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ABSTRACT

Retirement Patterns of Couples in Europe*

In this paper we study the retirement patterns of couples in a multi-country setting using data from the Survey of Health, Aging and Retirement in Europe. In particular we test whether women's (men's) transitions out of the labor force are directly related to the actual realization of their husbands' (wives') transition, using the institutional variation in country-specific early and full statutory retirement ages to instrument the latter. Exploiting the discontinuities in retirement behavior across countries, we find a significative joint retirement effect for women of 21 percentage points. For men, the estimated effect is insignificant. Our empirical strategy allows us to give a causal interpretation to the effect we estimate. In addition, this effect has important implications for policy analysis.

JEL Classification: J26, D10, C21

Keywords: joint retirement, social security incentives

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1 Introduction

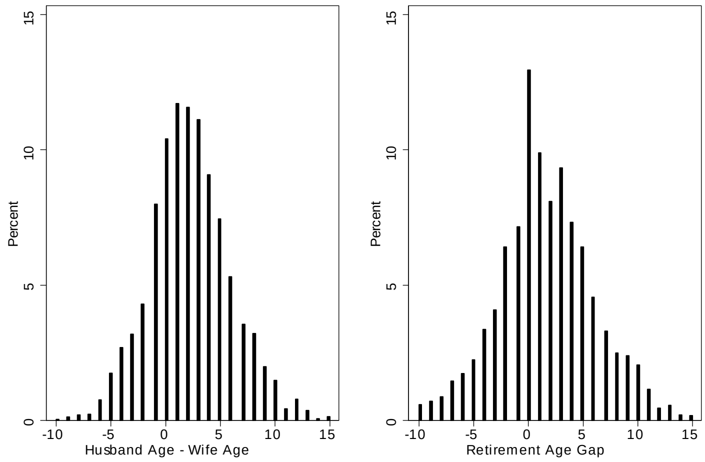
Continued improvements in life expectancy and fiscal insolvency of public pensions have led to an increase in pension entitlement ages in several countries, especially for women for whom eligibility ages for retirement pensions have been traditionally lower than for men. The success of such policies, however, relies on how responsive individuals are to changes in pension eligibility. In this paper we use longitudinal data from the Survey of Health, Aging and Retirement in Europe (SHARE) to study the determinants of retirement decisions among European couples and how responsive each member of the couple is to their own eligibility to retirement pensions, as well as their partner's eligibility induced retirement choice, after controlling for other factors that may affect their retirement decisions.

Numerous studies have shown the importance of Social Security incentives for retirement decisions. The timing of retirement has been found to be in part determined by the incentives imbedded in the rules determining Social Security benefits, as well as employer-provided pension benefits (see Hurd, 1990 and Lumsdaine and Mitchell, 1999 for reviews). Likewise, other cross-national research published volumes edited by Gruber and Wise (1999, 2004) note that there is a strong negative correlation between labor force participation at older ages and the generosity of early retirement benefits. Finally, Coe and Zamarro (2011) find that official retirement ages in Europe are a strong predictor of retirement for men. However, these studies focused mostly on men and little is known about the determinants of women's retirement decisions.

Finally, this paper also contributes to the increasing literature that considers retirement as a decision concerning the couple, rather than the individual (Ruhm, 1996; Gustman and Steinmeier, 2000, 2004, 2009; Blau and Gilleskie, 2006; Coile, 2004a, 2004b; Michaud, 2003; Michaud and Vermeulen, 2004; Casanova, 2010; Stancanelli and van Soest, 2012a, 2012b; Stancanelli, 2012; Honoré and de Paula, 2013), by providing empirical evidence of joint retirement behavior. The phenomenon of *joint retirement* refers to the coincidence in time of spouses' retirement and follows the observation that a significant proportion of spouses retire within less than one year of each other, independently of the age difference between them. The left graph of Figure 1 shows the histogram of the age differences between spouses using couples from the waves 1, 2, and 4 of SHARE. The average gap between the husband's age and the wife's age is of 2.2 years, being this difference quite stable across SHARE countries (with the only exception of Greece, where the average differential is of 4.4 years). The right graph shows the histogram of the differences between the age the husband stopped working and the age his wife did so. As expected by the joint retirement phenomenon, the peak at zero is large and much bigger than the proportion of couples with no age differences among its members. This hints at the presence of joint retirement behavior among couples in Europe.

In this paper we then focus on the retirement patterns of couples and study the complementarity of spouses' retirement patterns in continental Europe. This study complements the one of Banks, Blundell and Casanova (2010) for England and the US who, focusing on men, found that

Figure 1: Age gaps between spouses.



Notes: Source: SHARE (waves 1, 2, and 4). Retirement age gap = weighted mean of differences between the age of stop working for the husband and the age of stop working for his wife.

British men are from 14 to 20 percentage points more likely to retire when their wife reaches state pension age at 60 than their American counterparts. Considering the numerous differences in the labor markets, health insurance and social plans between the UK and US and many European countries, there is no a priori reason to assume that their findings would still hold in Europe. In addition, in contrast with Banks, Blundell and Casanova (2010), we are interested in studying both women's and men's transitions out of the labor force and how they directly relate to the actual realization of their husbands' (wives') transition, using the institutional variation in country-specific early and normal retirement ages to instrument the latter.

We find significant evidence of complementarity on spouses' transitions out of the labor force. The probability of women leaving the labor force increases in around 21 percentage points when their husbands also stop working. The effect for men, however, is insignificant. Controlling for spouse's working status reduces the impact of own eligibility for retirement pensions on the probability of leaving the labor force. In particular, the effect for women is reduced in about 2 percentage points for full retirement pensions. Therefore, by ignoring joint retirement, governments would be overstating the impact of eligibility rules on retirement decisions. Our empirical strategy allows us to give a causal interpretation to these effects we estimate as we control for the potential endogeneity of spouse's retirement decisions.

