June 2007, close to 93 percent of reporting firms had implemented these measures. According to a survey carried out by the Ministry of Health, Labour and Welfare and quoted by Fujimoto, 2008, two thirds of these firms reported that they employed almost all those who wished to stay on, a substantial increase with respect to the years before 2006. The rest employed between 70 and 90 percent of applicants, selecting them on criteria such as good

[11] We are grateful to Kenn Ariga for providing this information.

health, attitude, attendance and performance. Fujimoto, 2008, reports the results of a government survey suggesting that the number of regular employees aged 60 to 64 and 65+ increased by 26.9 and 46.5 percent, respectively, because of the EESL revision.

4. The Data

We study how the husband's retirement affects the wife's mental health by using data from the Japanese Preference Parameters Study (PPS), conducted by the University of Osaka. The PPS is a nationally representative panel survey on behaviours, risk attitudes, habits formation and time preferences of the Japanese population, implemented yearly from 2003 onwards, with refreshment samples in 2006 and 2009. Interviews are carried out via paper-and-pencil questionnaires that are delivered and picked up by interviewers at the interviewees' homes, with very high response rates (always above 70% and in recent years close to 90%) in both the longitudinal and the refreshment samples.[12]

The PPS is not a household survey, as only one individual per household is interviewed. However, the questionnaire asks married interviewees to report information also on their partners, including year of birth, education, employment status and, if the partner is retired, age at retirement. By focusing on the sub-sample of interviewed married females, we obtain information both on the wife's mental health and on the husband's retirement, as reported by the wife.

The annual questionnaire includes a common set of questions as well as wave-specific questions. Only in the waves from 2008 to 2013 the interviewees were asked how they felt about the following statements describing their mental health:

- *I have been feeling stressed lately.*

[12] These data have been used, among others, by Horioka, 2014, to study bequests, by Hanaoka et al., 2014, to study the effects of earthquakes on preferences, and by Brunello and De Paola, 2013, to study the effects of siblings composition on leadership.

- I have been feeling depressed lately.

- I haven't been sleeping well lately.

Responses had to be provided on a 5-point discrete scale, with 5 indicating something particularly true for the respondent and 1 something that does not hold true at all for the respondent.[13] Figure 1 shows the distribution of individual evaluations of each statement for the sample of females used in the estimates. These statements provide useful information on key symptoms of RHS, as described by Johnson, 1984, in his clinical article. We recode them as dummies equal to 1 for values 4 and 5 and to 0 for the remaining values. Our main dependent variable is the dummy RHS (Retired Husband Syndrome), equal to 1 if at least one of the three dummy variables just described is equal to 1, and to 0 otherwise.[14]

Our data also includes information on the household, such as the number of children, the presence of parents in the house (both of the respondent and of the respondent's husband), homeownership, household net income (on a discrete scale) and financial assets and whether the household has debts. Finally, from 2011 onwards we have also information both on the average daily hours spent by wives doing house chores and on self - reported health.

Our sample consists of married women interviewed between 2008 and 2013 whose husbands were born between 1940 and 1952, a six-year span on each side of the 1946 cohort, first affected by the 2006 EESL reform. We drop outliers in the distribution of the age difference between partners by excluding married couples where the wife was born either before 1940 or after 1961, which account for around two percent of the initial sample. Our final sample consists of 830 wives, each observed multiple times in the panel, for a total of

[13] We have recoded the original scale that had 1 for "particularly true" and 5 for "not true at all". Intermediate values from 2 to 4 are not labelled in the questionnaire, and indicate that the statement is progressively more true for the respondent.

[14] We have experimented with several alternative specifications of the dependent variable, but results are always qualitatively similar.

3,261 wife-year observations with non-missing values in the outcome and treatment variables.

Descriptive statistics for the relevant variables are shown in Table 2. It turns out that 46 percent of the wives in our sample report RHS symptoms: 41 percent have been feeling stressed, 23 percent have been feeling depressed and 16 percent have experienced sleeping difficulties. In our sample, 23 percent of husbands are retired. Conditional on retirement, the average number of years since retirement is 6.67. Furthermore, 47 percent of husbands are older than the cohort – specific maximum guaranteed employment age, and the number of years since this maximum age plus 1 ranges from 0 to 14,[15] with an unconditional mean of 3.71 years. Conditional on eligibility, this mean increases to 7.23 years.

5. The Empirical Approach

We specify the empirical relationship between the wife's mental health and the husband's retirement as follows

$$MH_{jt}^{w} = \alpha + \beta YR_{jt}^{h} + \gamma X_{jt} + \delta Z_{jt}^{w} + \xi_{jt} \qquad (1)$$

where the superscripts *w* and *h* are for the wife and the husband, MH^w is the wife's mental health,[16] YR^h is the number of years since the husband's retirement, X is a vector of predetermined variables, Z^w is the wife's number of years since maximum age of continuous guaranteed employment, ξ is an error term and the indices j and t are for the household and time.

On the one hand, Z^w impacts on the wife's labour market status, which affects MH^w. On the other hand, as discussed in Appendix 1 - where we derive Equation (1) - the years since the husband's retirement impact on the wife's mental health both directly and indirectly, by

[15] We explain below why we add one year to age.
[16] In a slight abuse of notation, we denote our key variables both with and without the subscripts *j* and *t*. We omit subscripts whenever they are clearly redundant.

affecting other household and individual variables that influence MH^w - denoted as mediators - such as the wife's health and housework hours, the husband's mental health, household composition, income and wealth. Since these mediators are choice variables, we refrain from attempting to distinguish between indirect and direct effects and estimate instead the overall impact of retirement on mental health. However, when attempting to interpret our results, we present estimates of the effects of the husband's retirement on each mediator.

We measure YR_{jt}^{h} as the number of years spent in retirement plus 1 if the husband has already retired and as zero otherwise, or, more formally:

$$YR_{jt}^{h} = \begin{cases} 0 & if\ Age_{jt}^{h} < R_{jt}^{h} \\ Age_{jt}^{h} + 1 - R_{jt}^{h} & if\ Age_{jt}^{h} \geq R_{jt}^{h} \end{cases} \quad (2)$$

where Age_{jt}^{h} and R_{jt}^{h} are the husband's current age and retirement age respectively. The selected measures of the husband's retirement is richer than a dummy measuring retirement status, because it compounds two pieces of information: a) whether the husband is retired; b) conditional on retirement, how many years have been spent in retirement. By using this measure, we assume that not only retirement status but also the duration of this status matters from the wife's RHS.[17]

The vector X_{jt} includes the number of children and the education of both partners; trends in the husband and the wife's age and in the husband's cohort of birth[18] and the following indicators of early life conditions: the real GDP per capita at birth, parental education for each partner, employment status of the mother when the respondent and the partner were 3 years old, birth order and number of siblings, whether the household was living in a

[17] See Mazzonna and Peracchi, 2012, for a similar definition. Both husband age and retirement age are reported by the wife. We add 1 to current age to avoid assigning the same value to those who have just retired (age equal to retirement age) and those who have still to retire. In the next section, we show that our estimates are qualitatively unchanged when measure YR^h with a dummy equal to 1 in the event of retirement and to 0 otherwise.

[18] We exclude the wife's cohort because $Yb^w = Yb^h + Age^h - Age^w$, where Yb is year of birth.

metropolitan area (Tokyo, Osaka or Nagoya) at age 15, and self-reported wellbeing (coded as high, medium or low) at age 15.[19]

The estimation of equation (1) by OLS is unlikely to uncover causal effects for at least three reasons. First, the husband's time since retirement is a choice variable, which is likely to be affected by shocks influencing the wife's mental health.[20] Second, our measure of time since retirement is likely to be affected by measurement error, as both retirement age and status are reported by the spouse. Additional measurement errors could also occur because some individuals may keep working after formal retirement. Last but not least, there may be variables affecting both the husband's retirement and the wife's mental health that are omitted from (1).

We address these problems using an instrumental variables (IV) identification strategy. Similarly to Kondo and Shigeoka, 2014, our selected instrument Z^h exploits the exogenous variation across cohorts induced by the revision of the EESL in 2006, which progressively guaranteed additional employment after age 60 to the cohorts born between 1946 and 1952 (treated cohorts), but not to earlier cohorts born between 1940 and 1945 (control cohorts).

