RETIREMENT PATTERNS OF COUPLES IN EUROPE

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Abstract

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 causally 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 significant joint retirement effect, especially for women, of around 16 to 18 percentage points. For men, we find a similar but less precise effect. 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.

Keywords: Joint retirement, Social security incentives.

JEL classification: J26, D10, C21.

Resumen

En este trabajo analizamos las pautas de jubilación de parejas en el contexto europeo utilizando datos de la Survey of Health, Aging and Retirement in Europe (SHARE). En concreto, evaluamos si las salidas del mercado de trabajo de las mujeres (hombres) están causadas por el hecho de que sus maridos (mujeres) dejen de trabajar, usando la variación institucional en las edades oficiales de jubilación (anticipada y normal) específicas de cada país como instrumento. Explotando las discontinuidades en los incentivos a la jubilación de cada país, encontramos que la jubilación de los maridos tiene un efecto significativo de entre 16 y 18 puntos porcentuales en la probabilidad de dejar de trabajar de sus mujeres. Para los hombres el efecto es similar en magnitud, pero no es estadísticamente significativo. Este efecto indirecto de la jubilación conjunta puede tener importantes consecuencias para la implementación de reformas.

Palabras clave: jubilación conjunta, incentivos de la Seguridad Social.

Códigos JEL: J26, D10, C21.

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 in multiple countries. The success of such policies, however, relies on how responsive individuals are to such 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.

Recent research has also stressed the role of other "push" factors in determining the timing of labor market exit. In particular, labor market constraints (Hurd, Michaud, and Rohwedder, 2008; García-Pérez and Sánchez-Martín, 2008), poor health (Currie and Madrian, 1999) or family care-giving obligations (Crespo, 2006; Fevang, Kverndokk and Røed, 2008) have also been found to have implications on the timing of retirement and may help explain gender differences in employment behavior among men and women.

Finally, this paper contributes to the increasing literature that studies joint retirement and 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 Vermulen, 2004; Casanova, 2010; Stancanelli and van Soest, 2012a, 2012b; Stancanelli, 2012; Honoré and de Paula, 2013). 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. 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 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 retirement plans of the U.K. and U.S. in comparison with many European countries, there is no a priori reason to assume that their findings would hold. In addition, we are interested on 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 around 16 to 18 percentage points when their husbands also stop working. We also find similar effect for men, but less precise. 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 is reduced in about 3 and 4 percentage points for early retirement and, about 6 and 3 percentage points for full retirement pensions, for men and women respectively. Therefore, by ignoring joint retirement governments would be overstating the impact of eligibility rules on retirement decisions. Finally, we also found substantial heterogeneity in the effect of eligibility for retirement pensions and joint retirement depending on policies in place concerning female early retirement ages. As we control for the potential endogeneity of spouse's retirement decisions, our empirical strategy allows us to give a causal interpretation to the effects we estimate.

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 descriptive statistics on spouse's retirement behaviors and econometric results from estimating our empirical model. Finally we conclude in section 5.

2 Data

This paper uses data from the Survey of Health Ageing and Retirement in Europe (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. SHARE 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 in Israel. The Czech Republic, Poland and Ireland joined SHARE in 2006 and only started participating during the second wave of data collection in 2006-07.

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 past 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 household and 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, jointly with the Effective age of stop working obtained from SHARE.[1] 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 8 years. In most countries, the effective age of retirement is well below the official age of receiving a full old-age pension and females are found to retire around one to two years earlier than males, especially those who are married or cohabiting with a partner.

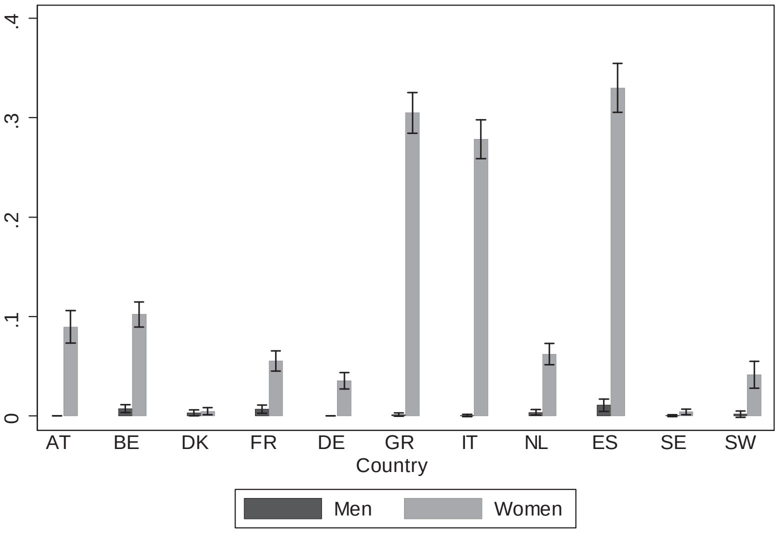
Table 1: Retirement Age.