The rest of the paper proceeds as follows. Section 2 describes the data and key variables for the analysis. Section 3 discusses the empirical reduced form model and identification strategy. In section 4 we present econometric results from estimating our empirical model. Finally we conclude in section 5.

2 Data

This paper uses data from SHARE, a multidisciplinary and cross-national panel database of micro data on health, socioeconomic status and social and family networks of more than 40,000 individuals aged 50 or over. The main purpose of this survey is to provide detailed information about the living conditions of middle-aged and older people for several countries in Europe. There are currently four waves of data available in SHARE corresponding to the years 2004-2005, 2006-2007, 2008-2009, and 2010-2011. However, the third wave of SHARE (2008-2009) was devoted to a retrospective survey about life events of the respondents and did not collect all the information available in other waves. For this reason, this paper focuses on analysis of waves 1 (2004-2005), 2 (2006-2007), and 4 (2010-2011). The first wave of the SHARE dataset contains a balanced representation of the various European regions, ranging from Scandinavia (Denmark and Sweden), Central Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands) and Mediterranean countries (Spain, Italy and Greece). Further data have been collected in 2005-06 and 2006-2007 in Israel. The Czech Republic, Poland and Ireland joined SHARE in the wave 2006-2007. However, Ireland only participated in the wave 2006-2007. Portugal also recently joined the SHARE team and participated in the survey during the last wave of data 2010-2011. To maximize the number of waves of data available we decided to focus our analysis on those OECD countries, for which information on retirement ages is available, who participated in the survey for at least two consecutive waves (i.e. Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Italy, the Netherlands, Poland, Spain, Sweden, and Switzerland).[1]

SHARE collects information on health variables (self-reported health, health conditions, physical and cognitive functioning, health behavior, use of health care facilities), biomarkers (grip strength, body-mass index, peak flow), psychological variables (psychological health, well-being, life satisfaction), economic variables (current work activity, job characteristics, opportunities to work, retirement age, sources and composition of current income, wealth and consumption, housing, education), and social support variables (assistance within families, transfers of income and assets, social networks, volunteer activities), both at the household and at the individual level. This gives the possibility to analyze a wide variety of questions related to population ageing and the quality of life of the elderly.

In addition, following Coe and Zamarro (2011) we supplemented the SHARE dataset with information regarding country and gender specific statutory ages of eligibility for early and full retirement pensions in order to construct instruments based on dummy variables indicating whether the individual is above the full or early retirement ages set in his country. Table 1 reports the statutory Early and Normal retirement ages in place in each country. Early and Normal retirement ages are based on OECD's definitions and represent eligibility ages for early and full

[1]Note that Israel is excluded from the group of countries we analyze because it did not join OECD until 2010 and by that time they did not participate in SHARE anymore.

retirement pensions, respectively (see, OECD, 2003, 2005a, 2005b, 2007, 2009, and 2011).[2] As it can be seen in this table, the official retirement ages in Europe vary by country, and sometimes by gender, by as much as ten years. Note that for multiple countries in our study retirement ages have been increasing in the period of our analysis. This is the case, for example, in France, Germany or Greece, among others. In such cases, we abstract from the fact that these reforms might only affect certain cohorts in our analysis. We believe this could affect the relevance of our instruments but not its validity. However, as we show later in the paper our instruments continue to be relevant and have a significant effect on transitions out of the labor force, despite this simplification in its definition.

Table 1: Early and Normal Retirement Ages: Men (Women).

	2002		2005		2007		2009		2011	
	Early	Normal	Early	Normal	Early	Normal	Early	Normal	Early	Normal
Austria	60 (57)	65 (60)	65 (60)	65 (60)	65 (65)	65 (65)	65 (65)	65 (65)	62 (60)	65 (65)
Belgium	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)
Czech Republic	-	-	60 (56-60)	63 (59-63)	60 (56-60)	63 (59-63)	60 (59-60)	65 (62-65)	60 (59-60)	65 (62-65)
Denmark	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	65 (65)	67 (67)	67 (67)
France	57 (57)	60 (60)	60 (60)	60 (60)	60 (60)	60 (60)	61 (61)	61 (61)	56-60 (56-60)	65 (65)
Germany	63 (63)	65 (65)	63 (63)	65 (65)	63 (63)	65 (65)	63 (63)	67 (67)	63 (63)	67 (67)
Greece	60 (55)	65 (60)	57 (57)	65 (65)	55 (55)	65 (65)	55 (55)	65 (65)	55 (55)	65 (65)
Italy	57 (57)	65 (65)	60 (60)	65 (65)	60 (60)	65 (60)	60 (60)	65 (60)	61 (60)	65 (60)
Netherlands	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)	65 (65)	65 (65)
Poland	-	-	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)	65 (60)
Spain	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)	60 (60)	65 (65)	61 (61)	65 (65)
Sweden	61 (61)	65 (65)	61 (61)	65 (65)	61 (61)	65 (65)	61 (61)	65 (65)	61 (61)	65 (65)
Switzerland	63 (62)	65 (64)	63 (62)	65 (64)	63 (62)	65 (64)	63 (62)	65 (64)	63 (62)	65 (64)

Notes: Retirement ages for women in the Czech Republic vary depending on the number of children. In France, early retirement is possible from 56 under certain circumstances related to working conditions. Source (2002): Natali (2004) supplemented with information from OECD (2003), the Bertelsmann Foundation, Sundén (2004), Preesman (2006), and OECD (2005a). Slight differences can be found between these retirement ages and the ones from OECD publications (e.g. OECD, 2005a) due to the differences between the current law at the time of those publications and the law that was in place when individuals were facing retirement decisions. Source (2005), (2007), (2009), and (2011): OECD (2005b), (2007), (2009), and (2011), respectively.

