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Partners' Leisure Time Truly Together Upon Retirement

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Abstract[‡]

Externalities in leisure are an important determinant of partners' retirement strategies. This is the first study that quantifies the extent to which partners actually spend more leisure time 'together' upon retirement. Exploiting the law on retirement age in France, we apply a regression discontinuity approach to identify the effect of retirement on partners' hours of leisure, separate or together. Using four different definitions of 'togetherness' of partners' leisure hours, we find that the separate leisure demand of the husband increases dramatically upon his retirement and this effect is robust to all sample cuts and specification checks. The wife's retirement increases significantly her separate leisure demand as well as the partners' joint leisure time. However, the latter effects are sensitive to the sample cut adopted. We conclude that upon controlling for the endogeneity of retirement in partners' leisure demands, retirement increases only moderately the leisure time truly together of partners and by no more than other activities such as notably separate leisure or house work hours.

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1. Introduction

The economic literature on retirement comes to controversial conclusions on whether individuals in a couple retire at a close time – a phenomenon defined as "joint retirement" and which hinges on positive partners' externalities in leisure. Earlier studies though did not explore the extent to which partners actually spend more leisure time together upon retirement. Here we exploit diary data collected for both partners on the same day, chosen by the interviewer, to investigate the effect of retirement on partner's leisure hours, exploiting age discontinuities in retirement due to legal retirement age in France to identify the causal effect of retirement on leisure hours together and separate of partners.

Earlier retirement studies conclude that partners tend to retire together mainly because of leisure complementarities (see, for example, Michael Hurd , 1990; Gustman and Thomas Steinmeier , 2000; Nicole Maestas 2001; Mark An, Bent Jesper Christensen and Nabanita Datta Gupta, 2004).[1] Recent work though highlights also possible asymmetries in spouses' retirement strategies. Gustman and Steinmeier (2009) incorporate partial retirement strategies in a discrete choice model of spouses' retirement to conclude that in numerous situations individuals in a couple may decide to retire only if their spouse does not retire. Using data drawn from the Health and Retirement Study (HRS), they find that the increased labour force participation of American women has actually contributed to lower husbands' hours of market work. Robert A Pollak (2013) argues that spouses may have conflicting interests over the timing of retirement because of age differences and gender differences in life expectancy as well as the social security design.

The literature on joint leisure hours of partners to date has focused on dual-earners. Daniel Hamermesh (2000 and 2002), for example, concluded that in the US partners adapt their work schedules to be able to enjoy leisure synchronously. Daniel Hallberg (2003), matching singles to individuals in a couple and using Swedish data, investigated the effect of working hours schedules on the fact that partners were found to consume leisure at the same time of the day, trying to disentangle what happened to be "synchronous" leisure, from leisure that partners really 'chose' to spend 'together'. He found that "actively" chosen joint leisure was only a small proportion of synchronized leisure. Alan Krueger and Andreas Mueller (2012) studied leisure episodes of individuals entering unemployment before and after finding a new job, to

[1] See Gruber, Jonathan and David Wise (2005) for a complete overview of retirement patterns all over the world.

conclude that while leisure hours increased upon entering unemployment, individuals enjoyed leisure less when they were unemployed than when they had a job. Daiji Kawaguchi, Jungmin Lee, Daniel S. Hamermesh (2013), and Jungmin Lee, Daiji Kawaguchi, Daniel S. Hamermesh (2012) provide compelling evidence on changes in individual market and non-market hours upon legislated changes in working days in Korea and Japan, finding significant increases in leisure hours.

Here we model the effect of retirement of partnered individuals on their leisure hours together and separate, using diary data collected on the same day (chosen by the survey designers) for both partners –called hereafter as the "husband" and the "wife", for simplicity and regardless of whether they are married or cohabiting. To endogenize the retirement decision, we exploit the retirement law in France which sets minimum retirement age at 60 for most workers and use a regression discontinuity approach. We experiment with four different definitions of leisure together of partners. On a typical day, using the narrowest definition of joint leisure, the husband enjoys on average five hours of leisure activities on his own while the wife spends four hours of leisure on her own, and over two and a half hour are spent on leisure activities done together, on average. Adopting the broadest definition of joint leisure, the husband (the wife) spends almost four (two and a half) hours of leisure on his (her) own while partners' joint leisure averages to almost four hours.

We find that the own retirement probability increases significantly at age 60 for both partners, namely by about 0.38 for the husband and 0.19 for the wife (0.34 dropping couples with a housewife) which supports our identification strategy. We also find that the wife's retirement probability increases significantly when the husband reaches legal retirement age and vice-versa, the husband's retirement probability increases when the wife reaches legal retirement age (at least when dropping couples with a housewife from the sample). We conclude that joint leisure hours of partners increase significantly only upon retirement of the wife -who is often the last to retire- though this effect is not robust to specification checks, perhaps due to the relatively smaller size of the sample of couples in which the wife was active. In contrast, the hours of leisure spent separately by the partners increase significantly upon retirement and especially so for the husband, for whom such increase is robust to various specification checks. The increase in leisure hours of the husband is as large as that in house work hours, suggesting that the husband reallocates the time he used to devote to paid work between house work and leisure spent separately from the wife, possibly because she is still at work when he retires. The huge increase in house work upon husband's retirement is in line with

earlier findings for the Unites States (Aguiar and Hurst, 2005) and France (Stancanelli and van Soest, 2012).

The structure of the paper is as follows. The next section presents the econometric model. Section 3 illustrates the data and the sample selection. The exploratory analysis and the results of the estimations are presented in Sections 4 and 5, respectively. Section 6 concludes.

2. The model

Let us assume that individuals in a couple j maximize a weighted utility function of each partner's i utility of leisure and consumption[2], subject to a household budget constraint that depends on each partner's labor income y and non-labor income Y as follows:

1) $U_j(.) = \Sigma_i w_i U_i(C_h, C_i, L_i, L_h)$ subject to $C_h + \Sigma_i C_i = \Sigma_i (T - L_i - L_h) y_i + Y_i$

with weights w_i reflecting partner's negotiation power (see, for example, Pollak, 2003 and Lundberg and Pollak, 2008, for excellent reviews of household economics). Here C_i and L_i stand, respectively, for each partner's private leisure time and consumption expenditure while C_h represents public consumption and L_h, leisure hours spent together by the two partners, and T is the total time available to each partner (say 24 hours a day). If individuals participate in market work, y_i is labor income and if they retire, pension income accrues under the form of non-labor income, Y_i. Upon retirement, all the time previously allocated to market work becomes suddenly available and is thus, reallocated to other activities. Solving the model leads to reduced form equations for partner's leisure hours separate (L_i) and together (L_h), that depend on partners' characteristics say Z, as follows: $L_h = L_h(Z_i)$ and $L_i = L_i(Z_i)$.

In particular, because partners' preferences for leisure may in turn also determine the timing of retirement, we instrument retirement with legal retirement age in France and take a Regression Discontinuity approach to capture the immediate effect of retirement on partners' hours of leisure separate or together. Using a RD approach has the advantage of being closer to a randomized experiment than other quasi-experimental techniques, as individuals of age just above or just below legal retirement age are likely to be very similar (see, for example, by David Lee and Thomas Lemieux (2010), Wilbert van der Klaauw (2008), or Guido Imbens and Thomas Lemieux (2007), for an outstanding account of RD). Therefore, identification of

[2] For simplicity, we assume that each partner is fully egoistic and only cares about the own utility function. We also ignore savings as our set up is static, as most household models. We assume that housework is all public and is included in public consumption.

the effect of partners' retirement on leisure hours (the outcome variable) is achieved thanks to the sudden and large increase in retirement (the treatment) at the point of discontinuity (age 60) in the running variable (age). Individuals cannot manipulate their age –and this is one of the requirements for using a regression discontinuity approach (see, for example, Lee and Lemieux, 2010). In our data, year and month of birth were collected, and we also know the day, month and year of the survey interview. Therefore, we assume that age is measured continuously. There are no other policy measures that affect individuals reaching age 60 in France.[3] Retirement is also measured at the time of the interview. However, we also need to assume that the other individual characteristics (Z) are smooth at the legal retirement age and we test for this (see Section 4).[4] Finally, we need to account for the fact that some people may retire earlier than sixty –due to special early retirement schemes or specific employment sector rules - and others later.[5] Therefore, we implement a 'Fuzzy' Regression Discontinuity design, allowing for an increase in the probability of retirement at age 60 greater than zero but less than one. In France unemployment, maternity, and sick leave periods are fully covered by pension rights, so that interrupted labour market experience will not translate into smaller pension benefits or a longer working life. Therefore, we use the discontinuities in partners' retirement probabilities at age 60 to instrument the effect of retirement on leisure hours, under an instrumental variable approach (see, Jinyong Hahn, Petra Todd and Wilbert van der Klaauw [2001]). The outcome equation can then be written as:

$$2)\quad L_h, L_i = \alpha_i + R_i\, \iota_i + Age_i\, D_i\, \eta^i + Age_i \xi_i + Z_i\, \beta^i + \nu_i$$

where Age_i is a polynomial in age and Z_i include other individual characteristics such as education, presence of children living at home, and area of residence dummies as well as

[3] Other policies are targeted at older unemployed workers, aged 55 and above, who are no longer required to search for jobs ("dispenses the recherches d'emploi"), or at employers who have to pay a large penalty for firing workers older than 55 ("Contribution Delalande"). Here we do not include inactive men in the sample for analysis. We included inactive women as most of them were housewives (see Section 3).

[4] Income from work drops upon retirement and thus, we test for the smoothness of the covariates including total household income on the two sides of age 60 (see Figure C in the Appendix). However, we do not control for household income directly as it may not be exogenous to the retirement choice (see, for example, French, 2005). Besides, there is no a priori reason to expect wealthier couples to spend more (or less) leisure time together than poorer couples. We include among the Z education and age that are likely to proxy income. Basically, similar to the fuzzy set up for the effect of educational grants that depend not only on grades that are observed but also on reference letters that are not observed, we use a fuzzy design and instrument retirement with a dummy for reaching legal retirement age and do not control for pension contributions either, which we do not observe.

[5] See, for example, Didier Blanchet and Louis-Paul Pele (1997) for more details of the French pension system. In 2010, the legal early retirement age was set at 62 years, but this will become effective only in 2018.

dummies for the season of the year and the day of the week (week-day or weekend) on which the activity diary was collected. The first stage equation takes the following form:

3) $R_i = D_i\,\gamma^{ri} + Age_i\,D_i\,\eta^{ri} + Age_i\,\pi^{ri} + Z_i\,\beta^{ri} + \nu^{ri}$

Where the dummy D_i takes value one when partner i has reached age 60 and zero otherwise; Age_i is a flexible polynomial in age; and the vector Z_i contains other individual characteristics. The two equations can be estimated using two stages least squares, instrumenting R with D (and correcting the standard errors as in Jinyong Hahn, Petra Todd and Wilbert van der Klaauw [2001]). We expand on this standard framework, and allow both partners' retirement to affect leisure hours:

4) $L_h, L_i = \alpha_i + R_m\iota_i^{m} + R_f\,\iota_i^{f} + Age_m\,D_m\,\eta^{mi} + Age_m\,\pi^{mi} + Z_m\,\beta^{im} + Z_f\,\beta^{if} + Age_f\,D_f\,\eta^{fi} + Age_f\,\pi^{fi} + \upsilon_i$ with i=m, f

5) $R_i = \alpha^{r}{}_i + D_m\,\gamma^{rmi} + Age_m\,D_m\,\eta^{rmi} + Age_m\,\pi^{rmi} + D_f\,\gamma^{rfi} + Age_f\,D_f\,\eta^{rfi} + Age_f\,\pi^{rfi} + Z_m\,\beta^{rmi} + Z_f\,\beta^{rfi} + \nu^{rji}$ with i=m, f

We estimate this model for leisure hours together (L_h), separate leisure hours of the husband (L_m), and separate leisure hours of the wife (L_f), using four alternative definitions of leisure 'together' (see Section 3).

In particular, for each of definition of 'leisure together' (see Section 3) we estimate a five simultaneous equation model of husband's retirement, wife's retirement, husband's separate leisure hours, wife's separate leisure hours, and partners' leisure hours 'together', by simulated maximum likelihood and specifying robust standard errors (see David Roodman, 2007 and 2009). Under this set up, we allow for unrestricted correlations of the system of five equations, Equations 6 to 10 below.

6) $L_m = \alpha_m + R_m\iota_m^{m} + R_f\,\iota_m^{f} + Age_m D_m\eta^{mm} + Age_m\,\pi^{mm} + Age_f\,D_f\,\eta^{mf} + Age_f\,\pi^{mf} + Z_m\,\beta^{mm} + Z_f\,\beta^{mf} + \upsilon_m$

7) $L_f = \alpha_f + R_m\iota_f^{m} + R_f\,\iota_f^{f} + Age_m\,D_m\eta^{fm} + Age_m\,\pi^{fm} + Age_f\,D_f\,\eta^{ff} + Age_f\,\pi^{ff} + Z_m\,\beta^{fm} + Z_f\,\beta^{ff} + \upsilon_f$

8) $L_h = \alpha + R_m\iota^{m} + R_f\,\iota^{f} + Age_m\,D_m\,\eta^{m} + Age_m\,\pi^{m} + Age_f\,\pi^{f} + Age_f\,D_f\,\eta^{f} + Z_m\,\beta^{m} + Z_f\,\beta^{f} + \upsilon_h$

9) $R_m = \alpha^{r}{}_m + D_m\,\gamma^{rmm} + Age_m\,D_m\,\eta^{rmm} + Age_m\,\pi^{rmm} + D_f\,\gamma^{rfm} + Age_f\,D_f\,\eta^{rfm} + Age_f\,\pi^{rfm} + Z_m\,\beta^{rmm} + Z_f\,\beta^{rfm} + \nu^{rm}$

$$10)\ R_f = \alpha^r{}_f + D_m\,\gamma^{rmf} + Age_m\,D_m\,\eta^{rmf} + Age_m\ \pi^{rmf} + D_f\,\gamma^{rff} + Age_f\,D_f\,\eta^{rff} + Age_f\,\pi^{rff} + Z_m\,\beta^{rmf} + Z_f\beta^{rff} + v^{rf}$$

If leisure complementarities in retirement are important, we would expect to find an immediate and positive effect of retirement on partners' leisure time together. Finally, to account for other changes in partners' time allocation upon retirement, we also estimate similar model for house work, specifying a four simultaneous equation system for each partner's retirement and each partner' s house work time.