Our empirical strategy is different from the "difference – in – differences" approach adopted by Kondo and Shigeoka, 2014, who use a large sample from the Japanese Labour Force Survey to evaluate the effects of the EESL revision on employment. In their study, they compare employment changes before and after 2006 for the cohorts affected by the reform with the changes experienced at the same age by the cohorts not affected by the reform. We cannot do this for two reasons: first, our sample is much smaller; second, our usable data

[19] Descriptive statistics for these variables are presented in Table 2. Unfortunately, since the interviewed household member was not asked to report the spouse's order of birth, number of siblings, subjective well-being and household location at age 15, these variables are only available for her or him.

[20] For instance, Coile, 2004b, shows that in the U.S. the husband's labor supply is positively affected by negative health shocks affecting the wife. These shocks are captured by μ in Eq. (A.3) in the Appendix.

cover the period 2008 – 2013, after the discontinuity occurred. In a similar fashion, we cannot exploit a "fuzzy regression discontinuity" design. To implement this without confounding differences in husbands' age and cohort, we would need to compare the mental health of wives whose husbands have the same age but belong to cohorts on either side of the 1946 discontinuity. This cannot be done with our data, as we observe different age ranges for each cohort.

We use instead a parametric IV specification that relies on the exogenous variation provided by changes across cohorts in the maximum age of guaranteed employment, as determined by the EESL revision– see Table 1. *Prima facie* evidence on the relevance of our selected instrument is shown in Figure 2, where we plot both the percentage of husbands who retired at age 60 or before, by cohort of birth (1940 to 1952), and nonparametric smoothers for husbands born before and after 1946. The figure shows a large discontinuity in this percentage around the critical cohort of individuals born in 1946, who were first affected by the EESL amendment – from close to an average of 20 percent for those born until 1945 to close to an average of 12 percent for those born from 1947 onwards[21] – suggesting that the reform has been quite effective in delaying the retirement of older Japanese men. Our first stage regressions, presented later in the paper, provide formal evidence that the selected instrument is not weak.

Since our data are longitudinal, we maximize the variability of the instrument Z_{jt}^{h} by defining it as

$$Z_{jt}^{h} = \begin{cases} 0 & if\ Age_{jt}^{h} < CEG_{c} \\ Age_{jt}^{h} + 1 - CEG_{c} & if\ Age_{jt}^{h} \geq CEG_{c} \end{cases} \quad (3)$$

where CEG_c is the maximum age of guaranteed employment for employees born in cohort c – see column (2) in Table 1. The variable Z_{jt}^{h} is equal to zero whenever individual age is

[21] The average difference in the percent retired between treated and control cohorts is equal to -8.6%, statistically significant at the 1 percent level of confidence (p-value = 0.001).

below maximum age CEG, and equal to the distance between age and CEG plus 1 when individual age is above or equal to the maximum age.[22] The discontinuous jump in CEG, from 60 to 63 for those born in 1946, from 63 to 64 for those born between 1947 and 1948, and from 64 to 65 for those born later, generates discontinuous jumps in *Z*. To illustrate, consider individuals aged 64 who have been born between 1944 and 1948. Their value of *Z* is equal to 5 for those born in 1944 and 1945, falls to 2 for those born in 1946, further to 1 for those born in 1947 and 1948 and to 0 for those born after 1948.

To qualify as valid, the selected instrument should affect the wife's mental health only via its impact on the husband's retirement, and should therefore be uncorrelated with variables entering in the error term of equation (1). Since our identification strategy is based on a comparison across cohorts, a potential threat to identification is that treated cohorts, who have been born after 1945, may have experienced different early life conditions than control cohorts, born before 1946. If childhood conditions affect mental health, and these effects are persistent, we may incorrectly attribute changes in the wife's mental health to variations in the husband's retirement conditions, when these changes are driven instead by omitted differences among cohorts. For instance, the economic situation in the first years after the end of the Pacific War – when many large cities where almost destroyed – was quite different from the one prevailing before the war ended. According to Angus Maddison's data,[23] real GDP per capita in Japan, which amounted to 2,874 dollars (at 1990 prices) in 1940, before the war started, collapsed to 1,346 dollars in 1945, when the war ended. Between 1946 and 1952, GDP per capita rose from 1,444 to 2,336 dollars, relatively close to the pre-war period. This sharp discontinuity among cohorts in economic conditions – as captured by GDP per capita – occurred one year earlier than the one induced by the 2006 revision of EESL.

[22] As in the case of YR we add 1 to individual age to avoid assigning the same value of Z to treated individuals with age equal to CEG and to untreated individuals with age less than CEG.

[23] See http://www.ggdc.net/MADDISON/oriindex.htm

Since we have panel data, we could model time-invariant early life conditions as individual fixed effects and use a fixed effect estimator. This strategy, however, is not suitable to the data at hand, that contain two separate sources of variability in the selected instrument, Z^h: one among cohorts conditional on age, and the other within cohorts. The latter source is concentrated in the cohorts born between 1946 and 1948, who changed their CEG status during the years 2008 to 2013, our sample period. By using fixed effects, we would soak up the former source of variability, and only very limited identifying variation would remain.

In our alternative approach, we control for differences in early economic conditions associated to the war by including in all regressions both the log of real GDP per capita in the year of birth of both the husband and the wife and a linear trend in the husband's year of birth. In addition, we capture differences in early life conditions within and among cohorts by adding to our regressions a broad set of individual variables that measure early-life conditions. These variables have been introduced above as components of the vector X. Since the main coefficients of interest change very little after adding these controls, we believe that omitted variable bias due to uncontrolled differences in early-life conditions among cohorts is not driving our results. To further investigate this, we apply the methodology proposed by Altonji, Elder and Taber, 2005, and Oster, 2015, and use selection on observables to estimate the degree of selection on un-observables that would be required to entirely explain away our first stage and reduced form estimates. Our conclusion, is that un-observables are not a plausible source of bias in our application – see Appendix 2 for a detailed discussion.

Another threat to causal inference is the presence of an effect of Z^h on the wife's labour market status (NLF^w) – defined as a dummy equal to one if the wife is out of the labour force

and to zero otherwise, conditional on Z^w.[24] If this was the case, we would not be able to tell whether the reduced form effect of Z^h on MH^w is to be attributed to its effect on YR^h or on NLF^w. In Figure 3 we dispel this concern by plotting both the percentage of wives who retired at age 60 or before against the husband's year of birth and nonparametric smoothers for husbands born before and after 1946. The figure provides suggestive evidence that – contrary to what happens for the husband's retirement – there is no detectable discontinuity in the wife's status as we move from untreated to treated husband cohorts.[25]

An additional threat is that we consider married couples only, because divorced women do not provide information on their previous husband's date of birth and labour market status. Yet the husband's retirement could be so stressful for the wife to induce divorce (see Stancanelli, 2014). By omitting divorced wives from the sample, we are likely to underestimate the effect of the husband's retirement on the wife's mental health. We identify divorced males in our data and plot in Figure 4 the divorce rate by cohort and nonparametric smoothers for males born before and after 1946. First of all, the figure shows that divorce is very uncommon in Japan (the average rate is 3.5%). More importantly for our purposes, there is no clear discontinuity in the neighbourhood of the pivotal cohort – the one first affected by the EESL revision, suggesting that our instrument is orthogonal to selection into marriage. To further support visual evidence, we have also regressed the probability of being divorced on the instrument and the vector X and found no statistically significant effect of Z^h.[26]

We estimate Equation (1) both by Two Stage Least Squares (2SLS) and using an IV probit model, to account for the fact that the dependent variable MH^w is binary, and cluster standard

[24] We use labour force status rather than retirement in the case of females because – contrary to the case of males - retirement in the relevant age group is not the main source of disengagement from work.
[25] The difference in the percent retired is equal to -4%, not statistically significant (p-value = 0.386). Econometric evidence on this point is provided later in the paper.
[26] Results are available from the authors.

errors at the same level of variation as the instrument, that is, cohort by year.[27] IV methods capture the local average treatment effect of the husband's retirement on the wife's mental health for the sub-population of compliers affected by the EESL reform (see Imbens and Angrist, 1994). Before this reform, re-employment programs were adopted by firms on a discretionary basis. It seems plausible to assume that, during this period, firms were less willing to offer re-employment to the less talented and skilled. After the Law was revised in 2006, these programs were extended to cover all workers, and economic incentives were provided to employers choosing to do so. Many offered the employment guarantee to all applying workers, and some conditioned the guarantee to a few eligibility requirements, including performance. This suggests that the compliant sub-population consists of workers with lower performance, who in some cases met a minimum requirement. Our estimated effects are informative of the marginal improvement in the wife's mental health when this sub-group is induced by the EESL revision to stay longer at work rather than retire.