2.1 Sample

This paper uses data from three waves of SHARE (waves 1, 2 and 4) for thirteen countries (Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Italy, the Netherlands, Poland, Spain, Sweden, and Switzerland). In particular, our sample consists of couples - married or living with a partner - who reported being working in either wave 1 or wave 2, with both members aged between 50 and 70, and with both members present in at least two consecutive

[2] In the case of the Netherlands, the modelling at age 60 refers to a "typical" occupational early retirement scheme. However since the early 1990s these schemes have been progressively transformed into less generous, fully-funded, systems. As a result of these transformations, early retirement ages may have a lower incentive effect there than in other countries considered.

waves. After dropping observations with incomplete records, our sample has 3,058 such couples.[3]

Given that our aim is to measure the causal effect of joint retirement we focus the analysis on working couples in one wave of data (waves 1 or 2) and study their retirement transitions in the subsequent wave (waves 2 or 4). However, it should be stressed that, for some countries, this sample would not be representative of the whole middle-age and older population, especially for women. This is so because, as shown in Figure A.1, some European countries (notably the Mediterranean countries) have very high proportions of women who never worked.

Moreover, a large proportion of women who ever worked but stopped before age 50 did so at the early stages of their careers (see bimodal histogram shapes in Figure A.2 for females in countries like Belgium, Italy, the Netherlands or Spain). Many of those early career stops are, however, not related to retirement decisions and so they are excluded from our analysis.

2.2 Definition of retirement

We define retirement as making a transition out of work between two waves of data. That is, we consider a respondent as having retired if she reports working as her current job status in one wave and reports other working status (i.e. retired, unemployed, permanently sick or disabled, or homemaker) in the subsequent wave of data. In our sample, the percentage of males transitioning out of the labor force is 29 per cent, while for women the percentage is 25. The proportion actually describing themselves as transitioning into retirement is 25 per cent for men, but only 17 per cent for women.[4]

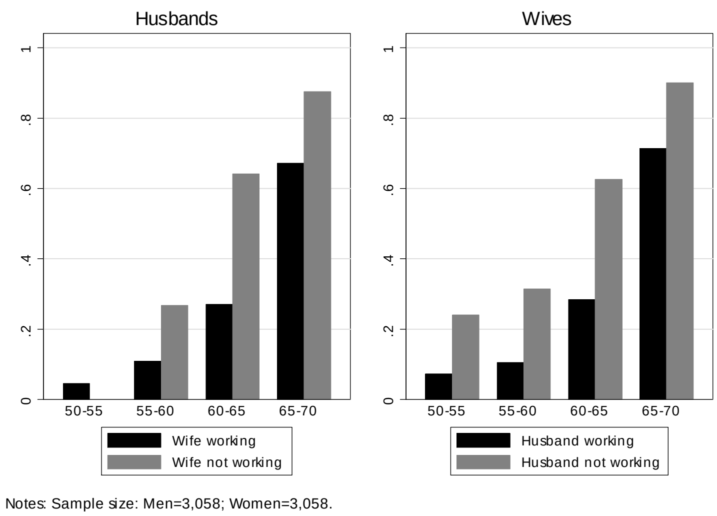
Figure 2 presents percentages of respondents out of the labor force by age intervals and partner's labor market status. We find that in our sample the fraction of workers that transition out of the labor force is higher, for both men and women and at every age interval, when the partner also makes such transition.

Some other descriptive statistics for our sample of working couples can be found in Table A.1. The average age of men in our sample is 60 and 58 for women. Eleven per cent of men and a 6.5 percent of women are over the normal retirement age, while 33 and 21.5 percent, respectively, are over the early retirement age. Finally, educational attainment and health status are similar among males and females in our sample of couples.

[3]The distribution of number of couples by country is as follows: 70 couples in Austria, 350 couples in Belgium, 134 couples in Czechia, 454 couples in Denmark, 376 couples in France, 294 couples in Germany, 88 couples in Greece, 128 couples in Italy, 334 couples in the Netherlands, 64 couples in Poland, 98 couples in Spain, 502 couples in Sweden, and 166 couples in Switzerland.

[4]Note that 4% of women in our couples reported transitioning from work to homemaker. This is in contrast with only 0.4% of men that reported such transition. Not to lose these transitions from women, we focus on transitions out of the labor force. Transitions to unemployment or disability were lower and did not show gender differences (1.7 % of men reported transitioning to disability vs. 1.3% of women; 2.3% of men reported transitioning to unemployment vs. 2.2 % of women). In any case, in the empirical analysis we also study only transitions to self-reported retirement status as the dependent variable and results are robust to this alternative definition.

Figure 2: Retirement transitions by age intervals and partner's labor market status.



3 Empirical model

We aim to determine the effect of having a partner leaving the labor force on the respondent's probability of retirement. In particular, let R_i be a binary indicator that takes value 1 if respondent i leaves the labor force, and let $R_{j(i)}$ be another indicator that takes value 1 if her partner $j(i)$ also makes such transition, conditional on both members being at work in the previous wave. Then, we consider a reduced form bivariate probit model, for transitions out of the labor force,[5,6] of the following form:

$$R_i = 1\left[\left(\beta R_{j(i)} + \lambda D_i^{early} + \alpha D_i^{normal} + X_{i,j}\theta'\right) > u_i\right] \quad (1)$$

$$R_{j(i)} = 1\left[\left(\gamma D_{j(i)}^{early} + \delta D_{j(i)}^{normal} + Z_{i,j}\phi'\right) > \epsilon_i\right] \quad (2)$$

where $i = \{h, w\}$ stands for husbands and wives, respectively, and $(u_i, \epsilon_i) \sim N(0, \Sigma)$.