	Males				Females			
	Early	Normal	Effective		Early	Normal	Effective	
			All	Married			All	Married
Austria	60	65	59	58	55	60	56	55
Belgium	60	65	58	58	60	65	57	56
Denmark	65	65	61	61	65	65	60	60
France	57	60	59	59	57	60	59	58
Germany	60	65	60	60	60	65	60	59
Greece	57	65	60	60	57	65	60	60
Italy	57	65	58	58	57	65	57	56
Netherlands	60	65	60	60	60	65	59	58
Spain	60	65	62	61	60	65	61	59
Sweden	61	65	63	63	61	65	62	62
Switzerland	63	65	64	63	62	64	62	62

Source: SHARE (2004, 2006/07). Effective age = weighted median age of stop working.

[1]The main source for this data was Coe and Zamarro (2011). The *official retirement ages* are referred to the law that was in place when individuals in SHARE were facing their retirement decisions. The *effective retirement age* is obtained as the weighted median age of stop working for those respondents who were working at age 50.

Figure 1: Fraction of individuals who never worked.



Notes: Sample size: Men=16,127; Women=19,150. Brackets represent 95% confidence intervals.

2.1 Sample

This paper uses data from the first two waves of SHARE (2004 and 2006/07) for the eleven countries for which we have longitudinal data available (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, and Switzerland). In particular, our analysis sample consists of couples who reported both working in wave 1 with both members aged between 50 and 69. After dropping those observations with incomplete records, our sample has 1,275 such couples.[2]

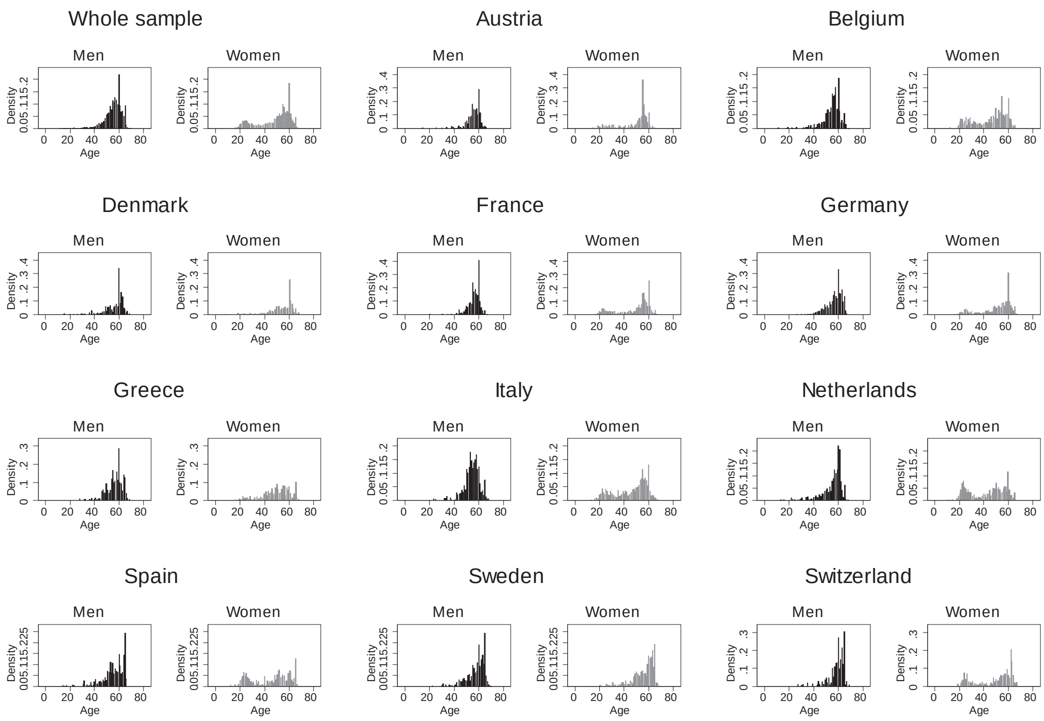
Given that our aim is to measure the causal effect of joint retirement we focus the analysis on working couples in the first wave of data and study their retirement transitions in the second wave. However, it should be stressed that, for some countries, this sample would not be representative of the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

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

Some other descriptive statistics by country and gender can be found in Table A.2. The average age of men in our sample is 58 and 56 for women. Eight percent of men and a three percent of women are over the normal retirement age, while 32 and 20 percent, respectively, are over the early retirement age. While the average age between men and women in our sample is

[2] More details on our sample selection can be found in the Appendix A.

Figure 2: Stop working age.



Note: Sample size: Men=16,080; Women=16,751.

significantly different, the percentage being out of the labor force is very similar for both males and females (16 and 15 percent). However, significant gender differences arise when we look at the proportion actually describing themselves as retired (13 percent for men and 8 percent for women). This is due to a higher percentage of women than men describe themselves as housemakers (4 percent for women and 0.5 percent for men). Given these differences, we define retired as making a transition out of work between the two waves of data. That is, we consider a respondent as having retired if she is active in the first wave and inactive in the second wave. A respondent is considered active when she describes herself as working in the paid labor force, and inactive otherwise.[3] Finally, educational attainments and health status are similar among males and females in our sample.