3. The data: sample selection and covariates

The data for the analysis are drawn from the 1998-99 French time use survey, carried out by the French National Statistical offices (INSEE).[6] This survey is a representative sample of more than 8,000 French households. Three questionnaires were collected: a household questionnaire, an individual questionnaire and a diary of activities. The response rate to the survey was 80% (see also, for example, Lesnard, 2009). The diary was collected for both adults in the household on the same day, which was chosen by the survey designers and could be either a week day or a weekend day. Activities were coded in ten minutes slots.

3.1 Sample selection

We selected couples, either married or unmarried, which gave a sample of 5,287 couples – after dropping one same sex couple. We then applied the following criteria to select our regression discontinuity estimation sample:

1. Each partner was aged 50 to 70 –which reduced the sample size to 1395 couples.
2. Each partner had filled in the diary (we dropped 109 couples).
3. No partner had filled in the diary on an atypical day, defined as a special occasion day, a vacation day, a wedding or a funeral, or a sickness day (we dropped 106 couples).
4. We dropped partners that did not fill in the activity diary on the same day (we dropped 5 couples).
5. We dropped severely health-handicapped partners (60 couples).
6. Male partners were not unemployed or other inactive (we dropped 72 couples).
7. We kept housewives and other inactive women.

[6] The next French Time Use Survey 2009-2010 only collected two diaries per household so that sometimes a child is interviewed together with a parent, which makes the size of the sample with both partners' diaries available too small for the purposes of RD analysis.

Applying these criteria led to a sample of 1043 couples. The first criterion sets bounds of ten years on each side of the discontinuity. To check for the robustness of the RD estimates we also experiment with narrowing the bounds on both sides of the discontinuity. The unemployed were dropped because of age specific unemployment legislation which allows job seekers older than 55 to be exempted from searching for jobs. This criterion is imposed only for men as 80% of the inactive women in our sample were housewives. We tested for the sensitivity of the results to excluding other inactive women from the sample (see Table 3).

3.2 Leisure, age, retirement, and covariates

Our definition of leisure includes forty-six activities encompassing socializing, eating out or also eating at home, doing sports, playing video-games, watching television, reading, going to the cinema or the theatre or to arts exhibitions, hiking, walking, fishing, hunting, performing religious practices and relaxing. This measure of leisure corresponds to what Aguiar and Hurst (2007), for example, define as "narrow' leisure. Broader measures include any time not at work, such as also notably house work and sleep. Here we do not consider house work as leisure since house work is not seen as enjoyable by many, but we account separately for house work and estimate a comparable model of the effect of partners' retirement on partners' house work. We also ignore sleep as closer to 'biological' time than leisure. Our aim is to capture complementarities in leisure and, therefore, we focus on activities that are considered as "pure" leisure, that is, enjoyable time.

We use records in the activity diary to construct four different definitions of leisure hours together as follows:

a) Both partners reported exactly the same type of leisure activity (out of the 46 considered) during the same ten-minute slot and both of them also said that they did this activity "with family" (the question "with whom" allows for four possible answers: family, friends, neighbors, or other people.)
b) Both partners reported exactly the same type of leisure activity (out of the 46 considered) during the same ten-minute slot and reported performing this at the same place (there are four possible locations defined for each activity in the diary: at home, at work, outside, or somewhere else.)

c) Both partners reported exactly the same type of leisure activity (out of the 46 considered) during the same ten-minute slot.
d) Both partners reported any of the leisure activities (any of the possible 46 listed) during the same ten-minute slot and reported performing this at the same place.

The four definitions imply a decreasing degree of restrictiveness - the first being the narrowest and the last the broadest. Definition a. can be seen as the narrowest as it requires partners to perform the same leisure activity (of the possible 46) on the same moment of time and to state both that they did that activity "with family". This is the closest to leisure hours spent "truly together" Definition b. is broader as it encompasses situations in which, for example, both partners are at home and they are both reading at the same time. The next definition c. is a step broader as it counts as joint leisure diary episodes during which both partners are reading without requiring them to be both at the same place. The last definition d. is the broadest of all, as it considers an episode of leisure as joint leisure if, for example, the husband watches football and the wife reads a book and they are both at home. The leisure episodes of each partner that are not classified as "joint leisure" are considered as separate leisure, implying that we also have four different definitions of separate leisure hours of each partner (see Section 3.3 and Table 2 for descriptive statistics).

For comparison purposes, we also construct measures of partners' house work and time spent caring for others. We define house work to include the following activities, as conventional (see Stancanelli and Van Soest [2012] for a discussion): cleaning, doing the laundry, ironing, cleaning the dishes, setting the table, doing administrative paper work for the household, shopping, cooking, gardening, house repairs, knitting, sewing, making jam, and taking care of pets. Care hours include time spent caring for children and other adults.

In our data, age is available in months. We also know the day, month and year of the interview. Thus by assuming that individuals are born on the fifteen of the month, we construct an approximate measure of age in days. We also check the robustness of the estimates to measuring age in months (results available from the authors). The employment or retirement status is derived from the respondent's self-assessed occupational status (at the day of the interview). The indicator for retirement takes value one for respondents that reported to be retirees or early-retirees. In the analysis, inactive women will be considered as non-employed as opposed to those still at work. We are interested in leisure complementarities and housewives have as much time available as retired women.

As far as the other covariates go, we consider education dummies. We also control for the number of children living at home and area of residence dummies as well as dummies for the season of the year and the day of the week (week-day or weekend) on which the activity diary was collected.

3.3 Descriptive statistics

Descriptive statistics for the estimation sample are given in Table 1. About 57 per cent of the men and 43 per cent of the women in the sample are aged 60 or above. On average, the husband is about two years older than the wife. The percentage employed is larger for men (36 per cent) than for women (32 per cent).[7] The vast majority of men and women have less than high school (the benchmark). Men tend to be slightly more educated than women: 12 (10) per cent of husbands (wives) have completed high school and 15 (11) per cent have college or more education. Few couples in this age range still have children living at home and few are cohabiting rather than married (4 per cent).

Descriptive statistics of participation and mean and median durations of all the activities considered (in minutes per day) are given in Table 2 (see Section 3.2 for definitions). First of all, almost all individuals in the sample participate in leisure separately and 'together'. About 99 percent of the sample participates in separate leisure activities on the diary day. Depending on the definition of joint leisure adopted, between 94 and 98 percent spends some leisure together. Going from the narrowest to the broadest definition of joint leisure (see Section 3.2), joint leisure hours increase progressively, and separate leisure hours fall. Under the narrowest definition, we find that the husband enjoys on average five hours per day of separate leisure activities and the wife a little less than four hours, while almost 2.5 hours are spent on leisure activities done together. Adopting the broadest definition of joint leisure, the husband and wife spend almost four and two and a half hours of leisure on their own, respectively, while joint leisure averages to four hours.

For comparison purposes, we also show descriptive statistics of house work and care time. Almost all of the partners in the sample perform some house work on a representative day: the participation rate in house work is equal to 87 per cent for men and 99 per cent for women. The women in our sample spend on average more time on house work than men. Partnered women perform over five hours of house work per day on average, compared to about three

[7] The statistical correlation between the non-employment status (i.e. retirement) of the two partners is equal to 0.45 while that between the dummies for age- 60-and-above of the two partners is 0.64.

hours for partnered men. In contrast, only 15 per cent of the male partners in the sample and 22 per cent of the female partners participate in the activity of caring for children or adults. The average time (including the numerous zero) devoted to caring for others on a representative day amounts to 18 minutes for the husband and 24 minutes for the wife.

4. Exploratory graphical analysis

As usual in the RD context, we ran a "Mc Crary" test (see Justin McCrary, 2008, for details) of the null hypothesis that the age distribution of partnered men (women) is discontinuous at age 60 and rejected this at the 5 per cent significance level (see Figures A and B in the Appendix)[8]. Therefore, we are confident that there is no significant discontinuity in partners' age distribution at age 60 in our data sample. Next, we carry out some exploratory graphical analysis of the discontinuities in the treatment and outcome variables upon reaching legal retirement age. We show the age profile of partners' retirement probabilities using bins of size ten and letting the own retirement probability vary as a function of own and partners' age (see Figure 1; and Figure D in the Appendix, for the raw data plot). There are obvious jumps in retirement at age 60 for both the husband and the wife, though the cross-effects are tiny. Next, we plot partners' leisure demands as a function of own age and according to each of the four definitions of leisure (see Section 3) in Figures 2 to 5, respectively. Jumps at age 60 are apparent in separate leisure hours of partners, though the jumps in joint leisure are much less pronounced, and this is true for all the definitions of leisure. Next, we produce the same type of exploratory analysis dropping couples with a housewife or an unemployed wife from the sample. As for the main sample, there are large jumps in retirement upon turning 60 years of age (see Appendix, Figure E) and much less of an increase when the partner turns 60. There is no large jump in joint leisure upon retirement (see Appendix, Figure F) while separate leisure increases remarkably upon retirement (see Appendix, Figure G), like for the full sample. Furthermore, we produce graphical evidence of possible discontinuities at the legal retirement age cut-off for some subcomponents of leisure, namely time spent eating together and time spent watching television (see Figure 6) and for house work and time spent caring for others (see Figure 7). Finally, to include other covariates in addition to age (denoted by Z here) in our model, it is required that the Z covariates must not be discontinuous at age 60. To test for this possibility, as customary, we inspected the predicted probability of retirement

[8] Individuals cannot presumably control their age. However, the McCrary test also serves as a test that individuals of age 60 do not drop out of the sample. The value of the test was 0.28 with a standard deviation of 0.21 for partnered men and 0.46 with a standard deviation of 0.28 for partnered women.

as a function of the Z covariates only (partners' education dummies, number of children living at home, area of residence dummies and dummies for the season of the year and the day the diary was collected) and concluded that the Z variables are not discontinuous at age 60 (see Figure 8). This comforts us that these covariates are not discontinuous at the legal retirement age and we can thus, include them into the model. We also ran the same test including also total household income among the explanatory variables (see Figure C in the Appendix to the paper).

5. Estimation results

As discussed in Section 2, we estimate the effect of partners' retirement on their leisure hours together and separate, instrumenting partners' retirement with dummies for reaching legal retirement age (fully interacted with partners' age polynomials). In particular, we use a simultaneous equation approach and estimate a five equations model of partners' retirement and partners' leisure demands by simulated maximum likelihood. We present the results of estimation both including and excluding other covariates, as customary under a regression discontinuity type of approach. As a robustness check, we re-estimated the models narrowing the bounds on both sides of the age 60 thresholds, including couples with both partners aged 52 to 68 or with both partners aged 54 to 66, respectively. For sensitivity purposes, we also dropped couples in which the wife was a "housewife" from the model, thus only selecting dual-earners. Moreover, using a similar simultaneous equation approach, we investigated the effect of partners' retirement on some specific leisure subcomponents such as namely, time spent watching television and time spent eating. Finally, we estimated the effect of partners' retirement on other uses of time such a house work and time devoted to caring for adults and children from other households. In what follows, we denote for the sake of conciseness the male partner as the "husband" and the "female" partner as the "wife", regardless of whether partners are cohabiting (this is the case for about 4 per cent of the sample) or married.

First of all, we provide in Table 3 results of estimation of single equations models of each partner's retirement decision and partners' leisure demand separate and together, controlling for the same explanatory variables as in our preferred specification (see Section 2) and assuming that retirement is exogenous to the demands for leisure, also ignoring the interactions between the unobservable components of the equations. We find that retirement

increases strongly when partnered individuals turn 60 years of age: the husband's retirement probability increases by 0.38 when he turns 60 while the wife's retirement probability increases by 0.18 when she turns 60. Moreover, the husband reaching 60 years has also a significant and a positive effect on the wife's retirement probability, equal to about 0.16, while the cross-effect of the wife's reaching age 60 on the husband's retirement probability is positive but small and not significant statistically. Under this set up, in which each equation is estimated one by one and retirement is assumed to be exogenous to the amount of time individuals spend together with their partner or separate from each other, we find that for all four definitions of joint leisure adopted, partners' leisure time together increases strongly upon each partner's retirement. In particular, partners' joint leisure time goes up by between 65 and 95 minutes per day upon retirement of the husband and by an extra 35 to 49 minutes when the wife retires. The amount of leisure time that the husband spends on his own also increases strongly upon his retirement, by 99 to 129 minutes per day, depending on the definition of leisure adopted (see Section 3 for details of these definitions), and falls by roughly 20 minutes upon retirement of the wife's, though the latter effect is only weakly significant. Her separate leisure time also increases significantly upon her retirement by roughly an hour per day and falls by 20 to 40 minutes upon his retirement, though the latter effect is not always statistically significant.