6. Results

Our identification strategy relies on the exogenous variation in the husband's retirement status that originates from changes in maximum guaranteed employment age (CEG) across contiguous cohorts. We first regress years since husband's retirement YR^h and the wife's labour market status NLF^w on Z^h, Z^w and the vector of predetermined variables X. The results of our first stage estimates are reported in Table 3. All regressions include linear trends in the husband and the wife's age, the husband's year of birth and real GDP per capita at birth for both partners, and we progressively add to the baseline specifications reported in columns (1) and (4) controls for demographic characteristics and early life conditions – see columns (2)

[27] There are 78 cohort-by-year clusters in our data (13 husbands' cohorts by 6 years). We also verify whether the statistical significance of our effects is robust to clustering at the cohort level, using the wild bootstrap procedure devised by Cameron, Gelbach and Miller, 2008.

and (3) for YR^h and columns (5) and (6) for NLF^w. We always find that the selected instrument Z^h has a positive and statistically significant effect on YR^h, but no statistically significant effect on NLF^w. Furthermore, adding additional covariates affects only marginally the estimated first stage effects.

Focusing on the least parsimonious specification for the husband's retirement, reported in column (3), we estimate that adding one year to Z^h increases time into retirement by 0.373 years, a sizeable effect.[28] As documented by the first stage F statistic – equal to 80.7 – our instrument is not weak. We also verify the quality of the data reported by wives on their husbands by estimating the effect of Z^h on YR^h when retirement age is reported by the husbands on themselves rather than by their wives - and find very similar results.[29] Reassuringly for our identification strategy, Columns (4) to (6) report that the instrument Z^h is unrelated to the wife's labour market status, thereby confirming the descriptive evidence in Figure 3. The wife's status depends instead on Z^w, as suggested by equations (A.8) and (A.9) in Appendix 1.

We report in Table 4 the reduced form estimates (intention to treat), using as dependent variables both the dummy RHS and separate dummies for stress, depression and lack of sleep. To save space, we report three specifications that progressively add controls only for the RHS dummy, and the least parsimonious specification for the three separate variables.

[28] This effect corresponds to a 26.6 percent increase (0.373/1.401), and is partly due to the increase in the probability of retirement, which rises by 3.5 percentage points, a 15 percent increase with respect to the average sample probability (0.23). Our first stage estimates are robust to several specification changes, which include the use of age dummies and second order polynomials for the age and cohort trends.

[29] When retirement age and status is reported by the husbands, the estimated first stage effect of Z including all controls is 0.343 (F statistic: 33.4), slightly lower but not statistically different at the conventional levels of significance from the first stage effect estimated when these variables are reported by the wives (the p-value of the test for equality of the two first stage coefficients is 0.555).

Conditional on linear trends in age and cohorts,[30] Z^w and the variables in X, we estimate that one additional year in the gap between husband's current age and the maximum age of guaranteed employment increases the likelihood of having a wife with RHS symptoms by 2.5 percentage points, a 5.4 percent increase with respect to the sample average (0.46). This result is unaffected by the inclusion of additional individual controls. When we break down RHS into separate symptoms, we find that the highest percentage effect is on stress, and the lowest on depression. The differences between these effects, however, are not statistically significant.[31]

Although both our first stage and the reduced form effects are unaffected by the inclusion of additional controls, a potential threat to identification is the presence of further omitted unobserved factors that correlate both with the instrumental variable and with the outcomes. To dispel this concern, we use the methodology introduced by Altonji, Elder and Taber, 2005, and extended by Oster, 2015, and show in Appendix 2 that the effects of un-observables would have to go in the opposite direction with respect to those of the included observables to explain away our first stage and reduced form effects.

The OLS, 2SLS, probit, and IV probit estimates of Equation (1) with the full set of available controls are reported in Table 5. Separate results for stress, depression and lack of sleep are presented instead in Table A1 in the Appendix.[32] Considering first the OLS and probit specifications, reported in Columns (1) and (3) of Table 5 respectively, we find no evidence that husband's retirement and wife's RHS are associated, as marginal effects are close to zero and not statistically significant in either estimate. However, when we address

[30] As for the first stage estimates, we have experimented with age dummies and with second order polynomials for the age and cohort trends, but found that linear trends give the best fit.
[31] We estimate the three equations using SURE and test whether the coefficients associated to Z^h are statistically different. The p-value of the test of the null hypothesis of no difference is 0.113.
[32] Results with fewer controls are quantitatively and qualitatively similar to the ones presented in the text, and are thus not shown.

the endogeneity of years since husband's retirement YR^h in Columns (2) and (4) of the table, our estimates change markedly: we find that, conditional on X and Z^w, the husband's retirement has a positive and statistically significant causal effect on the wife's RHS symptoms.[33] As reported in Table A1, we find evidence of a positive effect for all symptoms, larger for stress and only marginally significant for depression. The estimated marginal effects are sizeable: adding one year to the duration of the husband's retirement increases the probability that the wife develops RHS symptoms by 5.7 to 6.8 percentage points, depending on the selected specification, a 12.4 to 14.7 percent increase with respect to the sample average value (0.46).[34] A candidate explanation of the large gap between the OLS and 2SLS (and between probit and IV probit) estimates of the husband's retirement effect is endogenous selection: if the husbands whose wives are not depressed select into earlier retirement, this would impart a negative bias on the OLS estimates, reducing them below the consistent 2SLS estimates. Another candidate is the attenuation bias induced by the fact that the time spent in retirement is a noisy measure of the husband's disengagement from work, a common finding in the literature on the effects of retirement on health (see e.g. Celidoni, Dal Bianco and Weber, 2013). Additional noise is added in our data by the fact that retirement age is reported by the wife.

In the presence of heterogeneous effects, the observed gap in the estimates could also reflect the fact that OLS and 2SLS yield a population average treatment effect (ATE) and a local average treatment effect (LATE) respectively, where the latter is the effect for the sub-group of complying husbands, who have been granted additional employment after age 60

[33] Similar results are obtained also using Two-Samples 2SLS (see Inoue and Solon, 2010). This estimator combines the first stage estimated in the sample of husbands reporting information on their retirement with the reduced form estimated in the sub-sample of wives who report on their RHS symptoms. The estimated marginal effect is 0.074 (standard error: 0.022).

[34] Our results are broadly robust to clustering at the cohort level. Using wild bootstrap with 100 replications, we find that the p-values of the estimated first stage and 2SLS effects are <.001 and 0.06, respectively.

because of the revision of the Law. Since firms could re-employ older workers on a voluntary and selective basis even before the 2006 Law, we expect that those offered re-employment before the reform belonged to the sub-group of applicants with better health, attendance and performance. After the reform, firms had to set up plans to offer re-employment to other workers as well. Some that did so introduced eligibility criteria to avoid employing workers with few desirable characteristics. Others offered re-employment to all workers and were compensated by the government with monetary incentives. Our interpretation is that the reform induced many firms to keep in their ranks the group of older workers who would not have been kept in the absence of the law, because their health, attendance and performance were above a minimum threshold but still relatively low. The estimates reported in Table 5 suggest that delaying the retirement of this group has had a substantial positive effect on their wives' mental health.

As a sensitivity test, we drop from our sample the couples where the wife is older than 65 years, because mental health problems in this group of older women – whose husbands are more likely to belong to the untreated cohorts – could be more pronounced for reasons other than the husband's retirement (declining health, for instance). Results are, however, qualitatively and quantitatively similar to those in Table 5: we estimate that in this sub-sample the marginal effect of the years spent in retirement by the husband on the wife's RHS ranges from 7.0 to 8.3 percentage points – see Table A2 in the Appendix.

As a further robustness check, we verify whether our qualitative results are unchanged when we measure the husband's retirement with a dummy equal to 1 if the husband is retired and to 0 otherwise, rather than with years since retirement. In this case, since both the dependent variable and retirement status are dummy variables, we estimate Eq. (10) using a

bivariate probit specification.[35] As reported in the first column of Table A3 in the Appendix, we estimate that a husband's switch into retirement increases the probability that the wife develops RHS by 26.5 percentage points. This sizeable effect is in the same ballpark as the one reported in Table 5, as the sample average years since retirement for those retired is 6.67; when we multiply this average by 0.057 we obtain a 38.0 percentage points increase in the wife's RHS. As shown in column (2) of Table A3, a similar effect is obtained when we focus on wives younger than 65 years only, for whom the marginal effect of having a retired husband is equal to 33.8 percentage points. [36]

We have documented that the husband's retirement has a causal effect on the wife's RHS symptoms, measured by stress, depression and lack of sleep. The natural question arises as to whether the reverse is also true. However, when we estimate the effect of the wife's labour market status on the husband's RHS symptoms using Eq. (1), we find no evidence that a statistically significant effect exists.[37]

7. Discussion

Coping with a retired and estranged husband is - in the Japanese social context - a candidate explanation of our results. However, other mechanisms could be at play. In particular, the husband's retirement could affect the wife indirectly by influencing household composition, income and wealth, her self–reported health and the time she spends in doing housework, which in turn can have an impact on the wife's RHS.