3 Empirical model

We aim to determine the effect of having a spouse 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 spouse $j(i)$ also transitions to retirement in the second wave of data. Then, we consider a

[3]In the empirical analysis we also use the probability of self-reported retirement status as the dependent variable and results are robust to this alternative definition.

reduced form binary choice probit model of the following form:

$$\begin{aligned} R_i &= 1\left[\left(\beta R_{j(i)} + \lambda D_i^{early} + \alpha D_i^{normal} + X_{i,j}\theta'\right) > u_i\right] \\ R_{j(i)} &= 1\left[\left(\gamma D_{j(i)}^{early} + \delta D_{j(i)}^{normal} + Z_{i,j}\phi'\right) > \epsilon_i\right] \\ (u_i, \epsilon_i) &\sim N(0, \Sigma) \end{aligned} \tag{1}$$

where $i = \{h, w\}$ stands for husbands and wives, respectively. β is our main parameter of interest, X is a vector of explanatory variables containing demographic information for both members of the couple, and $Z = \left\{X, D_i^{early}, D_i^{normal}\right\}$. 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. In particular, we assume that - conditional on observables - whether the spouse 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. The vector of explanatory variables X includes a series of controls for the individual and partner's characteristics, such as the age difference between the members of the couple, level of education and health status of each member, family composition (whether they have children and/or grandchildren), and country dummies. Under this assumption our estimates of β are interpreted as the effect of the spouse's retirement induced through eligibility for retirement pensions on the individual's retirement decision.

Our econometric approach exploits the fact 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.[4] In addition, by estimating the equations for both members of the couple jointly we also take into account the potential correlation among unobservables across partners.

[4] 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, Coe and Zamarro 2011, and Stancanelli and Van Soest 2012a, 2012b.

4 Results

4.1 Employment Rates and Joint Retirement Across SHARE Countries

Table 2 reports SHARE participation rates, defined as the employment to population ratios, for all respondents between 50 and 64 years old. We find that the average participation rate in this age group is of 49 percent, being 58 percent for males and only 41 percent for females. Italy, Austria, Belgium and Spain are in the group of European countries with lowest participation rates (or highest "unused labor capacity"). In addition, countries vary substantially in their gender differences in participation rates, ranging from a difference of 4.79 in Sweden to one of 41.84 in Greece.

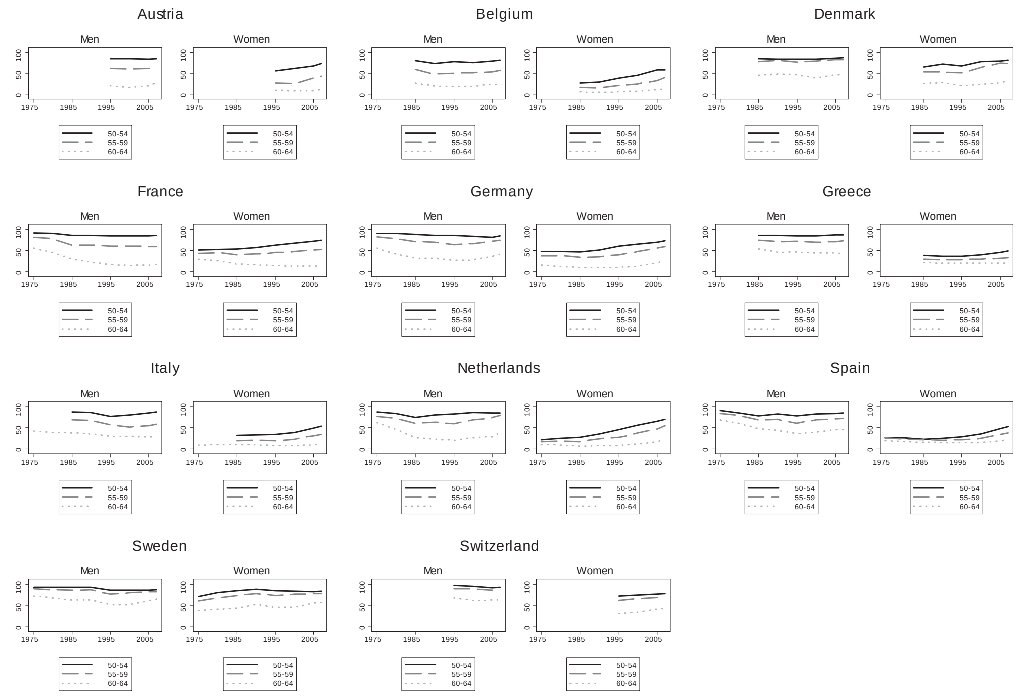
Table 2: Employment/population ratios (50-64 years).