These patterns quite different when we allow for the endogeneity of the partners' retirement decisions in the leisure demands equations and also account for the simultaneity of partners' retirement and leisure time decisions (similar results are obtained by estimating each leisure demand equation by two stages least squares, instrumenting the effect of retirement with a dummy for being aged 60 years and above, interacted with age polynomials, thus, using a conventional Fuzzy RD approach –results available from the authors). The first block presents the estimates of the effect of each partner's dummy for being age 60 and above on the own retirement probability, also controlling for partners' age polynomials and full interactions with the age 60 and above dummies (full estimates of the model are available from the authors). The other blocks in Table 4 present the estimated effect of each partner's retirement (instrumented with the dummy for being aged 60 and above) on partners' separate and joint leisure demands, for each of the four definitions adopted of leisure together (see Section 3 for definitions).

Thus, each of the bottom blocks of results in Table 4 presents the selected estimates from the corresponding five equation model –including two retirement equations and three leisure

demand equations (one for joint leisure and two for separate leisure, as discussed in Section 2). The effect of turning 60 on the own and cross-retirement probabilities remains robust to estimating the retirement equations simultaneously with the equations for the demands for leisure separate and together (see Table 3 in which the retirement equation were estimated one by one). The effect of own retirement on the separate leisure demand of each partner is statistically significant –and much larger in size for all definitions of leisure adopted, once retirement has been endogenized (see Table 4 against Table 3). The amount of leisure the husband spends on his own upon his retirement increases by roughly 200 minutes (much over three hours) per day while the leisure hours of the wife go up by between three and five hour per day upon her retirement. These represent very sizable increases relative to the average separate leisure hours of individuals aged 55 years to less than the legal retirement age, which are equal, respectively, to over two hundred minutes per day for the husband and to 150 to 200 minutes per day for the wife, depending on the definition of leisure adopted. In contrast, the cross-effect of the partner's retirement on the own leisure hours is statistically not significant though negative -except for the effect of the wife's retirement on the husband's separate leisure which is significant under the last definition of separate leisure (definition d). The effect of partners' retirement on leisure hours together is statistically insignificant except for the broadest definition of leisure time together (definition d, see Table 4) for which the wife's retirement increases joint leisure by almost 220 minutes per day. In particular, the effect of the retirement of the wife on joint leisure is positive for all specifications of leisure together, though only significant statistically for our broader definition (see Table 4). Notice that under this set up, we do not control yet for any other explanatory variable than partners' age polynomials interacted with the age cut-off points. Table A in the Appendix reports the correlations across the errors of the five equations of the system, respectively for each of our definitions of leisure. The correlation term of the unobservables of partners' retirement equations is strongly significant and positive, as expected, and equal to almost 0.13. The unobservable factors affecting the husband's retirement decision also correlate strongly and positively with the unobservables determining partners' demand for leisure time together and the estimated correlation is equal to about 0.20 to 0.26, depending on the definition of joint leisure adopted. The unobservables of the wife's retirement decision correlate negatively with her separate leisure demand. The correlations between the unobservables of the husband's retirement decision and the husband's separate leisure demand are also negative though statistically insignificant. Therefore, at least some of the correlations between the

unobservables of the five equations are significant and large, supporting our simultaneous equation specification approach.

Next, we include other explanatory variables: partners' education dummies, presence of children still living at home, a dummy for whether the time diary was collected at the weekend, dummies for the season of the year and region of residence fixed effects. We showed that these variables are smoothed at the age 60 discontinuity in retirement (see Section 4 and figures in the Appendix) and indeed, our estimates of the effect of turning 60 on the probability to retire are unaffected (see Table 5), which supports our Regression Discontinuity type of approach, confirming that under this set up identification of the effect of retirement on partners' leisure demand is achieved thanks to the discontinuity in retirement at the legal retirement age. As far as the estimates of the effect of partners' retirement on partners' leisure demands, these are quite robust to the inclusion of other explanatory variables in the model. In particular, the effect of the own retirement on the own separate leisure demand remains positive and statistically significant, for all leisure definitions, though it becomes slightly smaller in size for the husband and much larger in size for the wife. The effect of her retirement on partners' leisure time together also becomes larger in size and becomes now (weakly) statistically significant for definitions b) and c), while remaining significant for definition d and not significant for definition a (as in the model without additional controls of which selected estimates were shown in Table 4).

The estimates are also quite robust to narrowing the sample on the two sides of the legal retirement age cut-off, selecting couples in which both partners were aged 52 to 68 years (see Appendix, Table B, excluding other covariates, and Table C, including other covariates, respectively) or restricting the sample to couples with both partners aged 54 to 66 (see Appendix, Table D, excluding other covariates, and Table E, including other covariates, respectively). In particular, when narrowing the sample size, the effect of turning 60 on the own retirement stays strongly significant for both the husband and the wife, though the size of the coefficient changes slightly. The cross-effect of the husband reaching legal retirement age on the wife's retirement chances stays significant when narrowing the sample size to couples with partners aged 52 to 68 (Tables B and C, Appendix) but loses significance when restricting the sample bounds further to couples in which both partners are aged 54 to 66 (see Tables D and E, Appendix), possibly because we now drop couples in which partners are further apart in age. The effect of the own retirement on the own leisure time separate from the other partner stays significant and positive for the husband, under all sample cuts and

including or excluding other covariates though its size vary sometimes substantially (see Tables B, C, D, E Appendix). In contrast, the effect of the retirement of the wife on her separate leisure time or on partners' joint leisure together becomes not significant statistically when narrowing the sample size further or dropping other covariates. This may be due to the relative smaller sample size and possibly to the fact that when narrowing the sample bounds we drop couples in which the age difference between partners is larger.

Because due to selectivity concerns, our main sample includes couples in which the wife reports to be "housewife" or "unemployed", we re-estimate the model dropping these couples from the sample and including and excluding other explanatory variables (see Tables 6 and 7, respectively). Under this sample cut, not only the estimates of the jumps in retirement upon turning 60 years of age are still strongly significant and robust but now also the cross-effect of the wife's reaching age 60 on the husband's retirement becomes significant and it is quite sizable (equal to almost 0.1). The effect of the husband's retirement on the husband's separate leisure demand remains positive, large and significant under all definitions of leisure. Similarly, the effect of the wife's retirement on her separate leisure demand is positive, large and significant, as for the full sample of couples (see Tables 4 and 5, respectively, including or excluding other covariates). As far as the effect of her retirement on partners' joint leisure time goes, this is positive and significant for all definitions of leisure, including or excluding other covariates (see Tables 6 and 7). Moreover, the retirement of the husband does not affect partners' joint leisure under any of these specifications, and the sign of the relative coefficient stays negative as for our main sample. In addition, the effect of the wife's retirement on the husband's separate leisure which is negative under all specifications becomes now statistically significant for some of the leisure definitions. Keeping this sample cut (dropping couples in which the wife is a housewife or an unemployed) and narrowing the sample bounds further to couples in which both partners are aged 52 to 68, the cross-effect of the wife's reaching legal retirement age on the husband's retirement becomes not statistically significant though, as for our main sample (see Tables B, C and F in the Appendix to the paper), indicating that this effect is not robust to specification checks and may be driven be few couples in which the age difference between spouses is quite large and both partners were active in the labor market (at least at some stage). Moreover, narrowing the sample boundaries, also the effect of her retirement on her separate leisure time becomes now not significant statistically, which may be perhaps be due to the small sample size, as we now find ourselves with only slightly over 500 couples, almost half of the original sample size (our

main sample included 1043 couples and the sample dropping couples with a housewife or an unemployed wife included 732 couples).

To gather more insights into partners' changes in time allocation upon retirement, we disaggregate leisure time further and single out time spent watching television and time devoted to eating –both activities are included in our definition of leisure (see Section 3 for more details). Additionally, we also investigate changes in house work and care time for individuals from other household upon retirement and lastly, changes in sleeping time. The results of estimation are summarized in Table 8, for our main sample, and Table 9, for the sample excluding couples with a 'housewife' or an 'unemployed' wife. First of all, let us notice that for either sample, the time spent watching television by the wife drops significantly upon retirement of the husband, to increase significantly (by a much larger amount in absolute value) upon her retirement. These effects are significant at the ten per cent level for the main sample (Table 8) and at five per cent level for the sample dropping couples with a "housewife" or an "unemployed" wife (Table 9). For neither sample retirement affects time devoted to watching television by the husband. Similarly, her retirement increases her eating time significantly (at ten per cent level, for either sample) while his retirement does not affect the time he spends eating. This evidence indicates that the increase in leisure upon retirement is due to other leisure activities such as 'active' leisure, reading, and socializing.

Somewhat opposite patterns are found for house work and care time that increase significantly upon retirement of the husband but do not respond to the wife's retirement, perhaps because the wife already devotes a considerable amount of time to house work and unpaid care for others even when she is still employed. In particular, the husband's retirement increases dramatically the time the husband devotes to house work, which goes up by about 280 minutes per day –this represents a huge increase, knowing that the average husband aged 55 to less than 60 years spends 130 to 140 minutes per day on house work. This large increase in the husband's house work upon retirement confirms earlier findings in the literature for the United States (Aguiar and Hurst, 2005) and France (Stancanelli and van Soest, 2012). The care time of the husband also increases by a huge amount upon his retirement, as the size of the effect is equal to about 70 to 90 extra minutes of caring for others per day -while the average husband aged 55 to less than 60 years spends 10 to 12 minutes per day caring for others. Moreover, his retirement affects positively also the caring time of the wife, though this effect is only significant for the couples without a "housewife" or an "unemployed" wife and only at the ten per cent significance level.

To get a complete picture of changes in partners' time allocation, we also include their sleeping time into the analysis, to conclude that only for couples without other "inactive" wives than retired ones, the wife sleeps significantly more upon husband's retirement and her sleeping time falls back when herself retires from work, while the husband's sleeping time is not significantly affected by retirement. Overall these patterns may be explained by thinking of these latter couples as "dual-earners", observed before and after retirement, and with the husband typically retiring before the wife does, since he is usually couple of years older than she is.

Lastly, we have throughout the analysis in all the models so far used a quadratic specification for partners' age polynomials. We test then for the robustness of our results to using a cubic polynomial in age and conclude that the statistical significance and the direction of the effects of partners' reaching age 60 on the own retirement probability are robust, as well as the effect of husband's retirement on the husband's separate leisure time. In contrast, the effect of the wife's retirement on her separate leisure time or on joint leisure becomes statistically not significant under this specification (see Table G in the Appendix). This is in line with rest of the evidence gathered in this study, which points to the first sets of results as robust to all checks and the latter as little robust.

To conclude, we find that upon controlling for the endogeneity of retirement in partners' leisure demands, the separate leisure demand of the husband increases dramatically upon his retirement and this effect is robust to all sample cuts and specification checks. The wife's separate leisure demand also increases significantly and dramatically upon her retirement, though this effect is somewhat less robust to specification checks. Partners' joint leisure time only increases upon retirement of the wife, who is often the last to retire. The significance and the size of the increase in partners' leisure time together upon the wife's retirement is, however, quite sensitive to the sample cut adopted and to the inclusion or exclusion of other covariates. Moreover, the husband's house work also increases dramatically upon retirement and the size of this effect is at least as large as that of the increase in his separate leisure time.

6. Conclusions

In the literature on partners' retirement decisions one of the explanations for joint retirement is leisure complementarities. However, recent work also points to asymmetries in partners' retirement decisions. Earlier studies did not explicitly consider the extent to which partners

spend their leisure time together before and after retirement. This seems worthwhile to directly address the relevance of the leisure complementarities argument. In this study, we use diary data on leisure activities of older French partners to investigate the causal effect of partners' retirement on partners' leisure demands. Our identification strategy exploits the fact that for many French workers the legal retirement age is sixty, which enables us to use a fuzzy regression discontinuity approach to identify the effect of retirement on leisure hours. Remember that using a fuzzy design we expect a jump in retirement upon reaching age 60 greater than zero but less than one, which is indeed what we find.

The data for the analysis are drawn from a French time use survey which surveyed individuals of all ages, collecting an activity diary for both partners on the same day (chosen by the interviewers) and also asking additional questions as regards 'with whom' and 'where' the activity was carried out. Therefore, we can construct four alternative measures of leisure hours spent together by old partners. On a typical day, using the narrowest definition of joint leisure –which is the closest approximation to leisure time spent 'truly' together- the husband and the wife enjoy on average five and four hours of separate leisure activities, respectively, while over two and a half hours are spent on leisure activities done together. Adopting the broadest definition of joint leisure, the husband and the wife spend almost four and two and a half hours of leisure on their own, respectively, while joint leisure averages to almost four hours.

We specify and estimate a five simultaneous equation model of partners' retirement and leisure demands -including two retirement equations, two separate leisure equations and a joint leisure equation. We instrument each partner's retirement with a dummy for whether each partner reached legal retirement age and also include in both the outcome (leisure demands) and the first stage (retirement) equations full interactions of these dummies with partners' quadratic age polynomials. We find significant increases in own retirement upon turning 60 for both partners, equal respectively to about 0.38 for the husband and 0.19 for the wife, which supports our identification strategy. When restricting the sample to 'dual-earners' couples, including only spouses that were at some stage active on the labor market, the increase in retirement upon reaching legal retirement age becomes equal to 0.35 for the husband and 0.34 for the wife, respectively. We also find that the wife's retirement probability increases when the husband reaches legal retirement age and vice-versa, the husband's retirement probability increases when the wife reaches legal retirement age, though

the latter effect is not robust to all sample cuts –probably due to the fact that it is only identified for 'dual-earners' couples in which partners are far apart in age.