For instance, retirement may generate financial distress by reducing income and wealth, with negative effects on the wife's mental health. Alternatively, the husband at home may

[35] With respect to 2SLS, the bivariate probit model requires both stronger parametric assumptions and the assumption that the estimated treatment effect is constant, but under these assumptions it provides efficient estimates of the average treatment effect (see Nichols, 2011).
[36] Both estimates are also qualitatively similar when we use 2SLS.
[37] Results are available from the authors upon request.

increase with his additional demands the time spent every day by the wife doing housework, with negative effects both on the her self-reported health and on her RHS symptoms.[38] Stancanelli and Van Soest, 2012a, examine data for France and find that the wife's retirement substantially reduces the husband's time spent doing housework. The opposite, however, does not hold. In a similar fashion, the wife's RHS symptoms may increase when the husband himself experiences these symptoms, because of his own retirement.

Our data include information on the wife's time spent doing housework and on economic distress, that we measure as a dummy equal to 1 if the household has low financial resources, is burdened by financial debt, or has income equal to or lower than median income. We have also information on the presence of (elderly) parents in the house, on whether the household owns the house and on the wife's self-reported health.[39]

We treat these variables as mediators of the effects of the husband's retirement on the wife's RHS and regress them on YR^h and the controls shown in Table 5, using Z^h as instrument for YR^h. Results are reported in Table 6. We find statistically significant IV effects for the presence of parents in the house and for economic distress, but not for other variables.[40] Our estimates suggest that two potential mechanisms may be jointly at work: on the one hand, the attention and care required by elderly parents is likely to increase pressure on the wife, leading to either more stress, lack of sleep or higher depression. On the other hand, early retirement reduces financial and economic security (the so-called "early retirement trap", firstly analysed by Angelini et al., 2009), an obvious source of stress for both partners.

[38] Retired husbands may also be in poorer health, even after controlling for age, and in need of assistance and care, which is often provided by the wife. Unfortunately, because of the limited number of observations, our estimates of the effects of the husband's retirement on his own health are too imprecise for us to reach any conclusion on this potential mechanism.
[39] Unfortunately, both the wife's housework and self - reported health have many missing values.
[40] For outcomes such as the wife's housework, insignificant effects may depend on the presence of several missing values, that reduce sample size.

Furthermore, as shown in Table 7, the husband's impaired mental health can be considered as an additional potential explanation of our results, as it is also negatively affected by his retirement. This effect, however, is smaller in magnitude with respect to the one we estimate for wives (3-4% vs. 6-7%) and only significant at the 10% level of confidence. Interestingly, these findings highlight that concerns with the "Retired Husband Syndrome" should not be limited to wives, as both partners are affected.

We have argued that reasons why the husband's retirement affects the wife's RHS may include changing wealth, household composition and the husband's own RHS symptoms, but not housework tasks and the wife's health. We next show that the size of the estimated effect varies with individual traits. One such trait is the age difference between partners. When we estimate Eq. (1) separately for wives who are at least three years younger than their husbands, we find that the effect of the husband's retirement on RHS symptoms is significantly larger than for wives with a lower age gap – see Columns (1) and (2) of Table 8 - suggesting that when the age gap is higher it is more difficult for the wife to adapt smoothly to the husband's retirement.

The effect of the husband's retirement on the wife's RHS may also depend on her personality traits. In our data, we have information on whether the wife has been class president, captain or leader of a group activity while in school, which we take as an indicator of leadership and strong personality. We suspect that wives with this personality trait may be more independent and have a higher ability to negotiate their use of time with the retired husband, and be consequently less exposed to RHS symptoms. Our evidence in Columns (3) and (4) of Table 8 supports this view, as we find that wives with no leadership at school are more exposed to the effects of the husband's retirement.[41]

[41] This evidence should be viewed as suggestive, as the difference between estimates is not statistically significant.

Conclusions

This paper provides the first empirical evidence on the causal effect of the husband's retirement on the wife's mental health, the so called "Retired Husband Syndrome", affecting the stress, depression and ability to sleep of married women with retired husbands. Our evidence is from Japan, a country that has attracted considerable press attention on this matter. The diffusion of RHS in Japan has been often related to its economic and social fabric. In this country, the persistence of traditional gender roles has been seen as exacerbating the syndrome, because while Japanese wives tend to spend most of their life at home taking care of the husband, the house and the kids, Japanese husbands spend on average long hours at work and with their colleagues, and very little time at home with their wives.

We have estimated the causal effect of the husband's retirement on the wife's mental health using longitudinal data from the Osaka University Preferences Parameter Study, a survey particularly suitable for our purposes, because it collects detailed information on preferences, behaviours and labour market status of both partners in the household. We have addressed the endogeneity of the husband's retirement using the exogenous changes across cohorts in the maximum age of continuous guaranteed employment induced by the 2006 revision of the EESL Law, which progressively affected the cohorts born after 1945.

In line with what reported by the press and the clinical literature, we have found that the husband's retirement significantly affects the wife's RHS, measured by increased stress, higher depression or inability to sleep. We have estimated that adding one year to the time spent by the husband in retirement increases the probability that the wife develops RHS symptoms by 5.7 to 6.8 percentage points, depending on the empirical specification. This is a sizeable effect. In contrast, we have failed to detect statistically significant evidence that the

wife's labour market status, which includes retirement, has had any effect on the husband's mental health.

In search of potential mechanisms accounting for our uncovered effects, we have estimated the effects of the husband's retirement on economic distress, homeownership, the presence of elderly parents in the household and the wife's time spent doing housework. Our estimates suggest that both low financial security and the presence of elderly parents in the household are candidate mechanisms relating the cause (husband's retirement) to the effect (wife's RHS).

We have also found a qualitatively similar but quantitatively smaller and less significant effect of the husband's retirement on his own mental health. While we suspect that the husband's RHS might be an important mechanism explaining the wife's RHS, the nature of our data does not allow us to further investigate on this point. Needless to say, this question must be left to future research and to better data.

We have also found that the size of the effect of the husband's retirement on the wife's RHS varies both with the age gap between husband and wife – suggesting that when the age gap is higher it is more difficult for the wife to adapt smoothly to the husband's retirement - and with the wife's personality traits, that we measure with leadership at school, indicating that wives with no leadership at school may be less independent and have a lower ability to negotiate their use of time with the retired husband.

Needless to say, other factors may also be at play. For instance, retired husbands may ask their wives for additional attention and time, not in terms of housework, but of other activities that may intrude into their established routine, thereby increasing stress and other RHS symptoms. Johnson, 1984, provides examples of these activities, which include directing the wife about how she should carry out tasks she routinely did on her own before the husband's retirement - like cooking - or doing recreational tasks that interest the husband only – like

fishing or camping – or going shopping in unusual places, or finally pressing requests for sex. However, we are not able to measure these factors in our data, and we must leave these questions for future research.

Our findings are based on a single country but have broader implications. They highlight the need to study retirement as a joint process affecting the couple, and show that failure to consider cross partner effects can lead to underestimate the negative consequences of retirement on mental well-being. While much debate surrounding retirement in economics is centred around the financial preparedness to retire, our results suggest that attention should also be paid to preparing for retirement from a psychological point of view, so as to avoid or attenuate the consequences on the mental health and well-being of married couples.

Figures and Tables

Figure 1. Empirical distributions of the three key symptoms of RHS. Females' sample.