In this framework, β is our main parameter of interest, X is a vector of explanatory variables containing demographic information for both members of the couple, and $Z = \left\{X, D_i^{early}, D_i^{normal}\right\}$.

The vector of explanatory variables X includes a series of controls for the individual and partner's characteristics, such as the respondent's age, the age difference between the two members of the couple, level of education and health status of each member, family composition (whether they have children and grandchildren), country and survey wave dummies.

[5] It should be pointed out that our approach, focusing on transitions out of the labor force for working couples on waves 1 or 2, is equivalent to a discrete duration model for durations in the labor force where we assume that coefficients are constant across durations.

[6] In our sample, 550 out of the 3,058 couples are observed working both in waves 1 and 2 and so they contribute twice to our sample. To take this into account we obtain cluster robust standard errors at the respondent level. Note that the limited number of couples that appear in both waves and the limited number of waves does not allow us to estimate more sophisticated panel models to control for unobserved heterogeneity.

D_i^{early} is an indicator for eligibility for early retirement pensions, which is defined as:

$$D_i^{early} = \begin{cases} 1 & \text{if} \quad \text{individual } i\text{'s age is above the early official retirement age in the country} \\ 0 & , \quad \text{otherwise} \end{cases},$$

and similarly D_i^{normal} is an indicator for eligibility for full retirement pensions defined as:

$$D_i^{normal} = \begin{cases} 1 & \text{if} \quad \text{individual } i\text{'s age is above the full official retirement age in the country} \\ 0 & , \quad \text{otherwise} \end{cases}.$$

$D_{j(i)}^{early}$ and $D_{j(i)}^{normal}$ are our external instruments for retirement decisions, that is, they are the exclusion restrictions that allow identification of the model. Note that, identification then relies on partner's age being different than the individual's age. As Figure 1 suggests, that is precisely the case in our data. In addition, in our analysis we control for the age difference between the two members of the couple to capture any unobservable characteristics at the couple level revealed by choosing a partner with a certain age difference.[7]

In practice what we assume is that - conditional on observables - whether the partner is eligible for retirement pensions only has an impact on the individual's retirement decision through the partner's retirement decision, as opposed to directly having an effect. Note that our exogeneity assumption does not imply that partner's eligibility for retirement pensions does not affect ones' retirement decisions. The assumption is that it does so but only through the actual retirement decision of the partner. Under this assumption, our estimates of β are interpreted as the effect of the partner's retirement, induced through eligibility for retirement pensions, on the individual's retirement decision.

Our econometric approach exploits the fact - illustrated by Figure 3 - that the regressor of interest (transition into retirement) is partly determined by a known discontinuous (non-linear and non-monotonic) function of an observed covariate (age) to control for the endogeneity of partner's retirement decisions. This sort of identification strategy has a long tradition in social science and can be viewed as an application of a regression discontinuity design for evaluating the effect of joint retirement.[8,9]

Finally, note that by estimating the equations for both members of the couple jointly we also take into account the potential correlation among unobservables across members of the couple.[10]

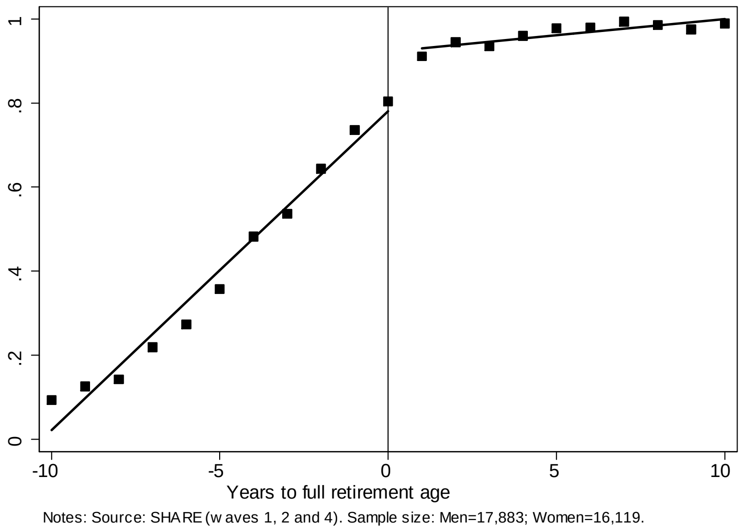
[7] For instance, those who have partners who are much younger than themselves might have a certain personality that could reflect in their retirement decisions. This could be confounded with the effect of having a spouse that does not retire if not controlled for.

[8] For literature reviews of regression discontinuity methods see Imbens and Lemieux 2007, Van der Klaauw 2008, or Lee and Lemieux 2010. For applications of regression discontinuity to the retirement decision see also Battistin *et al.* 2009, and Stancanelli and Van Soest 2012a, 2012b.

[9] It should be pointed out that, if the effect of partner's retiring on own retirement choices is heterogeneous among individuals, our results would then be interpreted as the average effect of those whose partners change their retirement decisions when they become eligible for retirement pensions. As eligibility for retirement pensions, especially for early retirement, depends on many cases of the labor history of the individual, our estimates would be more representative of effects for those whose partners have longer labor histories which might not necessarily coincide with those for the whole population.

[10] An alternative model would consist on an Instrumental Variables (IV) discrete choice model estimated sepa-

Figure 3: Probability of transitions out of the labor force by age.