Coming to the effect of partners' retirement on partners' leisure demands, we conclude that the husband's demand for leisure spent separately from the wife increases dramatically, by over three hours per day, upon his retirement and this effect is robust to all sample cuts. This may be explained by the fact that the husband is often the first to retire as he is usually older than the wife and she may, therefore, still be at work when he retires. Accordingly, the husband's retirement has not effect on partners' joint leisure hours together under any of the specifications considered, once the endogeneity of retirement has been accounted for in the leisure demand model. The wife's retirement increases her leisure hours separate from the husband by a huge amount (three to five hours per day) as well as increasing partners' leisure hours together, but neither effect is robust to narrowing the sample cut. This may possibly be explained by the smaller number of couples with an 'active' wife in the sample, since about 30 per cent of the couples in the main sample include a "housewife" or an "unemployed" wife and our main sample includes just over a thousand older couples with both partners aged 50 to 70 years.

To get a clearer picture of partners' changes in time allocation upon retirement, we also consider two specific leisure activities, watching television and eating time, to conclude that only the time devoted by the wife to these activities increases moderately upon her retirement. This suggests that other components of leisure such as "active" leisure, reading and socializing are beyond the increase in leisure upon retirement. Moreover, we find huge increases in house work and time devoted to caring for individuals from other households upon the husband's retirement but no significant effect on either activity upon the wife's retirement, which may be explained by the fact that the wife already devotes a substantial amount of time to house work and caring for others even when she is still employed for pay. The finding of a substantial increase in the husband's house work upon retirement is in line with earlier literature for the United States and France. Remarkably, upon retirement the increase in the husband's house work is at least as large as the increase in his separate leisure time.

To conclude, we find that upon controlling for the endogeneity of retirement in partners' leisure demands, separate leisure demand of the husband increases dramatically upon his retirement and this effect is robust to all sample cuts and specification checks. The wife's

separate leisure demand also increases significantly and dramatically upon her retirement, though this effect is not robust to specification checks. Partners' joint leisure time only increases upon retirement of the wife, who is often the last to retire. The significance and the size of the increase in partners' leisure time together upon the wife's retirement is, however, sensitive to the sample cut adopted and to the inclusion or exclusion of other covariates and this may be possibly explained by the relative small size of the sample of couples with an active wife. Keeping this concern in mind, it appears that upon retirement the leisure time together of partners increases only moderately and by no more than other activities such as notably separate leisure or house work. Because our identification approach captures the immediate effect of retirement on the demand for leisure, things may look different over a longer time horizon into retirement.

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Table 1. Descriptive Statistics

	Male partner		***Female partner***	
	Mean	***standard deviation***	***Mean***	***standard deviation***
Age (in years)	60.72	5.50	58.60	5.61
Age 60 or older, dummy	0.57	0.49	0.43	0.47
Retired	0.64	0.48	0.67	0.47
Employed	0.36	0.48	0.32	0.47
High School (12 years schooling)	0.12	0.32	0.10	0.30
College and more	0.15	0.36	0.11	0.31
		Household characteristics		
		Mean	***standard deviation***	
Number of children at home		0.15	0.51	
Cohabiting		0.04	0.19	
Weekend time diary		0.23	0.42	
Winter season diary		0.25	0.42	
Observations		1043		

Note: These variables as well as the sample selection steps are detailed in Section 3 of the paper.
Source: French Time Use Survey 1998-1999; couples with both partners of age 50-70.

Table 2. Participation rate and mean duration of market work and leisure

	Male partner			***Female partner***		
	Participation rate %	***Mean duration (st. dev.)***	***Median duration***	***Participation rate %***	***Mean duration (st. dev.)***	***Median duration***
Market work, standard question	*24.74*	112.01 (199.20)	0	*25.02*	94.15 (176.93)	0
Market work, diary	*29.82*	137.83 (235.46)	0	*21.67*	86.04 (182.88)	0
House work	*86.77*	183.70 (152.55)	160	*99.04*	310.60 (147.39)	310
Caring for others	*14.67*	17.66 (66.12)	0	*21.76*	24.31 (65.13)	0
Joint Leisure (a)	*93.77*	159.79 (117.22)	140	*93.77*	159.79 (117.22)	140
Joint Leisure (b)	*96.26*	195.47 (130.90)	180	*96.26*	195.47 (130.90)	180
Joint Leisure (c)	*97.60*	215.88 (136.31)	200	*97.60*	215.88 (136.31)	200
Joint Leisure (d)	*97.99*	237.96 (141.89)	230	*97.99*	237.96 (141.89)	230
Separate Leisure (a)	*99.42*	302.42 (177.33)	270	*97.60*	228.24 (144.02)	210
Separate leisure (b)	*99.23*	266.74 (163.04)	240	*96.55*	192.55 (128.28)	180
Separate leisure (c)	*99.04*	246.34 (159.26)	220	*96.26*	172.15 (123.04)	150
Separate leisure (d)	*98.95*	224.26 (146.56)	200	*95.59*	150.07 (112.82)	130

Note: Activities are measured in minutes per day. Definition (a) of joint leisure includes exactly the same leisure activity carried out by the partners on the same moment and with "family". Definition (b) of joint leisure considers exactly the same leisure activity carried out by the partners on the same moment and at the same place. Definition (c) of joint leisure includes exactly the same leisure activity carried out by the partners on the same moment. Definition (d) of joint leisure includes any leisure activity carried out by the partners on the same moment and at the same place. See Section 3.2 for more details of definitions.

Figure 1. Partners' retirement as a function of own and partner's age (bins of ten months).

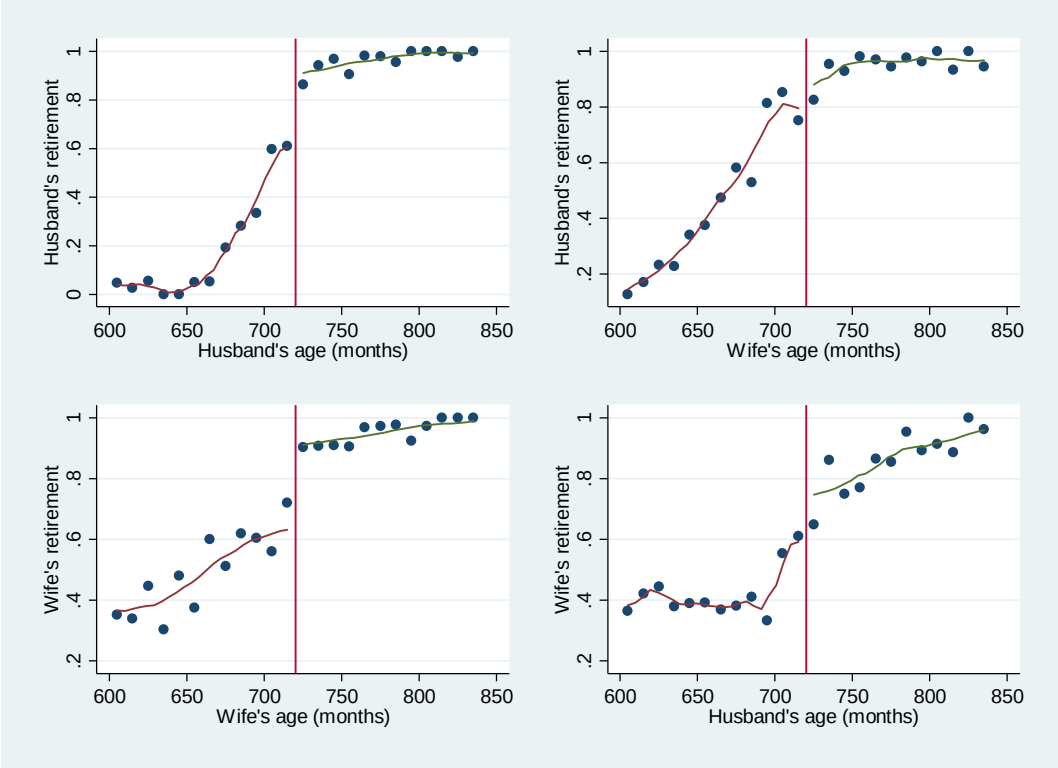


Figure 2. Partners' leisure together or separate as a function of age (bins of ten months)
Definition (a) of leisure together (narrowest definition)

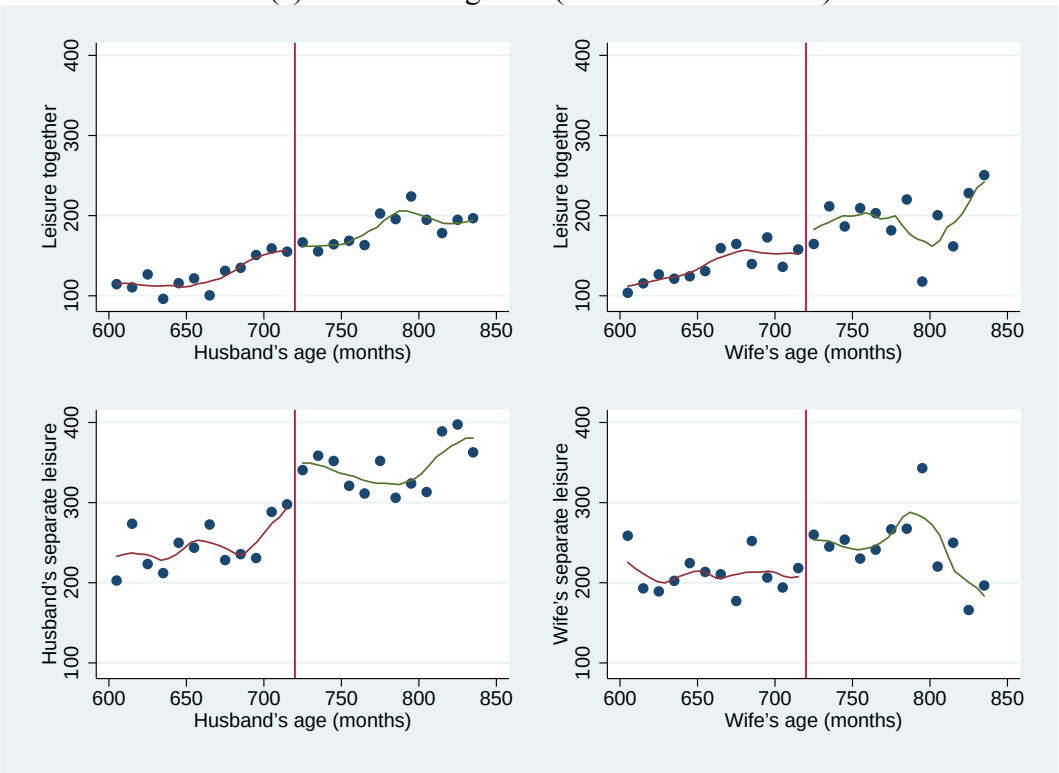


Figure 3. Partners' leisure together or separate as a function of age (bins of ten months)
Definition (b) of leisure together

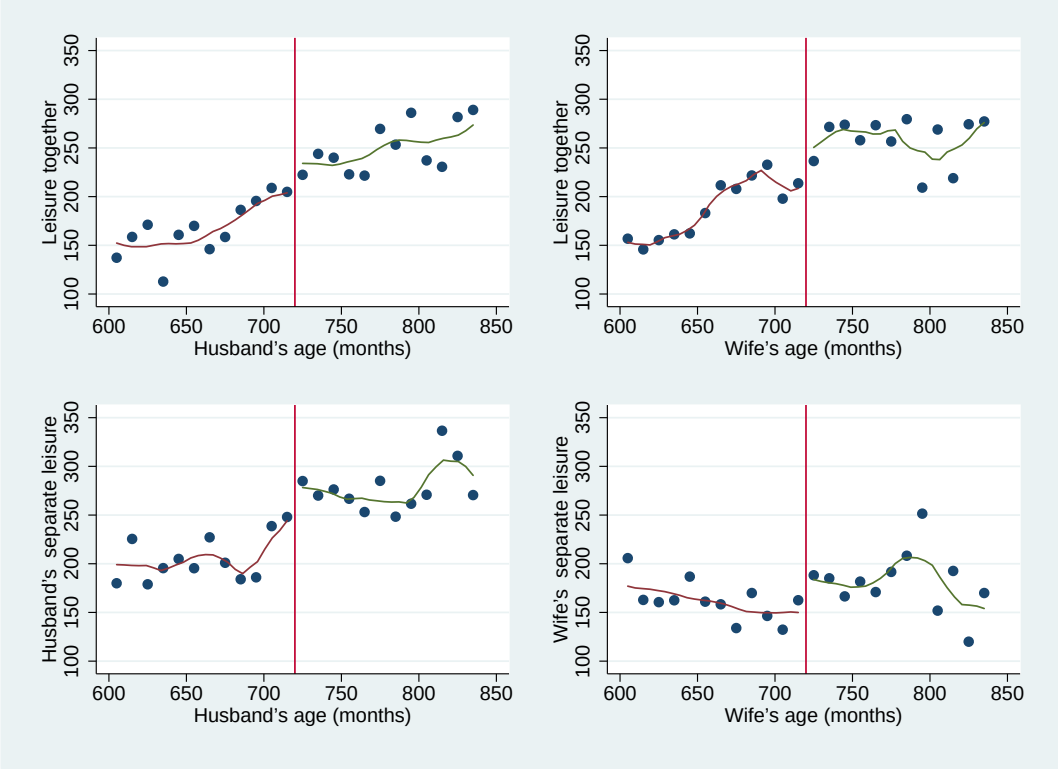


Figure 4. Partners' leisure together or separate as a function of age (bins of ten months)
Definition (c) of leisure together