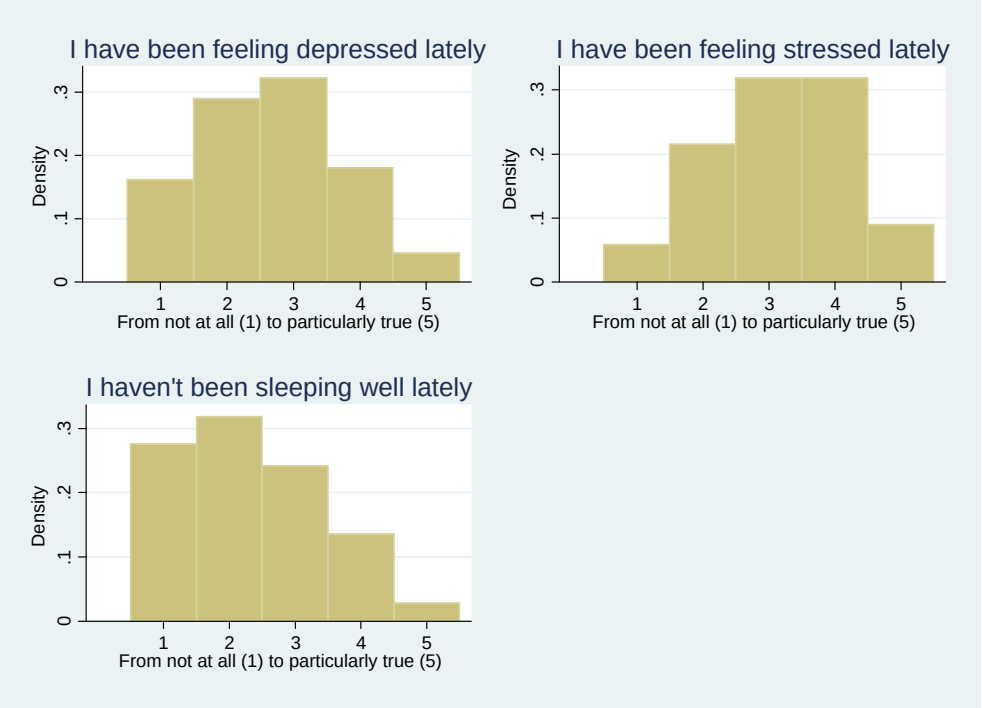

Figure 2. Percent of Husbands Retired at 60 or Before, by Husband's Cohort of Birth.

Figure 3. Percent of Wives Retired at 60 or Before, by Husband's Cohort of Birth

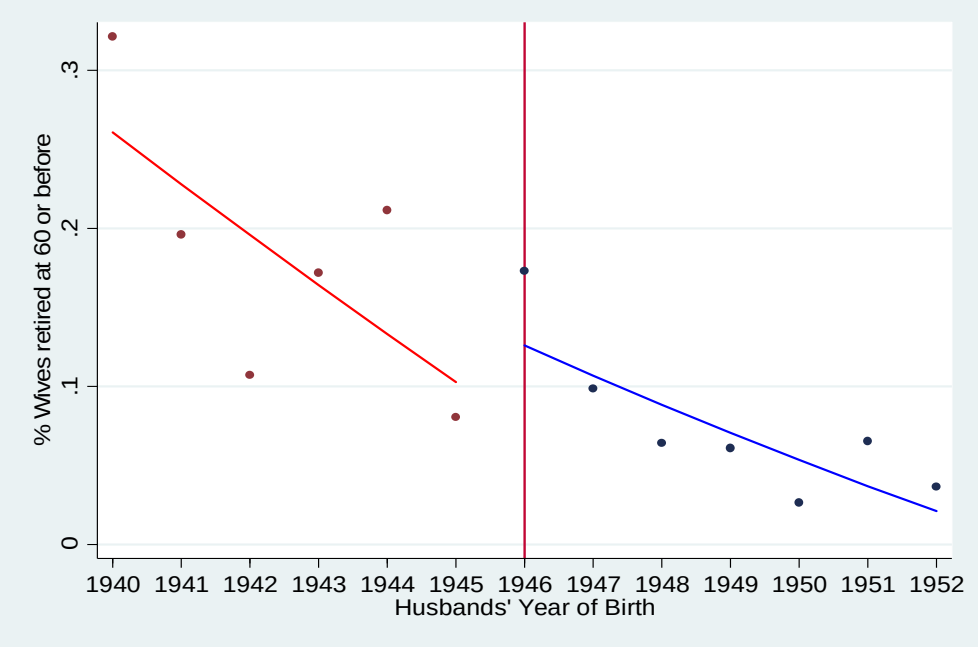

Figure 4. Husbands' Divorce rate by Cohort of Birth. Males' sample.

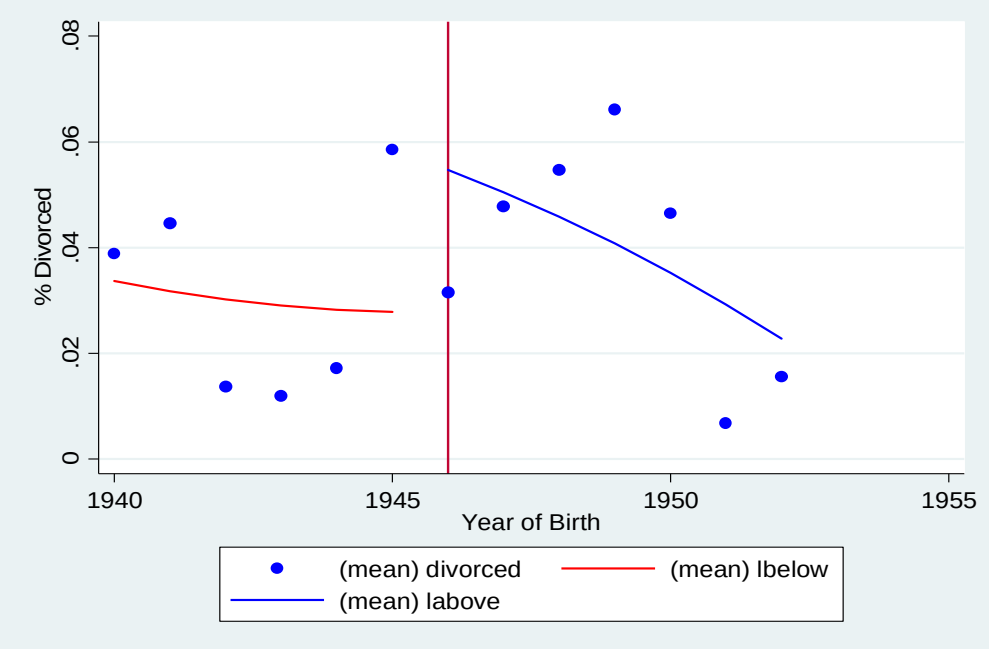

Table 1. Mandatory retirement age, age until employment is legally continued and eligibility age for the flat – rate benefit

Cohort	Mandatory retirement age	Age until which employers are legally obliged to continue employment (CEG)	Eligibility age for the flat – rate pension benefit
1940	60	60	60
1941	60	60	60
1942	60	60	60
1943	60	60	61
1944	60	60	61
1945	60	60	63
1946	60	63	63
1947	60	64	64
1948	60	64	64
1949	60	65	65
1950	60	65	65
1951	60	65	65
1952	60	65	65

Note: see Kondo and Shigeoka, 2014, and Okumura and Usui, 2014.

Table 2. Descriptive Statistics - Full Sample. N = 3,261

Variable	Mean	Std. Dev.
Wife' RHS	0.46	0.5
Wife is stressed	0.41	0.49
Wife is depressed	0.23	0.42
Wife lacks sleep	0.16	0.37
Husband has retired	0.23	0.42
Husband's years since retirement (YR^h) – conditional on retirement	6.67	3.6
Wife is out of the labour force	0.54	0.50
Husband's age plus 1 minus maximum guaranteed age (Z^h)	3.71	4.46
Wife's age plus 1 minus maximum guaranteed age (Z^w)	1.69	3.23
Husband's age	63.97	3.96
Wife's year of birth - 1900	49.62	4.38
Husband's year of birth - 1900	46.52	3.64
Wife has college degree	0.27	0.45
Husband has college degree	0.34	0.47
Number of children	2.11	0.79
At least one parent with high school or higher education	0.14	0.35
At least one parent of spouse with high school or higher education	0.19	0.39
Both parents with high school or higher education	0.34	0.47
Both parents of spouse with high school or higher education	0.36	0.48
High self-reported wellbeing at age 15	0.3	0.46
Low self-reported wellbeing at age 15	0.21	0.41
Lived in metropolitan area at age 15	0.32	0.47
Mother was not working at age 3	0.49	0.50
Spouse's mother was not working at age 3	0.57	0.50
Oldest son or daughter	0.41	0.49
Number of siblings at age 15	2.5	1.63
Log real GDP in thousand dollars at husband's birth	0.71	0.26
Log real GDP in thousand dollars at wife's birth	0.76	0.26
Parents in the house	0.14	0.35
Not homeowner	0.10	0.3
More than four hours of wife's housework per day	0.5	0.43
Self – reported wife's poor health	0.59	0.27
Economic distress	0.81	0.39

Table 3. First Stage Estimates. OLS Estimates. Dependent Variables: Years since Husband's Retirement and a Dummy indicating whether the Wife is Out of the Labour Force.