Country	Total	Males	Females	Difference
Austria	38.77	49.40	28.56	20.84
Belgium	43.15	51.20	35.28	15.92
Denmark	64.22	69.00	59.45	9.55
France	51.07	54.67	47.70	6.97
Germany	53.95	59.71	48.33	11.38
Greece	49.23	70.99	29.15	41.84
Italy	37.04	49.62	25.30	24.32
Netherlands	52.42	62.90	41.79	21.11
Spain	44.82	60.90	29.73	31.17
Sweden	73.63	76.01	71.22	4.79
Switzerland	69.54	79.11	59.96	19.15
Total	49.23	58.19	40.65	17.54

Source: SHARE (2004, 2006/07). Weighted means.

Underlying these cross-country differences in labor participation rates of older workers are very different trends over time for males and females in these countries (see Figure 3). Participation rates for older men have fallen substantially since the 70's in most countries, but with considerable variation between countries. For instance, participation rates for men aged 55 to 59 dropped 22.7 percentage points in France in between 1975 and 2007, 11.6 in Spain and 8.1 in Germany. In contrast, labor participation rates for older women have been in the rise in all SHARE countries. However, this increase has been also much bigger in some countries than in others. For example, labor participation rates of women aged 50 to 54 increased by 48.2 percentage points in The Netherlands in between 1975 and 2007 while in Spain they only increased by 26.5 percentage points.

Figure 3: Participation rates over time.

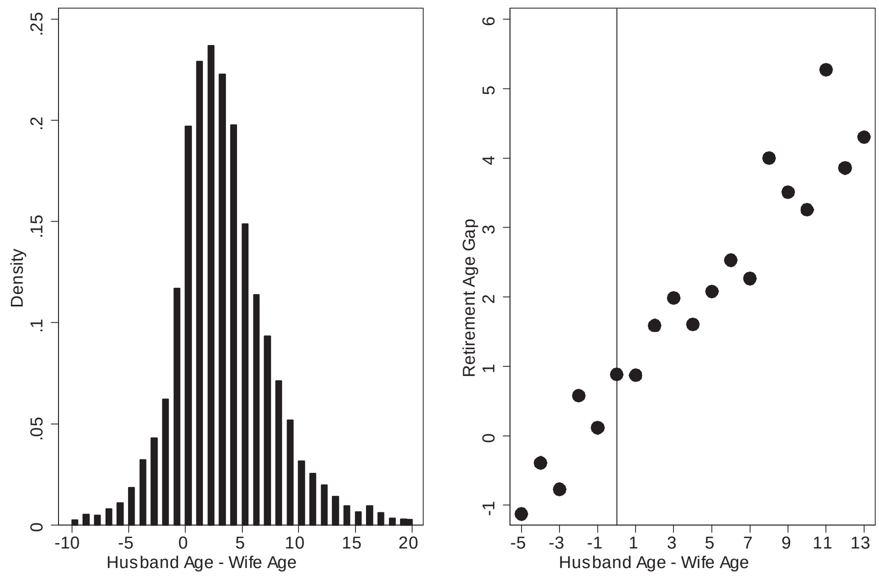


Source: OECD.

We also find descriptive evidence of *joint retirement* across SHARE countries. As mentioned before, *joint retirement* refers to the coincidence in time of spouses' retirement. Figure 4 shows the histogram of the age differences between spouses using couples from the first two waves of SHARE. The average gap between the husband's age and the wife's age is of 3 years, this difference is quite stable across SHARE countries (with the only exception of Greece, where the average differential is of 5 years). The right graph shows that, as predicted by the joint retirement hypothesis, there is a positive correlation between the within couple age gap and the difference between the age the husband stopped working and the age his wife did so.

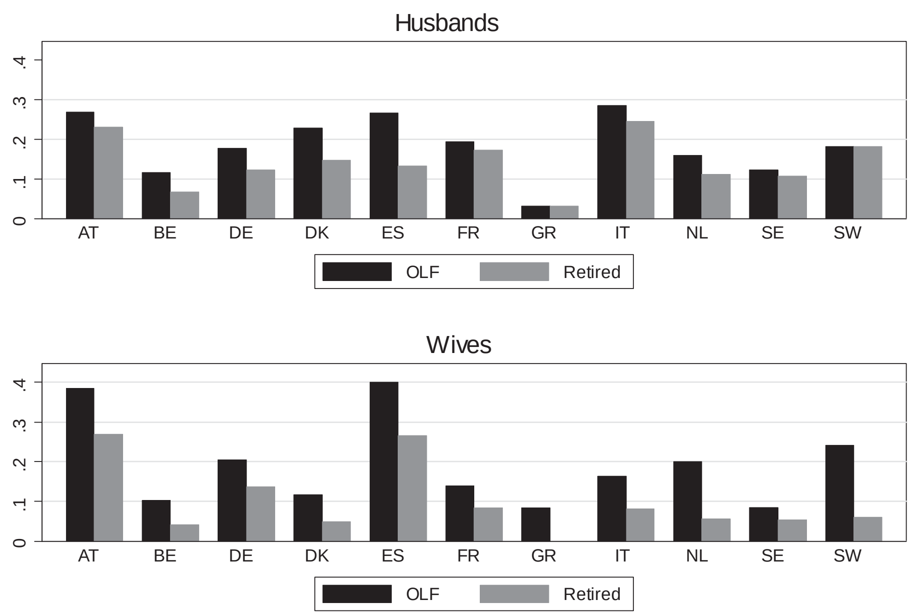
Figures 5 and 6 describe labor market and retirement patterns of couples in our sample. That is, we describe gender differences on self-reported labor market status of respondents in wave 2, conditional on having reported being in the paid labor force in wave 1. Figure 5 shows the proportion of respondents reporting not working (OLF) as well as the proportion of respondents defining their work status as retired, by gender and country. We find that even in this homogeneous sample there are remarkable differences between men and women, and across countries. Finally, figure 6 presents percentages of respondents out of the labor force in wave 2 by whether their spouse reports being also out of the labor force. We find that the fraction of workers that reports not working in wave 2 is higher, for both men and women and at every age interval, when the partner also reports being not working.