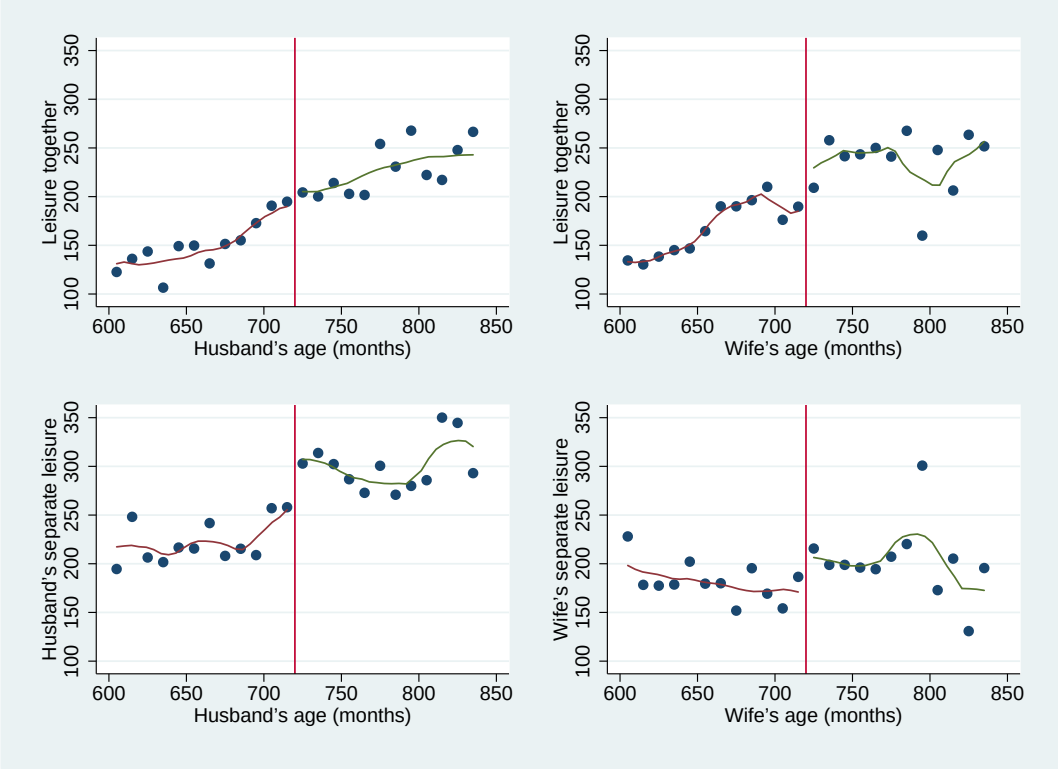


Figure 5. Partners' leisure together or separate as a function of age (bins of ten months)
Definition (d) of leisure together (broadest definition)

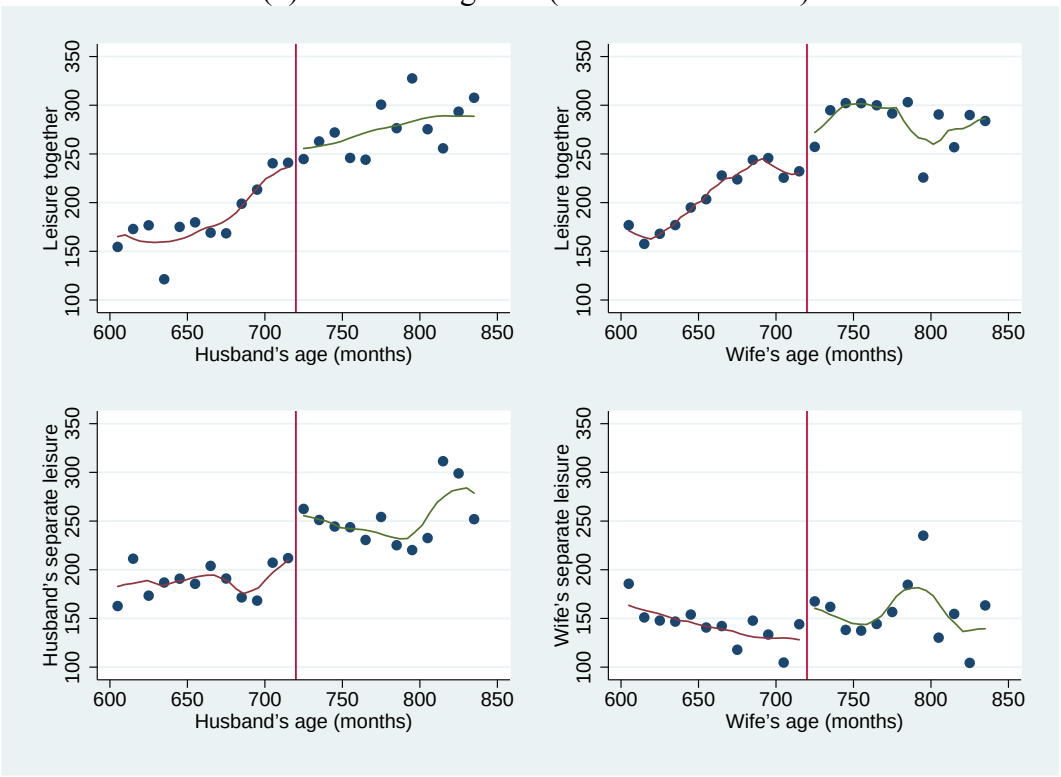


Figure 6. Partners' leisure time uses as a function of age (bins of ten months): time spent watching television and eating time.

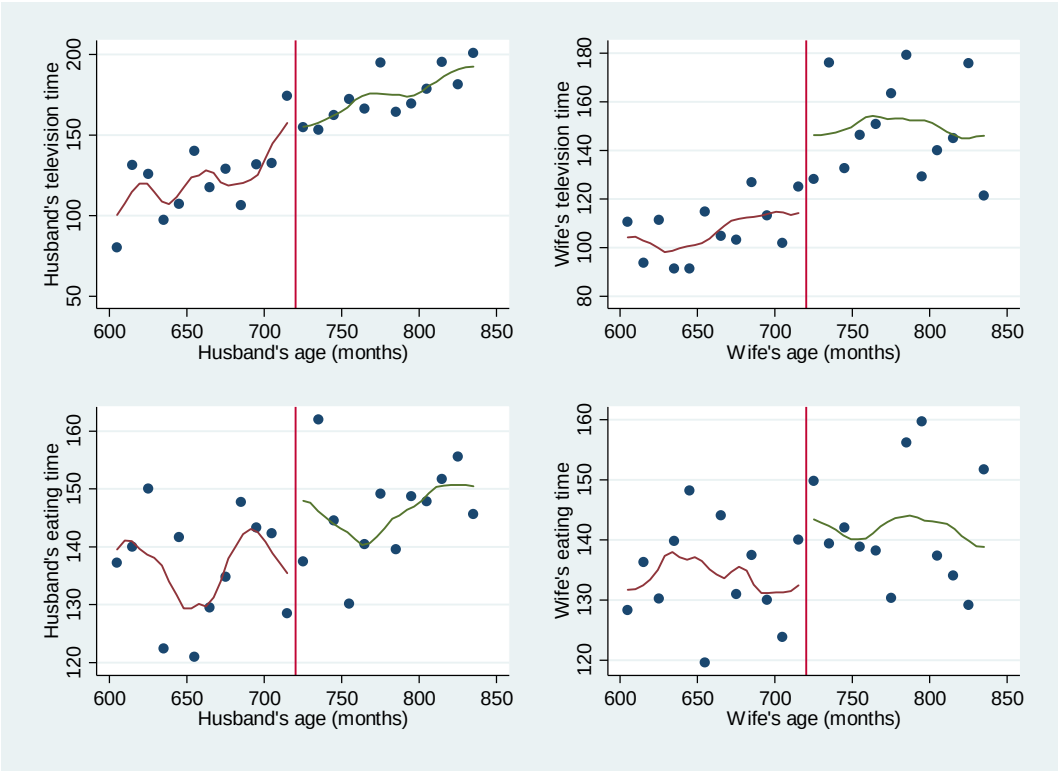


Figure 7. Partners' house work and time spent caring for others as a function of age (bins of ten months).

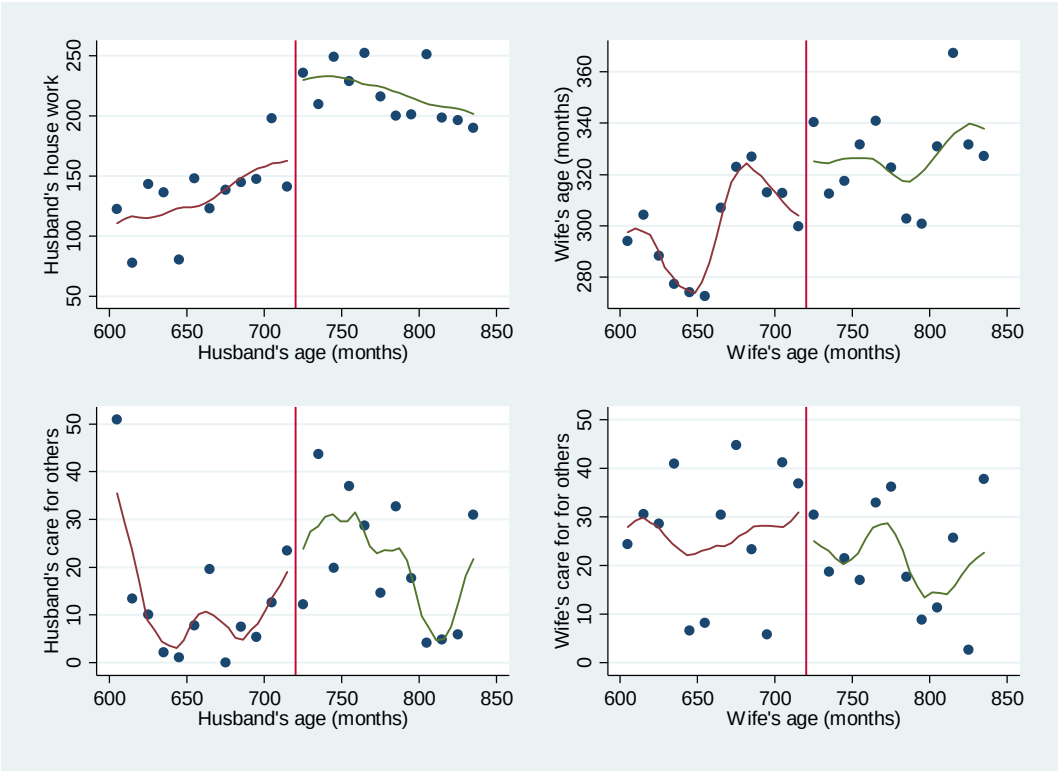
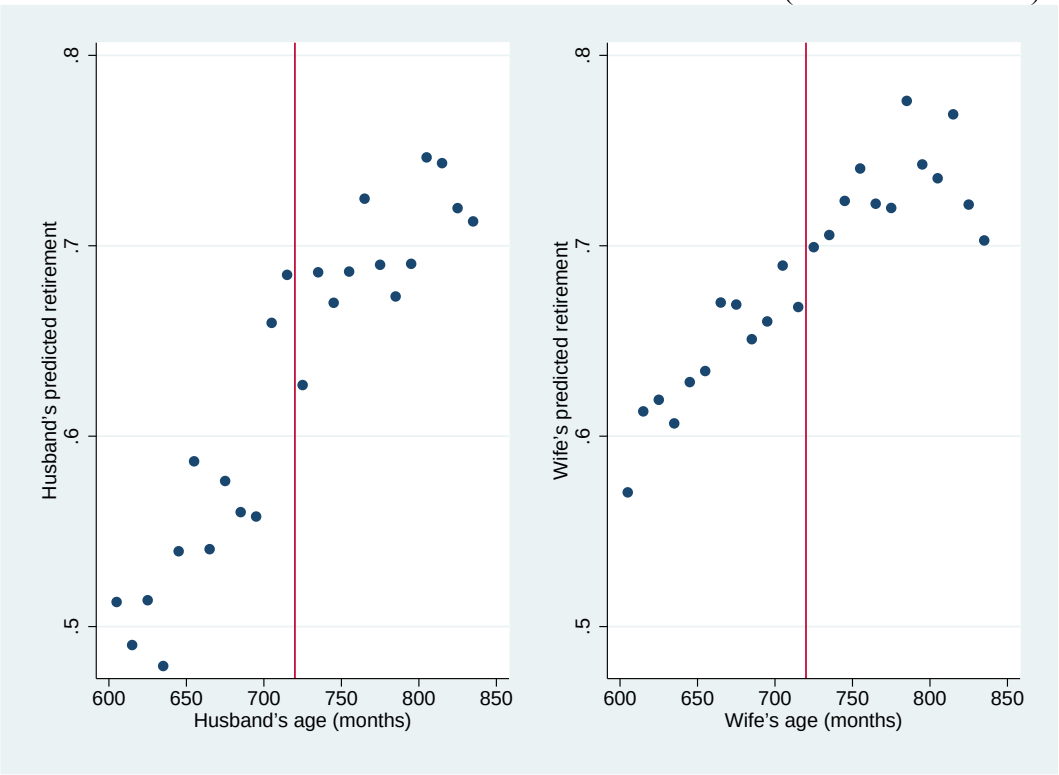


Figure 8. Smoothness of covariates other than age at legal retirement age
Predicted retirement as a function of the Z covariates (bins of ten months)



Note: Retirement is predicted as a function of both partners' education level, a dummy for any child still living at home, area of residence dummies, season and weekend diary dummies.