	(1) Years since husband's retirement	(2) Years since husband's retirement	(3) Years since husband's retirement	(4) Wife out of the labour force	(5) Wife out of the labour force	(6) Wife out of the labour force
Husband's age plus 1 minus maximum guaranteed age (Z^h)	0.383***	0.377***	0.373***	0.001	0.000	-0.004
	(0.042)	(0.041)	(0.041)	(0.007)	(0.007)	(0.007)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	0.080	0.080	0.092	0.019***	0.019***	0.022***
	(0.083)	(0.082)	(0.083)	(0.007)	(0.006)	(0.006)
Wife has college degree		0.030	-0.030		-0.011	-0.046**
		(0.134)	(0.117)		(0.019)	(0.022)
Husband has college degree		0.271***	0.252**		0.072***	0.057**
		(0.093)	(0.106)		(0.019)	(0.022)
Number of children		-0.261***	-0.063***		-0.287***	-0.06***
		(0.065)	(0.01)		(0.065)	(0.01)
Both parents have at least high school			-0.219			0.006
			(0.172)			(0.026)
Both spouse's parents have at least high school			0.132			0.008
			(0.173)			(0.022)
One parent with at least high school			0.017			-0.01
			(0.116)			(0.033)
One spouse's parent with at least high school			-0.084			0.003
			(0.186)			(0.022)
High self- reported wellbeing at age 15			-0.310**			-0.007
			(0.119)			(0.020)
Low self-reported wellbeing at age 15			-0.338***			-0.105***
			(0.093)			(0.023)
Oldest child			0.183*			0.032
			(0.110)			(0.021)
Lived in metropolitan area at age 15			-0.233**			0.058***
			(0.099)			(0.015)
Mother was not working at age 3			0.406***			0.022
			(0.119)			(0.019)
Spouse's mother was not working at age 3			-0.291***			0.077***
			(0.089)			(0.018)
Observations	3,261	3,261	3,261	3,261	3,261	3,261
R-squared	0.274	0.282	0.301	0.059	0.075	0.107
F-stat for husband's Z	83.5	82.9	80.7	0	0	.2
F-stat for wife's Z	.9	1	1.2	8.4	9.1	14.9

Notes: All regressions include the husband and the wife's age, the husband's year of birth and real GDP per capita at birth for both partners. Columns (3) and (6) also includes dummies for the number of siblings of the wife. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table 4. Reduced Form Estimates. OLS Estimates. Dependent Variables: Wife's RHS, Stress, Depression and Lack of Sleep.

	(1)	(2)	(3)	(4)	(5)	(6)
	Wife's RHS	Wife's RHS	Wife's RHS	Wife stress	Wife depressed	Wife no sleep
Husband's age plus 1 minus maximum guaranteed age (Z^h)	0.025***	0.024***	0.025***	0.023***	0.010*	0.016***
	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.004)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	-0.005	-0.004	-0.004	-0.004	0.006	-0.009*
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)
Wife has college degree		-0.000	-0.011	-0.017	0.015	-0.024
		(0.020)	(0.021)	(0.020)	(0.022)	(0.016)
Husband has college degree		0.012	0.024	0.036	-0.011	0.001
		(0.019)	(0.022)	(0.022)	(0.021)	(0.019)
Number of children		0.005	0.005	0.013	-0.009	-0.020***
		(0.010)	(0.011)	(0.011)	(0.010)	(0.007)
Both parents have at least high school			-0.012	-0.002	-0.023	-0.053***
			(0.029)	(0.030)	(0.018)	(0.017)
Both spouse's parents have at least high school			0.026	0.014	0.008	0.031*
			(0.024)	(0.025)	(0.018)	(0.018)
One parent with at least high school			-0.028	-0.022	-0.028	-0.066***
			(0.025)	(0.025)	(0.022)	(0.016)
One spouse's parent with at least high school			0.073***	0.077***	0.030	0.014
			(0.025)	(0.026)	(0.019)	(0.017)
High self - reported wellbeing at age 15			0.008	0.004	0.039*	0.018
			(0.020)	(0.020)	(0.021)	(0.015)
Low self-reported wellbeing at age 15			0.093***	0.078***	0.106***	0.078***
			(0.019)	(0.019)	(0.021)	(0.021)
Oldest child			0.016	0.017	0.000	-0.015
			(0.020)	(0.019)	(0.014)	(0.016)
Lived in metropolitan area at age 15			0.071***	0.074***	0.005	0.022
			(0.016)	(0.016)	(0.013)	(0.014)
Mother was not working at age 3			-0.017	-0.023	0.016	-0.026*
			(0.020)	(0.021)	(0.019)	(0.015)
Spouse's mother was not working at age 3			0.020	0.012	0.014	0.012
			(0.020)	(0.019)	(0.015)	(0.016)
Observations	3,261	3,261	3,261	3,261	3,261	3,261
R-squared	0.031	0.031	0.049	0.055	0.038	0.030

Notes: All regressions include the husband and the wife's age, the husband's year of birth and real GDP per capita at birth for both partners. Columns (3) and (6) also includes dummies for the number of siblings of the wife. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table 5. The Effect of the Years since Husband's Retirement on the Wife's RHS. OLS, 2SLS, Probit and IV Probit Estimates. Marginal Effects. Dependent Variable: Wife's RHS.

	(1) OLS	(2) 2SLS	(3) Probit	(4) IV probit
Husband's years since retirement	-0.001	0.068***	-0.001	0.057***
	(0.003)	(0.018)	(0.003)	(0.012)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	0.003	-0.010	0.003	-0.009
	(0.007)	(0.011)	(0.007)	(0.010)
Wife has college degree	-0.010	-0.009	-0.011	-0.008
	(0.021)	(0.023)	(0.022)	(0.020)
Husband has college degree	0.024	0.007	0.025	0.006
	(0.021)	(0.022)	(0.022)	(0.019)
Number of children	0.004	0.024*	0.004	0.020*
	(0.011)	(0.013)	(0.011)	(0.011)
Both parents have at least high school	-0.007	0.003	-0.007	0.002
	(0.029)	(0.033)	(0.030)	(0.028)
Both spouse's parents have at least high school	0.023	0.017	0.024	0.015
	(0.024)	(0.026)	(0.025)	(0.022)
One parent with at least high school	-0.022	-0.029	-0.022	-0.024
	(0.025)	(0.025)	(0.026)	(0.021)
One spouse's parent with at least high school	0.073***	0.078***	0.076***	0.066***
	(0.026)	(0.025)	(0.026)	(0.021)
High self - reported wellbeing at age 15	0.007	0.029	0.007	0.024
	(0.021)	(0.024)	(0.021)	(0.020)
Low self-reported wellbeing at age 15	0.087***	0.115***	0.090***	0.097***
	(0.020)	(0.022)	(0.020)	(0.018)
Oldest child	0.016	0.004	0.017	0.003
	(0.020)	(0.020)	(0.020)	(0.017)
Lived in metropolitan area at age 15	0.071***	0.086***	0.073***	0.073***
	(0.016)	(0.017)	(0.016)	(0.015)
Mother was not working at age 3	-0.021	-0.045*	-0.022	-0.038*
	(0.020)	(0.025)	(0.021)	(0.020)
Spouse's mother was not working at age 3	0.022	0.039*	0.023	0.033*
	(0.020)	(0.020)	(0.021)	(0.017)
Observations	3,261	3,261	3,261	3,261

Notes: All regressions include the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table 6. The Effect of the Years since Husband's Retirement on Household Outcomes. Two Stages Least Squares Estimates. Dependent Variables: Dummies for Parents in the House, Homeownership, Economic Distress, Wife's Housework and Wife's Health.