Figure 4: Age gaps between spouses.



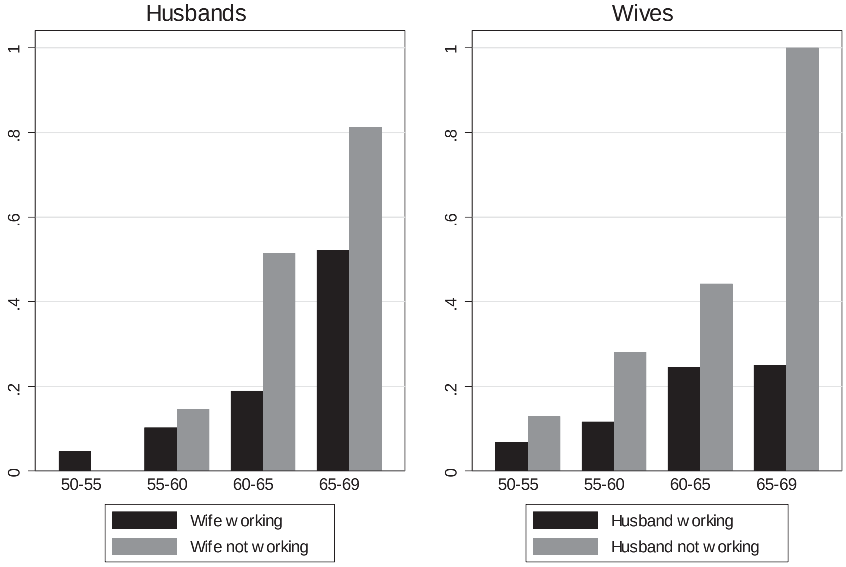
Source: SHARE (2004, 2006/07). Retirement age gap = weighted mean of differences between the age of stop working for the husband and the age of stop working for his wife.

Figure 5: Out of the labor force (OLF) and retirement rates by countries.



Notes: Wave 2. Sample size: Men=1,275; Women=1,275.

Figure 6: Out of the labor force rates by age intervals and partner's labor market status.



Notes: Wave 2. Sample size: Men=1,275; Women=1,275.

4.2 Estimation Results

In this subsection we present the results of estimating the system of equations (1). Tables 3 and 4 show marginal effects of estimates for men and women respectively of probit models for the probability of leaving the labor force (OLF) in the second wave of data, given that the respondent was working in the first wave. Each panel of the table, 1 to 4, incorporates additional controls to the analysis. In particular, Panel 1 only includes dummy variables for the respondent being eligible for retirement ages as well as a control for the age difference among the members of the couple; Panel 2 adds education variables; Panel 3 adds health status controls; and Panel 4 includes information on whether the respondent has children and grandchildren in the analysis as a measure of care necessities. Within each panel of the table we present results of models that ignore the possibility of joint retirement by excluding information on working status of the spouse, and our preferred bivariate probit models where we include this variable and instrument for it with the dummies for eligibility pensions of the spouse. In this respect, we only use eligibility for early retirement pensions to instrument for wife's work status in the models for men and both, eligibility for early and full retirement pensions to instrument for husband's work status in the models for women. This is so, because the proportion of wives above the full retirement age for men that are inactive is only nine percent and therefore, for the decision of retirement of the husband turns out to be more important if the wife becomes eligible for early retirement pensions.

Our results show that there is a significative joint retirement effect, especially for women, of around 16 to 18 percentage points. For men, we find a similar but less precise effect. 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 in about 3 and 4 percentage points for early retirement and, about 6 and 3 percentage points for full retirement pensions, for men and women respectively. Therefore, ignoring joint retirement overstates the impact of eligibility rules on retirement decisions. The remainder of the variables have the expected effects. Higher levels of education lower the probability of leaving the labor force but only for men. Bad health has a positive impact on the probability of leaving the labor force for both men and women, while the spouse having bad health has a negative effect only for women. Finally, having grandchildren increases the probability of leaving the labor force for both men and women.[5]

In order for the official retirement ages to be valid instruments, they must be exogenous and relevant. With respect to the exogeneity assumption, we make the assumption that if the husband (wife) reaches the statutory retirement age, his (her) spouse 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 the partner leaving the labor force (LF), 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 probit.[6] Our results show that eligibility for retirement pensions are a significant predictor of retirement decisions both for husbands and wives. Estimated marginal effects for these regressions can be found in the tables B.1 and B.2 of the Appendix.