Table 3. Results of estimation of the effect of partners' retirement on joint or separate leisure demands.

Assuming that retirement is exogenous and estimating each equation one by one

	His Retirement	Her Retirement	
His age 60 & above	0.379***	0.159**	
	(0.035)	(0.051)	
Her age 60 & above	**0.035**	**0.185*** **	
	(0.035)	**(0.052)**	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	115.749***	-24.91*	78.40***
	(17.454)	(13.63)	(13.45)
She retired	-21.505*	60.98**	43.77***
	(12.444)	(9.72)	(9.59)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	129.02***	-11.4	64.88***
	(18.609)	(15.81)	(12.36)
She retired	-13.93	68.99**	35.756***
	(13.27)	(11.27)	(8.816)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	115.749***	-24.639*	78.214***
	(17.454)	(14.158)	(13.296)
She retired	-21.505*	61.427***	43.324***
	(12.444)	(10.095)	(9.480)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	99.20***	-41.29***	94.76***
	(15.27)	(12.34)	(13.689)
She retired	-27.40**	55.53***	49.217***
	(11.39)	(8.80)	(9.760)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education dummies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 1043 couples.
*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table 4. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement Instrumenting Retirement with the dummy for being aged 60 and above

	His Retirement	Her Retirement	
His age 60 & above	0.380***	0.157**	
	(0.035)	(0.051)	
Her age 60 & above	0.031	0.187***	
	(0.035)	(0.051)	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	200.89**	-78.82	-39.32
	(85.92)	(85.03)	(57.62)
She retired	-94.66	300.40**	95.17
	(128.94)	(127.65)	(86.47)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	213.95**	-65.65	-52.37
	(82.80)	(73.57)	(65.19
She retired	-149.27	245.59**	149.79
	(124.23)	(110.42)	(97.83)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	188.80**	-90.85	-27.22
	(80.29)	(72.23)	(66.48)
She retired	-140.50	254.46**	141.00
	(120.50)	(108.41)	(99.79)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	225.13**	-54.51	-63.56
	(81.40	(60.17)	(74.47)
She retired	-218.46*	176.47**	218.98**
	(122.16)	(90.30)	(111.78)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' quadratic age polynomials interacted with the dummies for being aged 60 and above. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 1043 couples.
*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table 5. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement. Instrumenting Retirement with the dummy for being aged 60 and above and including other covariates

	His Retirement	**Her Retirement**	
His age 60 & above	0.380***	0.160***	
	(0.034)	(0.050)	
Her age 60 & above	0.035	0.185***	
	(0.035)	(0.051)	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	165.85**	-100.58	-39.46
	(84.51)	(94.68)	(58.77)
She retired	-6.27	375.72**	94.20
	(127.53)	(142.88)	(88.69)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	184.703**	-81.73	-34.52
	(80.088)	(81.87)	(67.43)
She retired	-67.99	314.00**	174.06*
	(120.85)	(123.55)	(101.72)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	160.91**	-105.51	-34.52
	(79.09)	(77.90)	(67.43)
She retired	-86.119	295.84**	174.06*
	(119.34)	(117.56)	(101.72)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	198.63**	-67.80	-72.24
	(78.24)	(64.57)	(76.63)
She retired	-166.41	215.58**	254.34**
	(118.06)	(97.43)	(115.63)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education mies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 1043 couples.

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table 6. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement Instrumenting Retirement with the dummy for being aged 60 and above. Dropping couples with a "housewife"

	His Retirement	**Her Retirement**	
His age 60 & above	0.347***	0.160***	
	(0.042)	(0.052)	
Her age 60 & above	0.081**	0.338***	
	(0.042)	(0.052)	
Mean retirement (age 55-59)	*0.353*	*0.221*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	205.65**	-65.78	-73.93
	(100.59)	(86.05)	(67.04)
She retired	-147.51	178.89**	118.77*
	(94.62)	(80.95)	(63.07)
Mean leisure (at age 55-59)	*274.71*	*197.05*	*142.94*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	242.68**	-28.76	-110.96
	(94.52)	(78.03)	(74.59)
She retired	-165.21*	161.19**	136.47*
	(88.92)	(73.40)	(70.17)
Mean leisure (at age 55-59)	*227.5*	*150.29*	*190.15*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	221.66**	-49.77	-89.94
	(93.03)	(74.73)	(76.52)
She retired	-169.65**	156.75**	140.91**
	(87.52)	(70.30)	(71.98)
Mean leisure (at age 55-59)	*243.97*	*166.76*	*173.68*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	252.10**	-19.35	-120.37
	(90.09)	(65.99)	(81.60)
She retired	-217.71**	108.69*	188.98**
	(84.75)	(62.08)	(76.77)
Mean leisure (at age 55-59)	*206.76*	*129.56*	*210.88*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 732 couples, excluding 'housewives'. *** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table 7. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement Instrumenting Retirement with the dummy for being aged 60 and above and including other covariates. Dropping couples with a "housewife"

	His Retirement	**Her Retirement**	
His age 60 & above	0.342***	0.151***	
	(0.041)	(0.050)	
Her age 60 & above	0.097**	0.339***	
	(0.041)	(0.051)	
Mean retirement (age 55-59)	*0.353*	*0.221*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	161.84*	-101.66	-54.27
	(98.27)	(90.63)	(66.09)
She retired	-86.69	251.56**	117.49*
	(94.66)	(87.30)	(63.66)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	208.34**	-55.18	-100.75
	(92.27)	(8238)	(73.67)
She retired	-108.96	229.29**	139.77**
	(88.88)	(79.35)	(70.96)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	188.48**	-75.04	-80.90
	(92.03)	(78.59)	(74.01)
She retired	-127.30	210.95**	158.10**
	(88.65)	(75.70)	(71.30)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	228.84**	-34.70	-121.26
	(88.67)	(68.62)	(80.26)
She retired	-187.37**	150.90**	218.18**
	(85.61)	(66.10)	(77.31)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education dummies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 732 couples.

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table 8. Results of estimation of the effect of partners' retirement on various time allocation demands. Simultaneous equation estimation. Full sample of couples. Instrumenting Retirement with the dummy for being aged 60 and above and including other covariates

	His Retirement	Her Retirement
His age 60 & above	0.380***	0.160***
	(0.034)	(0.050)
His age 60 & above	0.035	0.185***
	(0.035)	(0.051)
Mean retirement (age 55-59)	*0.359*	*0.485*
	Watching Television (subset of leisure, minutes per day)	
	His Television	**Her Television Time**
He Retired	32.87	-86.38*
	(57.97)	(53.91)
She retired	-45.76	147.51*
	(87.48)	(81.34)
Mean television time (at age 55-59)	*133.88*	*115.34*
	Eating time (subset of leisure, minutes per day)	
	His eating time	**Her eating time**
He Retired	21.16	-3.02
	(29.30)	(29.88)
She retired	11.76	72.64*
	(44.20)	(45.09)
Mean eating time (at age 55-59)	*139.42*	*135.53*
	House work (minutes per day)	
	His House work	**Her house work**
He Retired	276.435**	69.248
	(80.60)	(75.524)
She retired	-189.040	-21.775
	(121.62)	(113.96)
Mean house work (at age 55-59)	*143.398*	*291.65*
	Care for children and adults from other households (minutes per day)	
	His care for others	**Her care for others**
He Retired	69.15**	58.209
	(34.65)	(36.92)
She retired	-0.043	-50.889
	(52.28)	(55.692)
Mean care for others (at age 55-59)	*11.94*	*29.13*
	Sleeping (minutes per day)	
He Retired	56.374	32.291
	(47.259)	(48.862)
She retired	0.991	-46.914
	(71.311)	(73.727)
Mean sleep time (at age 55-59)	*524.95*	*539.80*

We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on the outcome equations. Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education dummies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for data definitions. Observations: 1043 couples, including inactive women.
*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table 8. Results of estimation of the effect of partners' retirement on various time allocation demands. Simultaneous equation estimation. Dropping couples with a 'housewife'. Instrumenting Retirement with the dummy for being aged 60 and above and including other covariates

	His Retirement	Her Retirement
His age 60 & above	0.342***	0.151***
	(0.041)	(0.050)
His age 60 & above	0.097**	0.339***
	(0.042)	(0.051)
Mean retirement (age 55-59)	*0.353*	*0.221*
	Watching Television (subset of leisure, minutes per day)	
	His Television	**Her Television Time**
He Retired	-1.711	-117.73**
	(67.147)	(61.510)
She retired	23.456	180.613**
	(64.681)	(59.252)
Mean television time (at age 55-59)	*132.94*	*102.21*
	Eating time (subset of leisure, minutes per day)	
	His eating time	**Her eating time**
He Retired	25.96	4.743
	(34.188)	(32.241)
She retired	9.352	55.112*
	(32.933)	(31.058)
Mean eating time (at age 55-59)	*134.56*	*131.76*
	House work (minutes per day)	
	His House work	**Her house work**
He Retired	289.19**	23.714
	(86.25)	(81.047)
She retired	-122.06	69.486
	(83.086)	(78.073)
Mean house work (at age 55-59)	*133.38*	*259.26*
	Care for children and adults from other households (minutes per day)	
	His care for others	**Her care for others**
He Retired	88.739**	64.273*
	(43.430)	(39.511)
She retired	14.960	-32.558
	(41.836)	(38.061)
Mean care for others (at age 55-59)	*10.29*	*23.09*
	Sleeping (minutes per day)	
He Retired	43.712	125.332**
	(53.608)	(59.017)
She retired	14.470	-99.181*
	(51.640)	(56.851)
Mean sleep time (at age 55-59)	*523.24*	*538.53*

We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on the outcome equations. Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education dummies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for data definitions. Observations: 732 couples, excluding couples with a "housewives".
*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

APPENDIX.

Table A. Correlations of the errors of the equations from the models in Table 4

	Outcome definition a, same leisure activity, same time interval, with family			
	Her Retirement	His separate leisure	Her separate leisure	Joint leisure
His Retirement	0.127***	-0.104	0.029	0.250**
	(0.031)	(0.112)	(0.113)	(0.108)
Her Retirement		0.164	-0.609**	-0.151
		(0.285)	(0.280)	(0.283)
His separate leisure			0.274	-0.448**
			(0.199)	(0.086)
Her separate leisure				-0.255
				(0.0205)
	Outcome definition b, same leisure activity, same time interval, same place			
	Her Retirement	His separate leisure	Her separate leisure	Joint leisure
His Retirement	0.127***	-0.140	-0.002	0.262**
	(0.031)	(0.109)	(0.115)	(0.103)
Her Retirement		0.282	-0.560**	-0.273
		(0.282)	(0.283)	(0.279)
His separate leisure			0.131	-0.451**
			(0.194)	(0.126)
Her separate leisure				-0.164
				(0.205)
	Outcome definition c, same leisure activity, same time interval			
	Her Retirement	His separate leisure	Her separate leisure	Joint leisure
His Retirement	0.127***	-0.099	0.047	0.201*
	(0.031)	(0.111)	(0.111)	(0.107)
Her Retirement		0.275	-0.597**	-0.248
		(0.283)	(0.279)	(0.282)
His separate leisure			0.084	-0.429***
			(0.197)	(0.115)
Her separate leisure				-0.162
				(0.207)
	Outcome definition d, any leisure activity, same time interval, same place			
	Her Retirement	His separate leisure	Her separate leisure	Joint leisure
His Retirement	0.127***	-0.169	-0.038	0.259**
	(0.031)	(0.104)	(0.118)	(0.010)
Her Retirement		0.470*	-0.431	-0.431
		(0.276)	(0.286)	(0.273)
His separate leisure			-0.045	-0.502**
			(0.188)	(0.177)
Her separate leisure				-0.120
				(0.204)

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table B. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement. Instrumenting Retirement with the dummy for being aged 60 and above. Sample of couples with both partners aged 52 to 68.

	His Retirement	**Her Retirement**	
His age 60 & above	0.318***	0.112*	
	(0.042)	(0.059)	
Her age 60 & above	-0.007	0.198***	
	(0.042)	(0.058)	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	272.54**	-46.28	-44.42
	(94.85)	(80.19)	(62.77)
She retired	-127.25	198.63*	114.67
	(128.85)	(108.97)	(85.26)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	238.82**	-80.00	-10.69
	(91.78)	(70.59)	(69.38)
She retired	-169.42	156.47*	156.85*
	(124.71)	(95.92)	(94.27)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	218.29**	-100.53	9.83
	(90.72)	(67.26)	(71.32)
She retired	-183.61	142.28	171.03*
	(123.27)	(91.39)	(96.90)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	261.38**	-57.44	-33.25
	(88.44)	(60.48)	(75.93)
She retired	-209.77*	116.12	197.19*
	(120.18)	(82.18)	(103.18)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 746 couples.
*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table C. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement. Instrumenting Retirement with the dummy for being aged 60 and above and including other covariates. Sample of couples with both partners aged 52 to 68.

	His Retirement	**Her Retirement**	
His age 60 & above	0.333***	0.122**	
	(0.041)	(0.059)	
Her age 60 & above	0.0002	0.227***	
	(0.041)	(0.059)	
Mean retirement (age 55-59)	*0.359*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	238.48**	-52.22	-35.44
	(84.45)	(75.09)	(58.90)
She retired	-75.90	208.27**	118.00
	(107.98)	(96.01)	(75.32)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	208.04**	-82.66	-4.99
	(81.88)	(66.45)	(64.96)
She retired	-114.53	169.65**	156.63*
	(104.69)	(84.97)	(83.05)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	188.29**	-102.37	14.76
	(81.84)	(62.85)	(65.99)
She retired	-142.44	141.64*	184.54**
	(104.58)	(80.36)	(84.33)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	224.70**	-65.98	-21.65
	(77.78)	(57.01)	(68.73)
She retired	-157.12	127.01*	199.22**
	(99.43)	(72.89)	(87.87)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education dummies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 746 couples.