4 Estimation Results

In this section we present the results of jointly estimating the system of equations (1-2). Table 2 reports, separately for men and women, average marginal effects of estimates of probit models for the probability of leaving the labor force, given that both spouses were working in the previous wave. The set of controls included in the regressions is the following: dummy variables for the respondent being eligible for early or full retirement, the respondent's age, the age difference between the two members of the couple,[11] country and survey wave dummies, education variables for the two spouses, information on whether the couple has children and grandchildren as a measure of care necessities, and health status controls for both spouses, lagged one period to lessen endogeneity concerns. Within each section of the table we present results of models that ignore the possibility of joint retirement by excluding information on the current working status of the spouse, and preferred bivariate probit models where we include this variable and instrument it with the dummies for spouse's eligibility for retirement pensions.

Our results show that there is a significative joint retirement effect for women, of 21 percentage points. For men, the estimated effect is insignificant. These results are similar in size to those found by Banks, Blundell and Casanova (2010) for British men. Introducing information on working status of the spouse reduces the impact of own eligibility for retirement pensions for women in about 2 percentage points. Therefore, by ignoring joint retirement, governments would be overstating the impact of eligibility rules on retirement decisions. The remainder of the

rately for men and women. However, this approach would be less efficient than the simultaneous discrete choice model models we estimate and it would not account for the potential correlation among unobservables across spouses.

[11]The age of the respondent is included as a continuous variable (measuring age in months), whereas the age gap between spouses enters as dummies.

Table 2: Bivariate probit estimates.

Probability of leaving the labor force	Men		Women	
Partner leaving the labor force		0.026		0.212***
		(0.094)		(0.063)
Age>early	0.046**	0.045**	-0.001	-0.007
	(0.021)	(0.022)	(0.023)	(0.022)
Age>full	0.165***	0.168***	0.143***	0.125***
	(0.033)	(0.034)	(0.035)	(0.034)
Age	0.045***	0.044***	0.047***	0.032***
	(0.003)	(0.006)	(0.003)	(0.006)
Age difference<0	0.032	0.020	-0.039*	0.066*
	(0.023)	(0.049)	(0.022)	(0.035)
0⩽Age difference<1	0.054**	0.045	-0.009	0.058**
	(0.024)	(0.039)	(0.024)	(0.029)
1⩽Age difference<2	0.057***	0.048	0.007	0.060**
	(0.022)	(0.036)	(0.023)	(0.026)
2⩽Age difference<4	0.039*	0.035	-0.031	0.005
	(0.020)	(0.023)	(0.022)	(0.024)
High education	-0.046**	-0.047**	-0.029	-0.018
	(0.021)	(0.021)	(0.021)	(0.021)
Medium education	0.012	0.012	0.006	0.011
	(0.018)	(0.018)	(0.018)	(0.017)
Partner high education	-0.045**	-0.044**	0.018	0.028
	(0.021)	(0.021)	(0.022)	(0.021)
Partner medium education	-0.021	-0.021	0.020	0.013
	(0.018)	(0.018)	(0.018)	(0.017)
Having children	-0.055*	-0.056*	0.030	0.033
	(0.031)	(0.031)	(0.034)	(0.032)
Having grandchildren	0.073***	0.072***	0.047***	0.028*
	(0.016)	(0.017)	(0.016)	(0.016)
Bad health in previous wave	0.022	0.021	0.071***	0.071***
	(0.022)	(0.022)	(0.019)	(0.019)
Partner bad health in previous wave	0.005	0.002	0.039*	0.031
	(0.020)	(0.023)	(0.020)	(0.021)
Log-likelihood	-2524.83	-2524.21	-2524.83	-2513.37
ρ	0.361	0.302	0.361	-0.195
	(0.036)	(0.228)	(0.036)	(0.191)
LR test of $\rho = 0$	82.13	1.55	82.13	0.99
	[0.00]	[0.21]	[0.00]	[0.32]

Notes: N. obs=3,058. Age difference measured as husband age minus wife age. All specifications include country and survey wave dummies. Delta-method standard errors clustered at the individual level in parentheses. Significant at the *10%, ** 5%, and *** 1% level. $\rho = corr(u_h, \epsilon_h)$. p-values in squared brackets.

variables have the expected effects. Higher levels of education lower the probability of leaving the labor force but only for men, whereas bad health has a positive impact on the probability of leaving the labor force only for women. Finally, having grandchildren increases the probability of leaving the labor force for both men and women, while having children reduces the probability of retirement only for men.[12]

In order for the official retirement ages to be valid instruments, they must be exogenous and relevant. With respect to the exogeneity assumption, we assume that if the husband (wife) reaches the statutory retirement age, his (her) spouse's retirement decision is only affected through his (her) own transition. This assumption is not testable. Regarding relevance, statutory retirement ages must be related to actual retirement behavior. To illustrate this latter point we estimated probit regressions of the individual probability of leaving the labor force, separately for husbands and wives. This set of regressions would represent a standard first-stage step in a two-stage estimation procedure such as an IV model.[13] Estimated marginal effects for these regressions can be found in Table A.2 of the Appendix. Our results show that eligibility for retirement pensions are a significant predictor of retirement decisions both for husbands and wives. In terms of the model in equations (1-2), these results confirm that $D_{j(i)}^{early}$ and $D_{j(i)}^{normal}$ affect $R_{j(i)}$, after controlling for D_i^{early} and D_i^{normal}, and the rest of the control variables.[14]

To get a better insight of the effect of policies on pension entitlement ages on retirement behaviors of couples, we also estimate bivariate models dividing the sample in two groups of countries. Group 1 includes those countries with a low gap in participation rates by gender, while group 2 contains those countries with high differentials in the participation rates between men and women. According to Table A.3, the mean gender gap in employment/population ratios for individuals aged 50-64 years in the thirteen countries considered in the analysis is 17.13. Below that number are the countries with low gender gaps, that is, Belgium, Denmark, France, Germany, Poland, and Sweden; whereas above the mean, we find countries with high gender gaps like Austria, Czechia, Greece, Italy, Netherlands, Spain, or Switzerland. The estimated marginal effects from these regressions are reported in Table 3. As before, the estimated joint retirement effect is insignificant for men, both for groups 1 and 2. On the contrary, for women

[12] We also estimated models controlling for household income in the previous wave and household wealth but this did not change our main results. Estimates for these models are available from the authors upon request.