In order to get a better insight of the effect of policies on pension entitlement ages on retirement behaviors of couples, we also estimate previous probit models dividing the countries in our sample in two groups. Group 1 include those countries with female early retirement ages that are below 60 (Austria, France, Greece, and Italy), while group 2 contains countries with female early retirement ages of 60 or more (Belgium, Denmark, Germany, Netherlands, Spain, Sweden, and Switzerland). The results of these regressions can be found in tables 5 and 6. An interesting result is that for those countries where the female early retirement age is below 60, for both men and women's retirement decisions it turns out to be more important whether the respondent is eligible for early retirement pensions than whether he/she reaches full retirement age. In contrast, for countries with women early retirement ages above 60 both men and women react more to eligibility for full retirement pensions. For countries in group 1 with lower early retirement ages for women, whether the wife retires has a bigger impact on the husband's retirement decision than in countries in group 2 with higher female early retirement ages. The opposite is true for women, whether the husband also retires appears to be more

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

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

Table 3: Bivariate probit (Average marginal effects): Leaving LF (MEN).

	[1]		[2]		[3]		[4]	
Partner leaving LF		0.298***		0.229***		0.186**		0.126
		(0.067)		(0.084)		(0.090)		(0.096)
Age>early	0.140***	0.084***	0.138***	0.097***	0.143***	0.110***	0.129***	0.109***
	(0.024)	(0.027)	(0.023)	(0.028)	(0.023)	(0.028)	(0.023)	(0.028)
Age>full	0.212***	0.132***	0.209***	0.155***	0.201***	0.162***	0.192***	0.171***
	(0.030)	(0.042)	(0.030)	(0.042)	(0.030)	(0.040)	(0.030)	(0.038)
Age difference	0.003	0.008**	0.003	0.007*	0.003	0.006	0.003	0.005
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
High education			-0.118***	-0.110***	-0.109***	-0.106***	-0.100***	-0.100***
			(0.031)	(0.030)	(0.031)	(0.030)	(0.031)	(0.030)
Medium edu.			-0.027	-0.033	-0.026	-0.031	-0.030	-0.033
			(0.025)	(0.024)	(0.025)	(0.024)	(0.025)	(0.024)
Partner high edu.			0.010	0.023	0.016	0.026	0.020	0.026
			(0.029)	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)
Partner med. edu.			-0.003	0.004	0.003	0.008	0.005	0.008
			(0.025)	(0.024)	(0.026)	(0.025)	(0.025)	(0.025)
Bad health					0.071***	0.076***	0.069***	0.073***
					(0.025)	(0.024)	(0.025)	(0.024)
Partner bad health					0.018	0.005	0.023	0.013
					(0.025)	(0.025)	(0.025)	(0.026)
Having children							-0.017	-0.015
							(0.019)	(0.019)
Having grandchild							0.085***	0.073***
							(0.019)	(0.021)
Log-likelihood	-926.77	-917.61	-912.87	-905.86	-903.58	-897.38	-890.70	-885.86
ρ	0.253	-0.591	0.247	-0.401	0.259	-0.262	0.247	-0.112
	(0.066)	(0.211)	(0.067)	(0.253)	(0.067)	(0.272)	(0.068)	(0.293)
LR test of $\rho = 0$	13.677	4.536	12.617	1.884	13.834	0.818	12.251	0.141
	[0.000]	[0.033]	[0.000]	[0.170]	[0.000]	[0.366]	[0.000]	[0.707]

Notes: N. obs=1,275. All specifications include country dummies. Delta-method standard errors in parentheses. Significant at *10%, ** 5%, *** 1% level. $\rho = corr(u_h, \epsilon_h)$. p-values in squared brackets.

Table 4: Bivariate probit (Average marginal effects): Leaving LF (WOMEN).

	[1]		[2]		[3]		[4]	
Partner leaving LF		0.163**		0.182**		0.157**		0.163**
		(0.081)		(0.072)		(0.074)		(0.075)
Age>early	0.190***	0.147***	0.190***	0.141***	0.190***	0.150***	0.127***	0.136***
	(0.023)	(0.035)	(0.023)	(0.033)	(0.023)	(0.032)	(0.023)	(0.032)
Age>full	0.164***	0.132***	0.163***	0.130***	0.172***	0.143***	0.197***	0.143***
	(0.045)	(0.047)	(0.045)	(0.046)	(0.044)	(0.046)	(0.029)	(0.046)
Age difference	0.007**	0.001	0.006*	0.000	0.007**	0.001	0.006*	0.000
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
High education			-0.046	-0.046	-0.039	-0.040	-0.036	-0.038
			(0.029)	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)
Medium edu.			-0.033	-0.031	-0.027	-0.026	-0.025	-0.024
			(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Partner high edu.			0.015	0.039	0.014	0.035	0.022	0.041
			(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Partner med. edu.			0.042	0.048*	0.041	0.047*	0.040	0.046*
			(0.026)	(0.025)	(0.026)	(0.025)	(0.026)	(0.025)
Bad health					0.074***	0.068***	0.077***	0.070***
					(0.024)	(0.024)	(0.024)	(0.024)
Partner bad health					-0.053*	-0.068**	-0.053*	-0.068**
					(0.030)	(0.030)	(0.030)	(0.030)
Having children							-0.009	-0.006
							(0.019)	(0.019)
Having grandchild							0.059***	0.043**
							(0.020)	(0.020)
Log-likelihood	-920.23	-913.47	-906.38	-898.88	-896.07	-888.97	-883.29	-877.29
ρ	0.273	-0.191	0.268	-0.254	0.284	-0.168	0.270	-0.209
	(0.066)	(0.244)	(0.067)	(0.220)	(0.067)	(0.226)	(0.068)	(0.231)
LR test of $\rho = 0$	15.756	0.582	14.731	1.186	16.523	0.518	14.565	0.742
	[0.000]	[0.445]	[0.000]	[0.276]	[0.000]	[0.472]	[0.000]	[0.389]