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table D. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement Instrumenting Retirement with the dummy for being aged 60 and above. Sample of couples with both partners aged 54 to 66

	His Retirement	Her Retirement	
His age 60 & above	0.318***	0.011	
	(0.058)	(0.075)	
Her age 60 & above	-0.020	0.166**	
	(0.055)	(0.071)	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	321.18**	50.75	-93.49
	(105.10)	(92.06)	(71.92)
She retired	-1.33	251.28	-5.53
	(191.71)	(167.96)	(131.09)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	282.25**	10.81	-53.56
	(98.11)	(73.76)	(74.57)
She retired	-102.62	149.78	95.67
	(178.92)	(134.34)	(135.88)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	239.89**	-30.55	-12.20
	(96.78)	(67.34)	(76.24)
She retired	-146.26	106.03	139.33
	(176.43)	(122.80)	(138.99)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	254.12**	-16.32	-26.43
	(93.50)	(62.38)	(78.80)
She retired	-158.36	94.04	151.41
	(170.51)	(113.74)	(143.69)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 506 couples.
*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table E. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement Instrumenting Retirement with the dummy for being aged 60 and above and including other covariates. Sample of couples with both partners aged 54 to 66

	His Retirement	**Her Retirement**	
His age 60 & above	0.348***	0.015	
	(0.054)	(0.073)	
Her age 60 & above	-0.010	0.184**	
	(0.053)	(0.072)	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	281.54**	46.54	-74.80
	(89.34)	(80.96)	(61.07)
She retired	22.22	248.32*	46.34
	(165.40)	(149.89)	(113.07)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	251.14**	16.13	-44.40
	(84.72)	(64.07)	(68.48)
She retired	-94.76	131.34	163.32
	(156.85)	(118.63)	(126.79)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	200.08**	-34.93	6.66
	(85.36)	(57.89)	(72.18)
She retired	-159.46	66.64	228.02*
	(158.03)	(107.19)	(133.64)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	209.55**	-25.45	-2.81
	(80.64)	(53.56)	(72.57)
She retired	-154.76	71.34	223.32*
	(149.29)	(99.16)	(134.36)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above; partners' education dummies, a dummy for any child still living at home, area of residence fixed effects, season of the year and weekend diary dummies. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 506 couples.

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table F. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement. Instrumenting Retirement with the dummy for being aged 60 and above. Dropping couples with a "housewife", couples aged 52-68

	His Retirement	**Her Retirement**	
His age 60 & above	0.259***	0.130***	
	(0.050)	(0.065)	
Her age 60 & above	**0.018**	**0.328*** **	
	(0.049)	**(0.064)**	
Mean retirement (age 55-59)	*0.353*	*0.221*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	278.92**	-67.36	-53.74
	(138.99)	(108.25)	(89.91)
She retired	-207.43**	100.03	102.42
	(100.62)	(78.37)	(65.09)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	270.96**	-75.30	-45.76
	(130.34)	(98.47)	(97.91)
She retired	-204.95**	102.46	99.97
	(94.36)	(71.29)	(70.88)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	254.11**	-92.12	-28.94
	(129.53)	(93.88)	(99.30)
She retired	-223.22**	84.18	118.24*
	(93.77)	(67.96)	(71.89)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	316.18**	-30.10	-91.01
	(126.68)	(85.74)	(106.42)
She retired	-240.46**	66.99	135.46*
	(91.71)	(62.07)	(77.04)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' age polynomials interacted with the dummies for being aged 60 and above. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 521 couples, excluding 'housewives'. *** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

Table G. Results of estimation of the effect of partners' retirement on joint or separate leisure demands. Simultaneous equation estimation of leisure separate or together and his and her retirement Instrumenting Retirement with the dummy for being aged 60 and above. Including Cubic Polynomial in Age

	His Retirement	Her Retirement	
His age 60 & above	0.202***	0.088	
	(0.044)	(0.065)	
His age 60 & above	**-0.025**	**0.198*** **	
	(0.045)	**(0.066)**	
Mean retirement (age 55-59)	*0.3259*	*0.485*	
	Outcome definition a, same leisure activity, same time interval, with family		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	405.29	-33.06	-147.05
	(157.15)	(121.11)	(107.74)
She retired	-125.79	128.91	137.05
	(150.75)	(116.19)	(103.35)
Mean leisure (at age 55-59)	*268.9*	*209.36*	*138*
	Outcome definition b, same leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	337.48**	-100.87	-79.24
	(145.02)	(108.51)	(111.56)
She retired	-143.10	111.36	154.42
	(138.91)	(104.07)	(106.88)
Mean leisure (at age 55-59)	*241.28*	*181.74*	*165.78*
	Outcome definition c, same leisure activity, same time interval		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	284.75**	-153.55	-26.51
	(139.81)	(105.49)	(113.81)
She retired	-154.77	99.88	166.03
	(134.07)	(101.16)	(109.16)
Mean leisure (at age 55-59)	*224.22*	*164.68*	*182.84*
	Outcome definition d, any leisure activity, same time interval, same place		
	His separate leisure	**Her separate leisure**	**Joint Leisure**
He Retired	372.37**	-65.88	-114.16
	(139.58)	(93.06)	(123.58)
She retired	-168.97	85.46	180.28
	(133.56)	(89.25)	(118.34)
Mean leisure (at age 55-59)	*207.61*	*148.07*	*199.45*

We move from definition (a), the most restrictive, to definition (d), the broadest. We only show results of estimation of the effects of the dummies for being age 60 and above of each partner on the retirement probability (first stage) and the effect of each partner's retirement on joint and separate leisure demands (outcome equations). Other controls include partners' cubic age polynomials interacted with the dummies for being aged 60 and above. See Section 2 for the model specification and Section 3.2 for definitions of leisure. Observations: 1043 couples, including inactive women.

*** p<0.01, ** p<0.05, * p<0.1 Standard errors in parentheses.

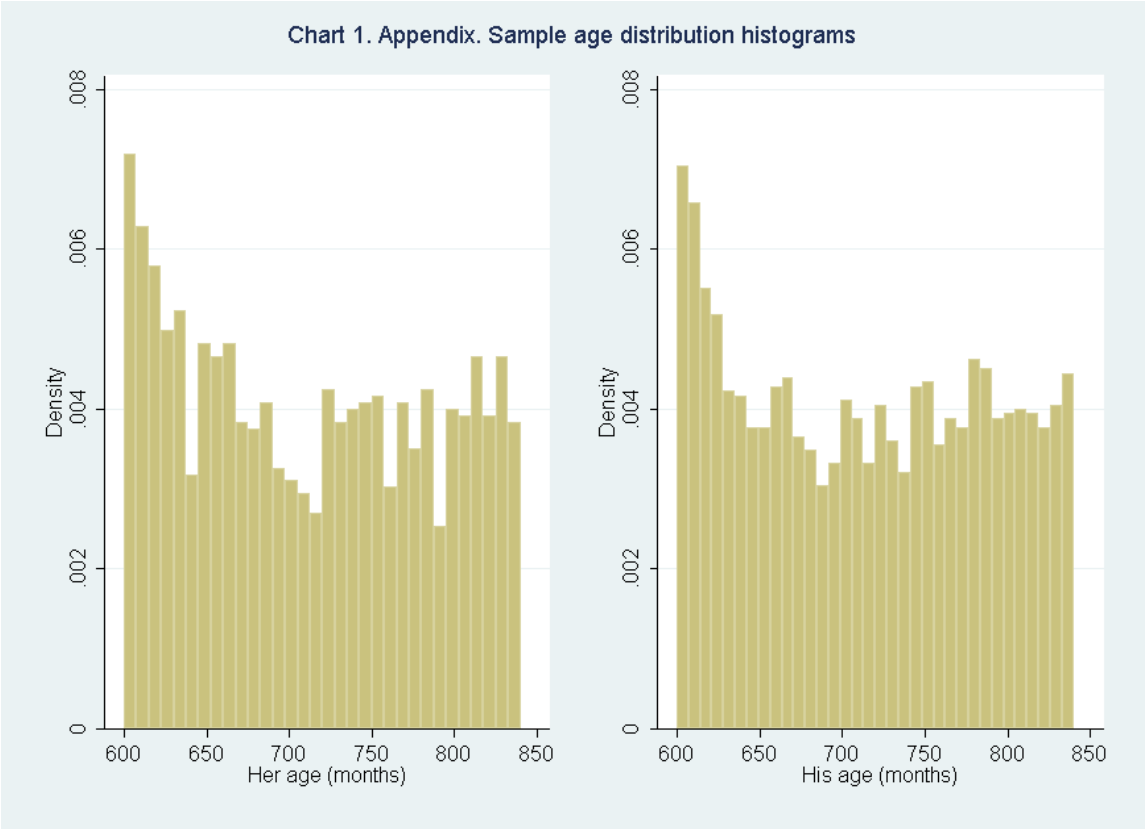


Chart 1. Appendix. Sample age distribution histograms
Density
0
.002
.004
.006
.008
600
650
700
750
800
850
Her age (months)
His age (months)

Figure A. Appendix. Estimated male age density on the two sides of age 60 for the Mc Crary test.

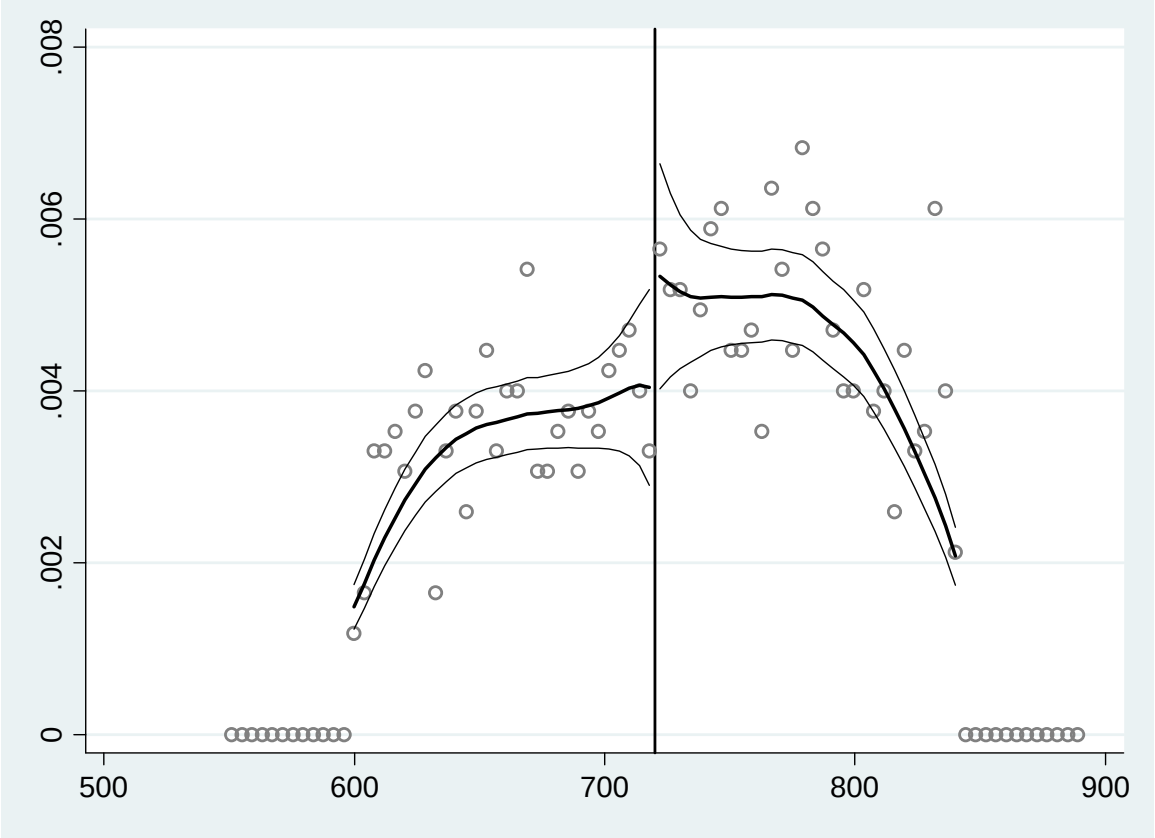


Figure B. Appendix. Estimated female age density on the two sides of age 60 for the Mc Crary test