[13] In practice, we follow a more efficient approach and estimate the whole bivariate model by maximum likelihood in a single step.

[14] The estimated model in this paper is a simultaneous equation binary choice model where partner's eligibility for early and full retirement pensions is used as exclusion restrictions to identify the system. As such, the reduced form probit models that we estimate just proxy what it would be a first step to assess the relevance of our instruments. Moreover, in order to also approximate traditional Hausman/Sargan test for the joint validity of the instruments, we have tried and estimate reduced form linear models for the probability of individual i leaving the labor force, separately for men and women, by 2SLS. In these models, the partner's transition out of the labor force, $R_{i(i)}$, is instrumented using the indicators $D_{j(i)}^{early}$ and $D_{j(i)}^{normal}$. For these latter regressions, we obtain the Sargan test of overidentifying restrictions. For men the corresponding p-value for the test is 0.274, whereas for women is 0.869; meaning that in both cases we can not reject the null hypothesis that the over-identifying restrictions are valid.

we find that the significative joint retirement effect is wholly due to those countries where the differences by gender in participation rates are small (that is, group 1, for which the estimated effect is 28 percentage points). On the contrary, for women in countries with large differences in participation rates by gender, the estimated effect of joint retirement is not statistically different from zero.

Finally, to assess the robustness of our results to different definitions of retirement, we also estimated models for the probability that the respondent describes herself as retired as opposed to out of the labor force. The results of these regressions can be found in the Appendix in Table A.4. Our results are still robust to this alternative definition of the dependent variable. For women, we find a significant joint retirement effect, although the magnitude of the effect gets reduced to about half the size (from 21 to 10 percentage points). For men we find an effect similar in magnitude, but again insignificant. Another difference with previous results is that lagged bad health does not seem to have an impact on retirement decisions for women in this case. This suggests that bad health shocks might lead women to rather leave the labor force without actually retiring. More research is needed to better understand the differences between women's transitions out of work to self-reported retirement or to homemaking.

5 Conclusions

Continued improvements in life expectancy and fiscal insolvency of public pensions have led to an increase in pension entitlement ages in several countries. For example, the normal retirement age in the US is currently rising from 65 to 67 for successive birth cohorts. England, Austria, Germany and Italy are also phasing in increases in their retirement ages. However, the success of such policies relies on how responsive individuals are to such changes in pension eligibility. In this paper we use longitudinal data from SHARE to study the determinants of retirement decisions among European couples and how responsive each member of the couple is to their own eligibility to retirement pensions, as well as their partner's eligibility induced retirement choice, after controlling for other factors that may affect their retirement decisions.

Our empirical strategy exploits the discontinuities in retirement behavior across countries to control for the endogeneity of partner's labor participation decisions. This allows us to give a causal interpretation to the effects we estimate. Our results show a significative joint retirement effect for women of 21 percentage points. For men, the estimated effect is insignificant.

We also compare our estimates with models that do not control for the partner's labor participation decisions and found that introducing information on working status of the spouse reduces the impact of own eligibility for retirement pensions for women in about 2 percentage points. Therefore, by ignoring joint retirement, governments would be overstating the impact of eligibility rules on retirement decisions.

Finally, our results are still robust to using self-reported retirement status as an alternative definition of the dependent variable. In this case, we find a significant joint retirement effect for

Table 3: Bivariate probit estimates.

Probabilkity of leaving the labor force	Men		Women	
(By participation rates gap)	Group 1	Group 2	Group 1	Group 2
Partner leaving the labor force	0.012	-0.119	0.277***	0.107
	(0.085)	(0.134)	(0.048)	(0.175)
Age>early	0.032	0.066*	-0.015	-0.040
	(0.028)	(0.037)	(0.026)	(0.042)
Age>full	0.150***	0.208***	0.094**	0.157**
	(0.046)	(0.054)	(0.038)	(0.065)
Age	0.046***	0.043***	0.029***	0.038***
	(0.006)	(0.008)	(0.006)	(0.012)
Age difference<0	0.025	0.089	0.073**	0.051
	(0.046)	(0.084)	(0.031)	(0.089)
0⩽Age difference<1	0.078**	0.053	0.011	0.143*
	(0.035)	(0.088)	(0.029)	(0.077)
1⩽Age difference<2	0.036	0.119*	0.049*	0.086
	(0.034)	(0.064)	(0.027)	(0.055)
2⩽Age difference<4	0.041	0.047	-0.003	0.019
	(0.026)	(0.044)	(0.026)	(0.050)
High education	-0.056**	-0.031	0.013	-0.009
	(0.028)	(0.037)	(0.024)	(0.040)
Medium education	0.017	-0.014	0.066***	-0.045
	(0.024)	(0.029)	(0.021)	(0.029)
Partner high education	-0.071***	0.018	0.075***	-0.049
	(0.025)	(0.039)	(0.025)	(0.037)
Partner medium education	-0.038	-0.004	0.041**	-0.012
	(0.025)	(0.029)	(0.021)	(0.030)
Having children	-0.024	-0.047	-0.015	0.072
	(0.046)	(0.045)	(0.044)	(0.047)
Having grandchildren	0.068***	0.093***	-0.008	0.079**
	(0.019)	(0.031)	(0.018)	(0.033)
Bad health in previous wave	0.010	0.029	0.096***	0.024
	(0.027)	(0.036)	(0.021)	(0.038)
Partner bad health in previous wave	-0.037	0.086***	0.045*	0.005
	(0.030)	(0.032)	(0.023)	(0.038)
Log-likelihood	-1632.39	-847.63	-1619.35	-847.11
ρ	0.370	0.643	-0.410	0.116
	(0.195)	(0.279)	(0.173)	(0.443)
LR test of $\rho = 0$	2.97	2.57	4.35	0.07
	[0.08]	[0.11]	[0.04]	[0.79]
N. obs	2,040	1,018	2,040	1,018