Notes: N. obs=1,275. All specifications include country dummies. Delta-method standard errors in parentheses. Significant at *10%, ** 5%, *** 1% level. $\rho = corr(u_w, \epsilon_w)$. p-values in squared brackets.

important in countries with higher female early retirement ages than in countries with lower female early retirement age. These results for countries with lower female early retirement ages are in line with those of Stancanelli (2012) who, using data from France, found that husband's retirement probability increases slightly when the wife reaches early retirement age while her retirement probability is not responsive to her husband's early retirement age.

Finally, in order to assess the robustness of our results to different specifications we also estimate models for the probability that the respondent describes himself as retired as opposed to out of the labor force. The results of these regressions can be found in the Appendix in tables B.3 and B.4. Our results are still robust to this alternative definition of the dependent variable and we find a significant joint retirement effect of similar magnitude for men, whereas for women the effect gets reduced to about half the size (notice that while the percentage being out of the labor force in our sample is very similar for both males and females, the proportion actually describing themselves as retired was significantly higher for men). Another difference with these results is that bad health and partner's 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.

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. Austria, England, Germany, Italy or Spain are currently 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 policies 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, especially for women, of around 16 to 18 percentage points. For men, we find a similar but less precise effect.

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 in about 3 and 4 percentage points for early retirement and, about 6 and 3 percentage points for full retirement pensions, for men and women respectively. Therefore, ignoring joint retirement overstates the impact of eligibility rules on retirement decisions.

Table 5: Bivariate probit (Average marginal effects): Leaving LF (MEN).

	[1]		[2]		[3]		[4]	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Partner leaving LF	0.356***	0.219**	0.282**	0.171	0.058	0.146	0.036	0.079
	(0.054)	(0.100)	(0.099)	(0.113)	(0.217)	(0.104)	(0.195)	(0.103)
Age>early	0.098**	0.072**	0.124**	0.075**	0.188***	0.085***	0.192***	0.072**
	(0.043)	(0.033)	(0.052)	(0.033)	(0.062)	(0.033)	(0.057)	(0.032)
Age>full	0.029	0.225***	0.064	0.234***	0.127*	0.229***	0.133**	0.242***
	(0.045)	(0.054)	(0.057)	(0.052)	(0.070)	(0.048)	(0.063)	(0.045)
Age difference	0.006	0.009**	0.002	0.008**	-0.005	0.008*	-0.006	0.007*
	(0.006)	(0.004)	(0.007)	(0.004)	(0.010)	(0.004)	(0.009)	(0.004)
High education			-0.136**	-0.099***	-0.163***	-0.090***	-0.165***	-0.075**
			(0.058)	(0.034)	(0.060)	(0.035)	(0.060)	(0.035)
Medium edu.			-0.058	-0.023	-0.043	-0.020	-0.042	-0.022
			(0.043)	(0.029)	(0.053)	(0.029)	(0.053)	(0.028)
Partner high edu.			0.072	0.008	0.070	0.012	0.070	0.013
			(0.056)	(0.032)	(0.064)	(0.033)	(0.064)	(0.032)
Partner med. edu.			0.052	-0.019	0.052	-0.015	0.051	-0.007
			(0.044)	(0.029)	(0.049)	(0.030)	(0.051)	(0.030)
Bad health					0.039	0.079***	0.036	0.069**
					(0.062)	(0.028)	(0.061)	(0.028)
Partner bad health					0.000	0.012	0.001	0.024
					(0.051)	(0.030)	(0.051)	(0.030)
Having children							-0.022	-0.012
							(0.037)	(0.021)
Having grandchild							0.214***	0.108***
							(0.081)	(0.024)
N. observations	340	935	340	935	340	935	340	935
Log-likelihood	-238.47	-673.61	-230.64	-666.80	-227.56	-660.24	-225.60	-645.38
ρ	-0.826	-0.375	-0.581	-0.250	0.205	-0.173	0.282	-0.022
	(0.203)	(0.280)	(0.352)	(0.322)	(0.686)	(0.303)	(0.600)	(0.315)
LR test of $\rho = 0$	3.379	1.464	1.565	0.550	0.075	0.312	0.174	0.005
	[0.066]	[0.226]	[0.211]	[0.458]	[0.784]	[0.576]	[0.676]	[0.945]

Notes: All specifications include country dummies. Delta-method standard errors in parentheses.