	(1) Parents in the house	(2) Not homeowner	(3) Economic distress	(4) At least four hours of wife's housework	(5) Wife is in poor health
Husband's years since retirement	0.032**	0.013	0.050***	-0.034	0.003
	(0.012)	(0.010)	(0.016)	(0.030)	(0.027)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	-0.009*	0.004	-0.007	0.010	-0.009
	(0.005)	(0.005)	(0.008)	(0.011)	(0.010)
Wife has college degree	0.032**	0.005	-0.050**	0.038	-0.029
	(0.016)	(0.010)	(0.024)	(0.034)	(0.037)
Husband has college degree	0.011	-0.017	-0.165***	-0.024	-0.034
	(0.015)	(0.012)	(0.021)	(0.034)	(0.028)
Number of children	0.052***	0.009	0.022**	-0.019	-0.001
	(0.008)	(0.008)	(0.009)	(0.022)	(0.019)
Both parents have at least high school	-0.020	0.041***	0.025	-0.011	-0.049
	(0.022)	(0.011)	(0.021)	(0.037)	(0.036)
Both spouse's parents have at least high school	-0.020	-0.029***	-0.025	-0.014	0.036
	(0.022)	(0.009)	(0.022)	(0.037)	(0.037)
One parent with at least high school	-0.009	0.089***	-0.086***	-0.041	-0.051
	(0.021)	(0.018)	(0.023)	(0.035)	(0.037)
One spouse's parent with at least high school	0.012	-0.003	-0.001	0.070	0.037
	(0.019)	(0.014)	(0.024)	(0.047)	(0.031)
High self - reported wellbeing at age 15	-0.014	0.045***	0.024	-0.047	-0.062**
	(0.016)	(0.016)	(0.019)	(0.033)	(0.032)
Low self-reported wellbeing at age 15	-0.002	0.020	0.077***	-0.058*	0.023
	(0.014)	(0.014)	(0.018)	(0.033)	(0.028)
Oldest child	0.009	-0.008	0.031	0.043	0.002
	(0.016)	(0.011)	(0.019)	(0.037)	(0.030)
Lived in metropolitan area at age 15	-0.005	0.073***	-0.011	-0.008	-0.027
	(0.013)	(0.010)	(0.017)	(0.025)	(0.024)
Mother was not working at age 3	0.004	-0.026**	0.004	0.070*	0.000
	(0.016)	(0.013)	(0.018)	(0.037)	(0.036)
Spouse's mother was not working at age 3	-0.016	0.005	0.001	0.028	-0.033
	(0.015)	(0.012)	(0.018)	(0.033)	(0.035)
Observations	3,261	3,261	2,513	1,379	1,550

Notes: All regressions include the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table 7. The Effect of the Years since Husband's Retirement on the Wife's and Husband's RHS. Two Stages Least Squares and IV Probit. Marginal Effects.

	(1) 2SLS Husband's RHS	(2) 2SLS Wife's RHS	(3) IVprobit Husband's RHS	(4) IVprobit Wife's RHS
Husband's years since retirement	0.039*	0.068***	0.032*	0.057***
	(0.021)	(0.018)	(0.017)	(0.012)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	0.008	-0.010	0.007	-0.009
	(0.008)	(0.011)	(0.008)	(0.010)
Wife has college degree	-0.045*	-0.009	-0.039*	-0.008
	(0.026)	(0.023)	(0.023)	(0.020)
Husband has college degree	0.021	0.007	0.020	0.006
	(0.022)	(0.022)	(0.020)	(0.019)
Number of children	0.032***	0.024*	0.030***	0.020*
	(0.011)	(0.013)	(0.010)	(0.011)
Both parents have at least high school	0.028	0.003	0.024	0.002
	(0.028)	(0.033)	(0.025)	(0.028)
Both spouse's parents have at least high school	-0.037	0.017	-0.033	0.015
	(0.024)	(0.026)	(0.022)	(0.022)
One parent with at least high school	0.007	-0.029	0.007	-0.024
	(0.024)	(0.025)	(0.022)	(0.021)
One spouse's parent with at least high school	-0.014	0.078***	-0.014	0.066***
	(0.027)	(0.025)	(0.026)	(0.021)
High self - reported wellbeing at age 15	-0.004	0.029	-0.002	0.024
	(0.034)	(0.024)	(0.032)	(0.020)
Low self-reported wellbeing at age 15	0.083***	0.115***	0.078***	0.097***
	(0.022)	(0.022)	(0.020)	(0.018)
Oldest child	0.004	0.004	0.003	0.003
	(0.022)	(0.020)	(0.020)	(0.017)
Lived in metropolitan area at age 15	-0.030*	0.086***	-0.029*	0.073***
	(0.017)	(0.017)	(0.016)	(0.015)
Mother was not working at age 3	-0.041**	-0.045*	-0.040**	-0.038*
	(0.020)	(0.025)	(0.019)	(0.020)
Spouse's mother was not working at age 3	-0.032	0.039*	-0.027	0.033*
	(0.020)	(0.020)	(0.018)	(0.017)
Observations	3,429	3,261	3,429	3,261

Notes: All regressions include the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Regressions on males' RHS are estimated using their own self-reported data. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table 8. Heterogeneous Effects of the Years since Husband's Retirement on the Wife's RHS. IV Probit Estimates. Marginal Effects. Dependent Variable: Wife's RHS.

	(1)	(2)	(3)	(4)
	Age difference between partners		Wife had a leadership position in school	
	Less than 3 years	Higher than 3 years	Yes	No
Husband's years since retirement	0.017	0.072***	0.035	0.064***
	(0.024)	(0.012)	(0.030)	(0.017)
P-value of test that coefficients for husband's time since retirement are not different	0.039		0.401	
Observations	1,408	1,853	1,013	1,564

Notes: All regressions include the wife's age plus 1 minus maximum guaranteed age, the couple's education, the couple's parental education, the wife's self-reported wellbeing at age 15, order of birth, whether the mother was working at age 3, whether the individual lived in a metropolitan area at age 15, the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence ..

Appendix.

1. The Empirical Model

We assume that the wife's mental health MH^w- where the superscript *w* is for the wife and *h* is for the husband - depends on: the husband's retirement status, that we measure either with a dummy - equal to one in the event of retirement and to zero otherwise - or with the years spent in retirement YR^h; the wife's labour market status, that we measure with the dummy NLF^w, equal to one if the wife does not participate to the labour market and to zero otherwise;[42] a vector *M* of contemporaneous household and individual variables, such as the partner's mental health, income and wealth, individual health and housework hours; a vector *X* of predetermined variables, including the couple's education, age and cohort of birth and the number of children.

Since early life conditions may have permanent effects on physical and mental health, as discussed for instance by Almond and Chay, 2006, Layard et al., 2014, and Bertoni, 2015, we add to vector *X* additional covariates measuring these conditions, that we list below. A symmetric equation holds for the husband's mental health. Ignoring for the sake of brevity the indices *j* and *t* (for the individual and time), the couple's mental health is given by

$$MH^w = F_0^w(NLF^w, YR^h, M, X, \varepsilon^w) \quad (A.1)$$

$$MH^h = F_0^h(YR^h, NLF^w, M, X, \varepsilon^h) \quad (A.2)$$

where F_ω^i, i=h,w, ω=0,1, are implicit functions and ε^i, i=h,w, are error terms.

[42] We use labour market status rather than retirement for the wife because the wife's retirement – contrary to what happens for the husband – is only a minor source of non-participation. Hashimoto, 2013, also suggests that the retirement process of Japanese females often involves transiting from homemaking to non-employment as alternatives to formal retirement.

Contemporaneous variables in vector *M* can be expressed as functions of the husband's retirement and of the wife's labour market status, as well as of the predetermined variables in vector *X*:

$$M = M(NLF^w, YR^h, X, \mu) \tag{A.3}$$

where μ is a vector of random shocks affecting *M*. We treat variables in vector *M* as mediators, that influence the wife's mental health and are themselves affected by YR^h.

In this setup, the husband's retirement affects the wife's RHS both directly and indirectly, by influencing *M*. Since mediators are choice variables, we refrain from attempting to distinguish between indirect and direct effects and estimate instead the overall impact of retirement on mental health. However, when interpreting our results, we investigate how *M* is affected by YR^h.

Substituting M in (A.1) and (A.2) by using (A.3), we obtain

$$MH^w = F_1^w(NLF^w, YR^h, X, \eta^w) \tag{A.4}$$

$$MH^h = F_1^h(YR^h, LFP^w, X, \eta^h) \tag{A.5}$$

where η^i, i=h,w, are functions of ε^i and μ.