Notes: Group 1 includes Belgium, Denmark, France, Germany, Poland, and Sweden. Group 2 Austria, Czechia, Greece, Italy, Netherlands, Spain, or Switzerland. Age difference as husband age minus wife age. All specifications include country and wave dummies. Delta-method standard errors clustered at the individual level in parentheses. Significant at *10%, ** 5%, and *** 1%. $\rho = corr(u_h, \epsilon_h)$. p-values in squared brackets.

women, although the magnitude of the effect gets reduced to about half the size. For men, the estimated effect remains insignificant.

As recent pension reforms that increase pension entitlement ages get established and new waves of data get collected, it would be good to analyze how these reforms are affecting retirement patterns of men and women. Lastly, additional waves of data would allow for the estimation of panel data models that could better control for unobserved heterogeneity affecting transitions out of the labor force.

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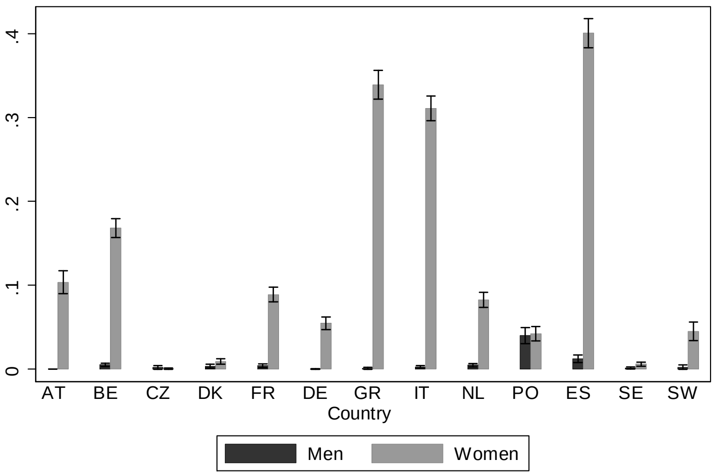
A Appendix

Table A.1: Descriptive Statistics by gender.

	[1] Men	[2] Women	Dif=[1]-[2]
Age	60.040	58.376	1.664***
	(3.792)	(3.618)	
Over Early Age	0.329	0.215	0.114***
Over Normal Age	0.109	0.065	0.044***
Out of the labor force	0.294	0.253	0.041***
Declared as retired	0.250	0.173	0.077***
Bad Health	0.151	0.169	-0.018**
Low Education	0.248	0.263	-0.015*
Medium Education	0.389	0.366	0.023**
High Education	0.355	0.361	-0.006*
Dummy of having children	0.942		
Dummy of having grandchildren	0.587		

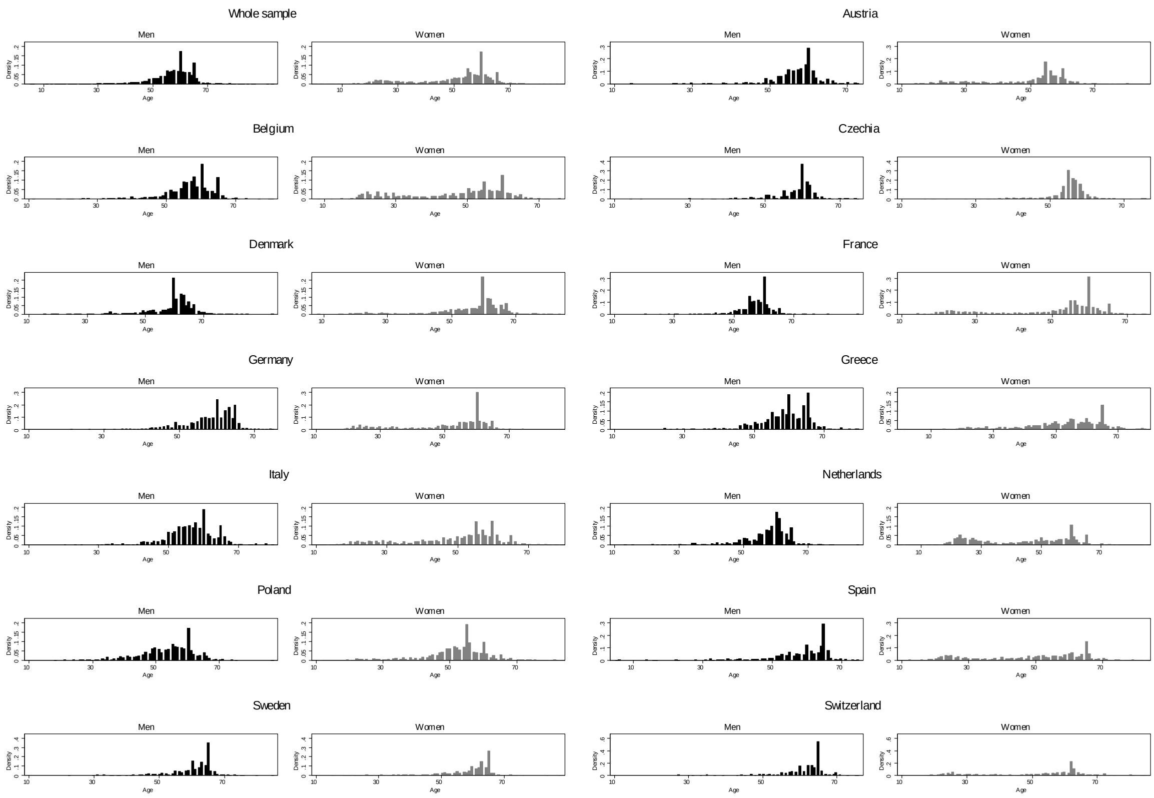
Notes: 3,058 observations for men and 3,058 observations for women. Standard deviations of non-binary variables in parentheses. Significant at the * 10%, ** 5%, and *** 1% level.