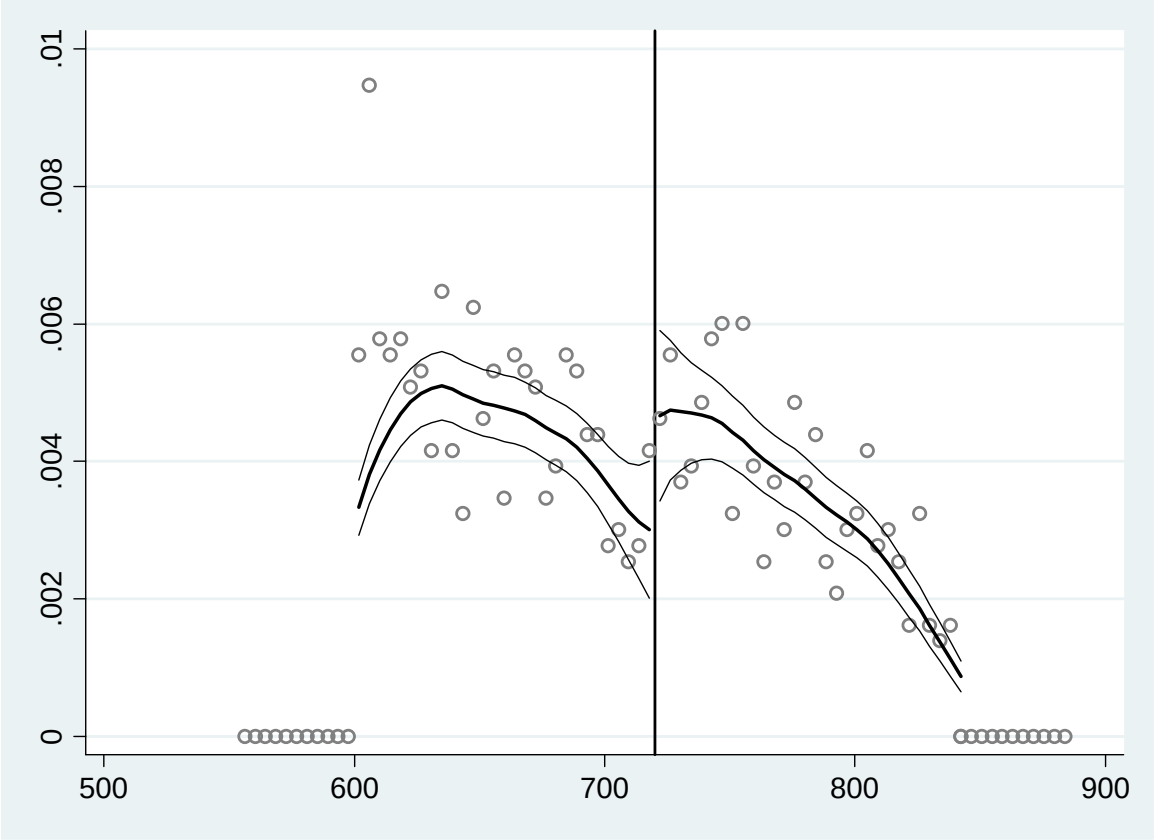
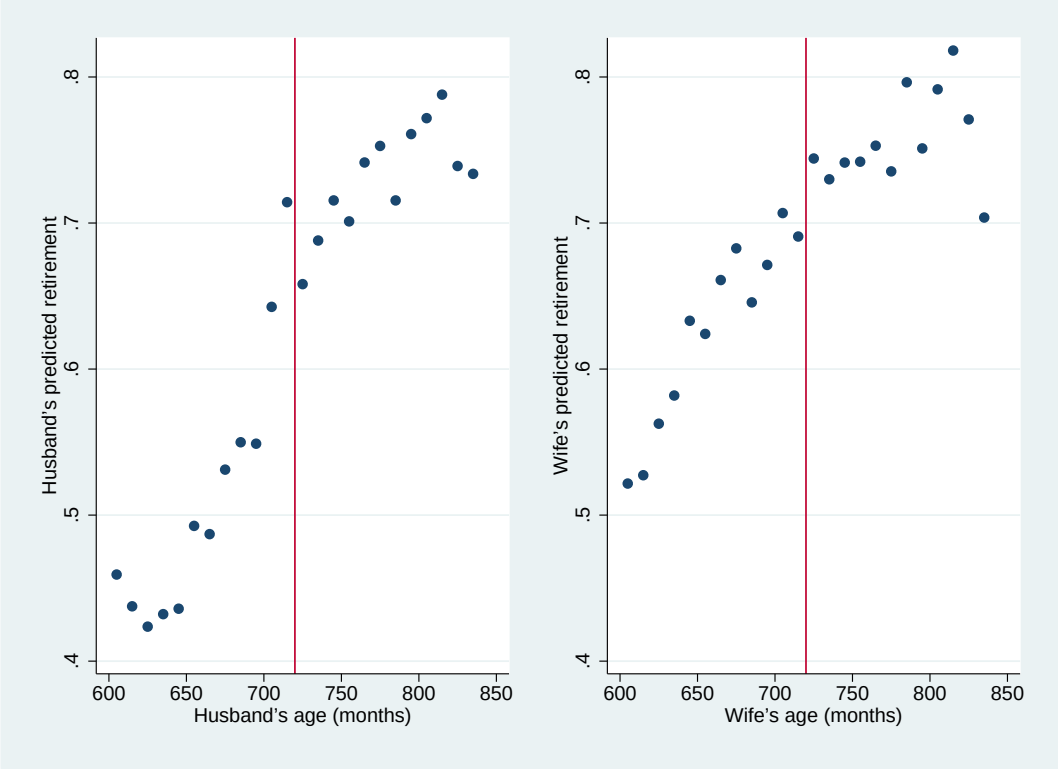


Figure C. Smoothness of covariates other than age at legal retirement age

Predicted retirement as a function of the Z covariates (bins of ten months)
Including also total household income among the Zs.



Note: Retirement is predicted as a function of both partners' education level, a dummy for any child still living at home, area of residence dummies, season and weekend diary dummies, and a series of indicators for the level total household income (which is collected in intervals in the survey).

Figure D. Partners' retirement as a function of own and partner's age (bins of ten months).

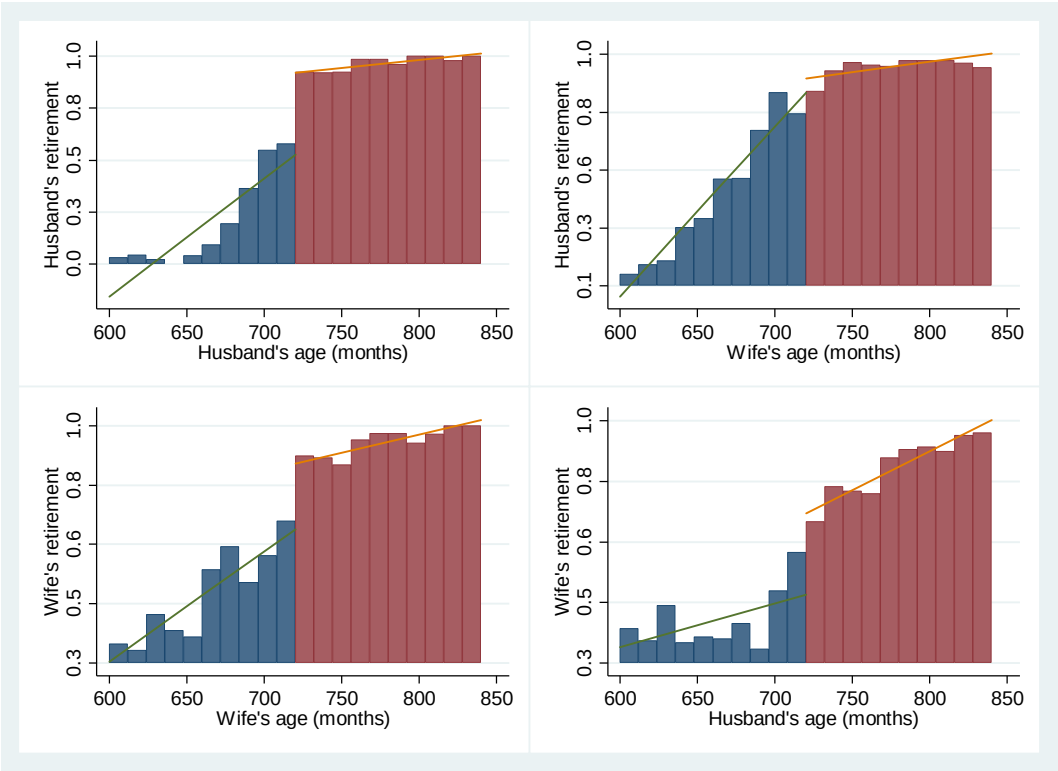


Figure E. Partners' retirement as a function of partner's age (bins of ten months). Sample excluding couples in which the wife is a "housewife".

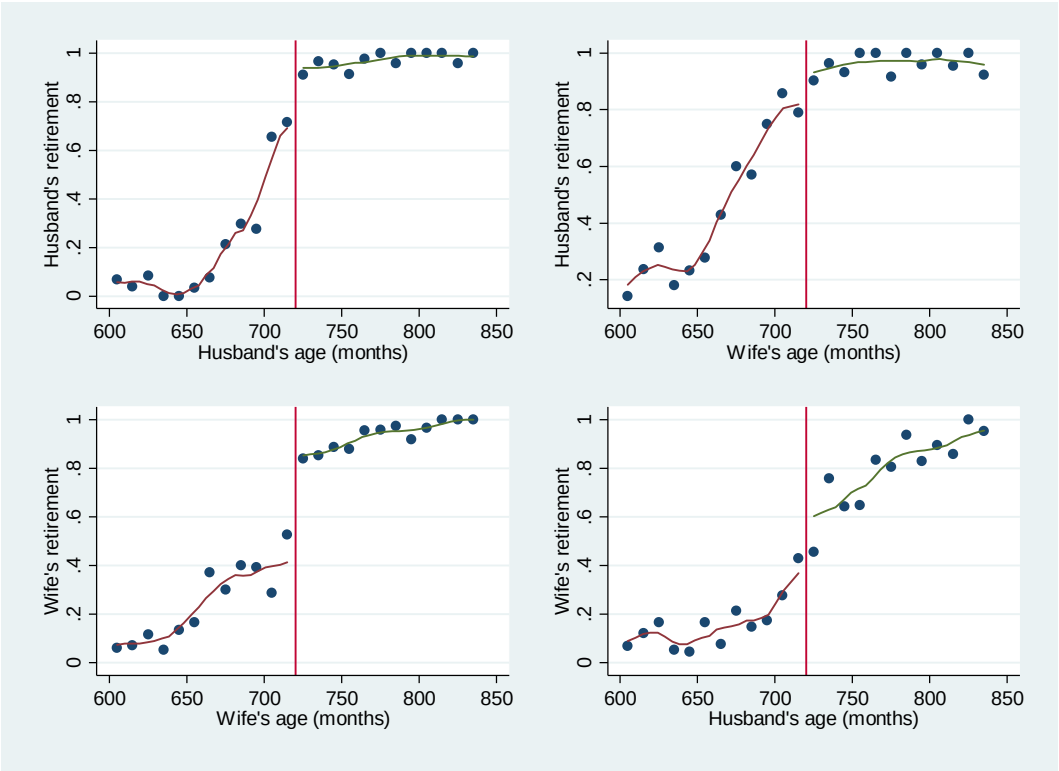


Figure F. Partners' leisure time together as a function of age (bins of ten months).
Sample excluding couples in which the wife is a "housewife".
Using the narrowest (a) and the broadest (d) definition of leisure together.

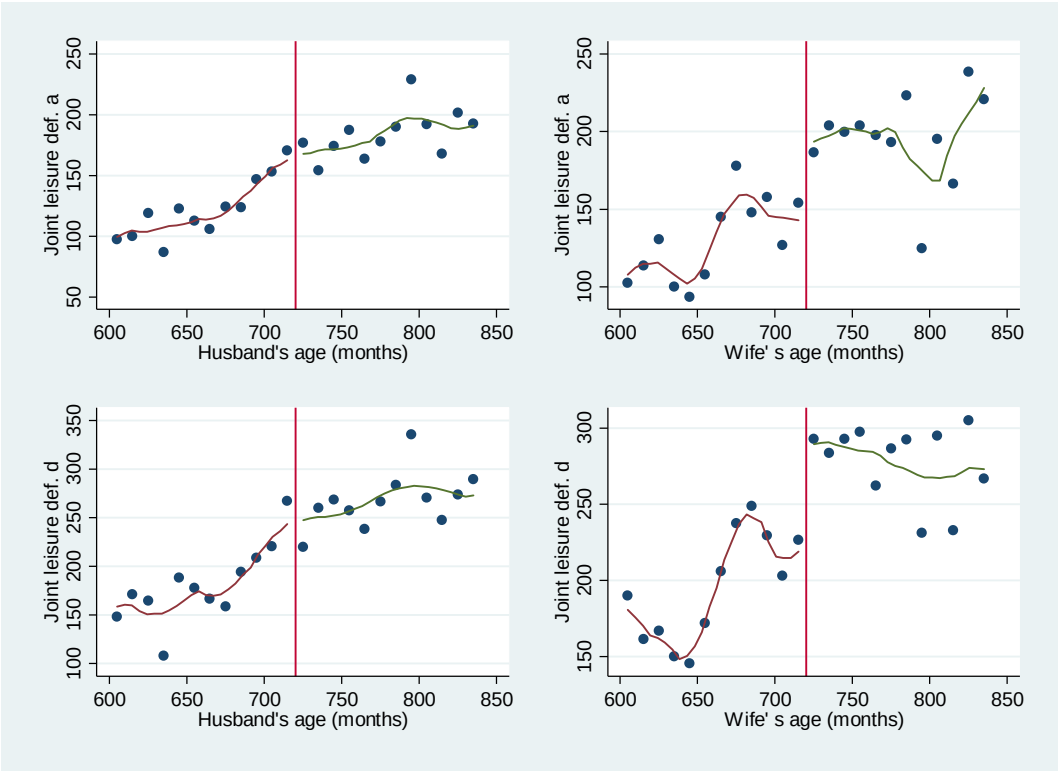


Figure G. Partners' separate leisure time as a function of age (bins of ten months).
Sample excluding couples in which the wife is a "housewife".
Using the two broader definitions of separate leisure ((a) and b)).