For both partners, the husband's retirement status and the wife's labour force status – YR^h and NLF^w - are functions of the predetermined variables in vector *X*, the contemporaneous variables in vector *M*, the vector of exogenous variables $Z = \{Z^h, Z^w\}$, that are described in the text and measure for each partner the number of years since maximum age of continuous guaranteed employment, and the error term u^i, i=h,w. We have

$$NLF^w = G_0^w(Z, X, M, u^w) \tag{A.6}$$

$$YR^h = G_0^h(Z, X, M, u^h) \tag{A.7}$$

where G_{ω}^{i}, i=h,w, ω=0,1, are implicit functions. Our empirical evidence – discussed in the text - suggests that each exogenous variable in the vector *Z* has no cross-partner effects once we condition on the partner's own years since maximum age of continuous guaranteed employment. Therefore, after substitution of (A.3), we can rewrite (A.6) and (A.7) as

$$NLF^{w} = G_{1}^{w}(Z^{w}, X, v^{w}) \tag{A.8}$$

$$YR^{h} = G_{1}^{h}(Z^{h}, X, v^{h}) \tag{A.9}$$

where v^{i}, i=h,w, are error terms. Substituting (A.8) in (A.4), linearizing the outcome and adding back the subscripts *j* and *t* yields

$$MH_{jt}^{w} = \alpha + \beta YR_{jt}^{h} + \gamma X_{jt} + \delta Z_{jt}^{w} + \xi_{jt} \tag{A.10}$$

where ξ is a function of η^{w} and v^{w}.

2. Unobservable selection and coefficient stability

Tables 3 and 4 show that the first stage and reduced form coefficients of our instrumental variables regression are broadly unaltered when we include a comprehensive set of observable covariates, such as education of both partners, family composition, parental education, maternal employment, living in an urban area in childhood and childhood well-being. However, since our identification is based on comparison across cohorts, a potential threat is the presence of further omitted unobserved factors that vary by cohort and correlate both with the instrument and with the outcomes.

In order to establish whether this is a serious threat in our setup, we implement the approach developed by Altonji, Elder and Taber, 2005, and extended by Oster, 2015, who propose using selection on observables as a guide to quantitatively assess the importance of omitted variables bias. In a seminal work on the topic, Altonji, Elder and Taber, 2005, formalize the notion that the more stable are the coefficients to the inclusion of observable

covariates, the larger needs to be the effect of selection on un-observables to explain away the estimated effects.

They estimate λ, the ratio of selection on un-observables to selection on observables that would be required to attribute all the estimated effects to selection on un-observables. As a rule of thumb, values of λ larger than 1 indicate robust estimates, as at least as much selection on un-observables as the degree of selection on the observed covariates would be required to drive the estimated effects to zero. Lower values of λ are instead considered as more vulnerable to selection on un-observables, while negative values of λ would suggest that – if anything – selection on un-observables should work in the opposite direction of selection on observables to explain away the estimated effects.

Oster, 2015, expands this argument by suggesting that a proper test for assessing coefficient stability should not only consider variations in the coefficients themselves, but also in the associated R-squared. In particular, the larger the share of variance of the outcome that is explained by observables, the lower would be the remaining share of variance that could be attributed to un-observables, thereby biasing the coefficients. She formalizes this notion and proposes an estimator that considers changes in the R-squared when computing λ. The implementation of her estimator requires the selection of the maximum share of the variance of the outcome that could be explained by any set of observable and unobservable covariates. She suggests as a rule of thumb 1.3 times the R-squared of the regression that includes all observable controls.[43]

We implement the test proposed by Oster, 2015, by comparing the changes in coefficients and in the R-squared occurring between columns (1) and (3) of Table 3, where we present the

[43] This is computed by Oster as the value that would allow 90 percent of randomized control-trial studies published in the Top 5 economics journals between 2008 and 2013 to survive in rejection-of-zero tests such as the one we are using. Still, our results are robust even when we choose values higher than 1.3.

most and the least parsimonious specification, and estimate a value of λ equal to -10.6. We apply the same procedure to the reduced form estimates in Table 4 and find a value of λ equal to -3.9. These results suggests that un-observables should have effects on outcomes that run in the opposite direction compared to the effects of the included observables to explain away both our first stage and our reduced form effects. We conclude that our results are unlikely to be explained by selection on un-observables.

Additional Tables.

Table A1. The Effect of the Husband's Retirement on the Wife's Stress, Depression and Lack of Sleep. Two Stages Least Squares and IV Probit Estimates. Marginal Effects.

	(2)	(4)
	2SLS	IV probit
Stress		
Husband's years since retirement	0.063***	0.053***
	(0.017)	(0.011)
Depression		
Husband's years since retirement	0.028*	0.022
	(0.016)	(0.016)
Lack of sleep		
Husband's years since retirement	0.042***	0.040***
	(0.012)	(0.010)

Notes: All regressions include the wife's age plus 1 minus maximum guaranteed age, the couple's education, the couple's parental education, the wife's self-reported wellbeing at age 15, order of birth, whether the mother was working at age 3, whether the individual lived in a metropolitan area at age 15, the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table A2. The Effect of the Years since Husband's Retirement on the Wife's RHS. OLS, 2SLS, Probit and IV Probit Estimates. Marginal Effects. Dependent Variable: Wife's RHS. Only Wives Aged 65 or Younger.

	(1) OLS	(2) 2SLS	(3) Probit	(4) IV probit
Husband's years since retirement	-0.001	0.083***	-0.001	0.070***
	(0.005)	(0.024)	(0.005)	(0.015)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	0.005	0.012	0.005	0.010
	(0.012)	(0.013)	(0.012)	(0.012)
Wife has college degree	-0.007	-0.001	-0.007	-0.001
	(0.023)	(0.026)	(0.024)	(0.022)
Husband has college degree	0.020	0.002	0.021	0.003
	(0.023)	(0.025)	(0.024)	(0.021)
Number of children	-0.001	0.017	-0.002	0.014
	(0.011)	(0.013)	(0.011)	(0.010)
Both parents have at least high school	-0.001	-0.011	-0.001	-0.009
	(0.031)	(0.034)	(0.032)	(0.029)
Both spouse's parents have at least high school	-0.001	0.004	-0.002	0.003
	(0.027)	(0.030)	(0.028)	(0.026)
One parent with at least high school	-0.031	-0.051*	-0.032	-0.043*
	(0.026)	(0.029)	(0.027)	(0.024)
One spouse's parent with at least high school	0.058**	0.069**	0.060**	0.059**
	(0.027)	(0.028)	(0.028)	(0.024)
High self - reported wellbeing at age 15	0.030	0.039	0.031	0.033
	(0.021)	(0.025)	(0.022)	(0.021)
Low self-reported wellbeing at age 15	0.104***	0.125***	0.106***	0.106***
	(0.021)	(0.023)	(0.021)	(0.020)
Oldest child	-0.004	-0.012	-0.005	-0.010
	(0.021)	(0.022)	(0.022)	(0.019)
Lived in metropolitan area at age 15	0.074***	0.093***	0.076***	0.079***
	(0.019)	(0.020)	(0.019)	(0.017)
Mother was not working at age 3	-0.010	-0.024	-0.011	-0.020
	(0.021)	(0.024)	(0.022)	(0.020)
Spouse's mother was not working at age 3	0.026	0.037*	0.027	0.031*
	(0.020)	(0.020)	(0.021)	(0.017)
Observations	2,715	2,715	2,715	2,715

Notes: All regressions include the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Table A3. The Effect of the Husband's Retirement Status on the Wife's RHS. Bivariate Probit Estimates. Marginal Effects. Dependent Variable: Wife's RHS.

	(1) All wives	(2) Wives aged 65 or younger
Husband has retired	0.265***	0.338***
	(0.091)	(0.115)
Wife's age plus 1 minus maximum guaranteed age (Z^w)	0.002	0.012
	(0.008)	(0.012)
Wife has college degree	-0.003	-0.002
	(0.021)	(0.022)
Husband has college degree	0.008	0.004
	(0.022)	(0.023)
Number of children	0.015	0.012
	(0.011)	(0.011)
Both parents have at least high school	-0.008	-0.010
	(0.028)	(0.030)
Both spouse's parents have at least high school	0.031	0.016
	(0.023)	(0.028)
One parent with at least high school	-0.035	-0.054**
	(0.023)	(0.025)
One spouse's parent with at least high school	0.080***	0.075***
	(0.023)	(0.025)
High self - reported wellbeing at age 15	0.014	0.027
	(0.021)	(0.021)
Low self-reported wellbeing at age 15	0.091***	0.100***
	(0.019)	(0.021)
Oldest child	0.011	-0.002
	(0.018)	(0.019)
Lived in metropolitan area at age 15	0.078***	0.081***
	(0.015)	(0.018)
Mother was not working at age 3	-0.036*	-0.022
	(0.020)	(0.020)
Spouse's mother was not working at age 3	0.021	0.021
	(0.018)	(0.018)
Observations	3,261	2,715

Notes: All regressions include the husband and the wife's age, the husband's year of birth, real GDP per capita at birth for both partners, dummies for number of siblings of the wife and dummies for missing values. In the case of missing values, we set the value of the relevant variable to zero and the corresponding dummy for missing values to 1. Robust standard errors clustered by cohort and year in parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

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