Figure A.1: Fraction of individuals who never worked.



Notes: Source: SHARE (waves 1, 2 and 4). Sample size: Men=33,387; Women=41,714.
Brackets represent 95% confidence intervals.

Figure A.2: Stop working age.



Notes: Source: SHARE (waves 1, 2 and 4). Sample size: Men=32,926; Women=34,260.

Table A.2: Probit estimates.

Probability of leaving the labor force	Men	Women
Age>early	0.056*	-0.002
	(0.030)	(0.028)
Age>full	0.284***	0.162***
	(0.058)	(0.060)
Partner age>early	0.008	-0.001
	(0.029)	(0.026)
Partner age>full	-0.104**	0.036
	(0.034)	(0.042)
Age	0.059***	0.055***
	(0.005)	(0.004)
Age difference<0	0.079**	-0.033
	(0.037)	(0.032)
0⩽Age difference<1	0.097***	-0.002
	(0.037)	(0.033)
1⩽Age difference<2	0.096***	0.022
	(0.033)	(0.032)
2⩽Age difference<4	0.062**	-0.029
	(0.028)	(0.026)
High education	-0.062**	-0.032
	(0.025)	(0.024)
Medium education	0.010	0.010
	(0.022)	(0.022)
Partner high education	-0.052**	0.022
	(0.025)	(0.027)
Partner medium education	-0.028	0.021
	(0.022)	(0.022)
Having children	-0.072*	0.029
	(0.044)	(0.037)
Having grandchild	0.086***	0.054***
	(0.019)	(0.018)
Bad health previous wave	0.024	0.091***
	(0.028)	(0.027)
Partner bad health previous wave	0.008	0.050*
	(0.025)	(0.027)
Pseudo R^2	0.303	0.267

Notes: N. obs=3,058. Age difference measured as husband age minus wife age. All specifications include country and wave dummies. Standard errors clustered at the individual level in parentheses. Significant at *10%, ** 5%, *** 1%.

Table A.3: Employment/population ratios (50-64 years).

Country	Total	[1] Men	[2] Women	Dif=[1]-[2]
Austria	39.22	50.57	28.23	22.34
Belgium	45.26	52.74	37.88	14.86
Czechia	50.01	62.17	39.60	22.57
Denmark	67.52	72.81	62.48	10.33
France	53.58	57.22	50.26	6.96
Germany	56.99	62.80	51.34	11.46
Greece	51.04	73.47	30.24	43.23
Italy	38.22	51.48	26.14	25.34
Netherlands	55.94	65.50	46.23	19.27
Poland	31.79	40.57	23.98	16.59
Spain	46.79	63.53	31.10	32.43
Sweden	76.35	79.26	73.45	5.81
Switzerland	71.18	80.75	61.71	19.04
Overall	50.65	59.48	42.35	17.13

Notes: Source: SHARE (waves 1, 2, and 4). Sample size: Men=16,261; Women=20,176. Weighted means.

Table A.4: Bivariate probit estimates.

Probability of retiring	Men	Women
Partner leaving the labor force	0.104	0.097**
	(0.064)	(0.041)
Age>early	0.043**	-0.001
	(0.018)	(0.018)
Age>full	0.096***	0.058**
	(0.028)	(0.026)
Age	0.043***	0.037***
	(0.005)	(0.004)
Age difference<0	-0.052	0.051
	(0.037)	(0.031)
0⩽Age difference<1	-0.005	0.047*
	(0.030)	(0.025)
1⩽Age difference<2	0.016	0.051**
	(0.026)	(0.022)
2⩽Age difference<4	0.004	0.014
	(0.019)	(0.021)
High education	-0.029	0.026
	(0.020)	(0.016)
Medium education	0.024	-0.003
	(0.016)	(0.014)
Partner high education	-0.028	0.002
	(0.020)	(0.017)
Partner medium education	-0.023	0.014
	(0.016)	(0.014)
Having children	-0.047	0.037
	(0.029)	(0.028)
Having grandchildren	0.081***	0.024*
	(0.015)	(0.013)
Bad health in previous wave	-0.030	0.017
	(0.019)	(0.015)
Partner bad health in previous wave	-0.010	0.015
	(0.017)	(0.017)
Log-likelihood	-1845.45	-1838.39
ρ	0.179	0.121
	(0.207)	(0.174)
LR test of $\rho = 0$	0.72	0.47
	[0.40]	[0.49]

Notes: N. obs=3,058. Age difference measured as husband age minus wife age. All specifications include country and survey wave dummies. Delta-method standard errors clustered at the individual level in parentheses. Significant at *10%, ** 5%, and *** 1%. $\rho = corr(u_h, \epsilon_h)$. p-values in squared brackets.