Significant at *10%, ** 5%, *** 1% level. $\rho = corr(u_h, \epsilon_h)$. p-values in squared brackets.

Group 1 = countries with female early retirement age below 60 (AT, FR, GR, IT);

Group 2 = countries with female early retirement age 60 or more (BE, DK, DE, NL, ES, SE, SW).

Table 6: Bivariate probit (Average marginal effects): Leaving LF (WOMEN).

	[1]		[2]		[3]		[4]	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Partner leaving LF	0.139	0.161*	0.171	0.175**	0.167	0.151*	0.176	0.172**
	(0.152)	(0.087)	(0.134)	(0.081)	(0.160)	(0.082)	(0.163)	(0.078)
Age>early	0.158***	0.143***	0.156***	0.139***	0.172***	0.146***	0.155**	0.129***
	(0.058)	(0.041)	(0.054)	(0.040)	(0.060)	(0.039)	(0.062)	(0.038)
Age>full	0.106	0.158**	0.127*	0.152**	0.146**	0.164**	0.141**	0.159**
	(0.067)	(0.066)	(0.068)	(0.065)	(0.066)	(0.064)	(0.065)	(0.064)
Age difference	0.001	0.001	0.000	0.000	0.000	0.002	-0.002	0.001
	(0.007)	(0.005)	(0.007)	(0.005)	(0.007)	(0.005)	(0.007)	(0.005)
High education			-0.089*	-0.031	-0.101*	-0.024	-0.103*	-0.020
			(0.057)	(0.033)	(0.056)	(0.034)	(0.056)	(0.035)
Medium edu.			-0.075	-0.015	-0.087*	-0.009	-0.097**	-0.004
			(0.046)	(0.030)	(0.047)	(0.030)	(0.047)	(0.030)
Partner high edu.			0.030	0.041	0.048	0.033	0.056	0.040
			(0.059)	(0.035)	(0.060)	(0.035)	(0.060)	(0.035)
Partner med. edu.			0.093**	0.030	0.117**	0.026	0.116**	0.025
			(0.046)	(0.030)	(0.047)	(0.030)	(0.046)	(0.030)
Bad health					0.087*	0.061**	0.091**	0.062**
					(0.047)	(0.028)	(0.046)	(0.028)
Partner bad health					-0.180**	-0.049	-0.171**	-0.052
					(0.078)	(0.034)	(0.078)	(0.034)
Having children							-0.029	-0.018
							(0.035)	(0.022)
Having grandchild							0.067*	0.037
							(0.037)	(0.024)
N. observations	340	935	340	935	340	935	340	935
Log-likelihood	-237.77	-669.35	-227.05	-661.62	-222.02	-654.76	-219.69	-639.83
ρ	-0.030	-0.218	-0.170	-0.257	-0.116	-0.178	-0.146	-0.274
	(0.503)	(0.253)	(0.470)	(0.236)	(0.576)	(0.240)	(0.604)	(0.230)
LR test of $\rho = 0$	0.003	0.683	0.131	1.038	0.042	0.504	0.060	1.198
	[0.952]	[0.409]	[0.717]	[0.308]	[0.837]	[0.477]	[0.806]	[0.274]

Notes: All specifications include country dummies. Delta-method standard errors in parentheses.

Significant at *10%, ** 5%, *** 1% level. $\rho = corr(u_w, \epsilon_w)$. p-values in squared brackets.

Group 1 = countries with female early retirement age below 60 (AT, FR, GR, IT);

Group 2 = countries with female early retirement age 60 or more (BE, DK, DE, NL, ES, SE, SW).

We also found substantial heterogeneity in the effect of eligibility for retirement pensions and joint retirement depending on the policies for female early retirement. In particular, by grouping countries depending on their female early retirement age, we found that eligibility for early retirement pensions seems to be a more important determinant of both men and women's retirement decisions in countries with lower female early retirement age than in countries with higher early retirement ages for women. In addition, for countries with lower early retirement ages for women, whether the wife retires has a bigger impact on the husband's retirement decision than in countries with higher female early retirement ages. The opposite is true for women, whether the husband also retires appears to be more important in countries with higher female early retirement ages than in countries with lower female early retirement age.

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 of similar magnitude for men while for women the effect gets reduced to about half the size.

As recent pension reforms that increase pension entitlement ages get established and new data are collected, it would be good to analyze how these reforms are affecting retirement patterns of men and women. In addition, future research should study whether joint retirement effects get affected once retirement ages of women get equalized to those for men.

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A Sample selection and composition

Starting point: SHARE waves 1 and 2 - merged files (Balanced panel: 37,482 observations). Filters:

1. We keep married individuals who answered their own interview as the household's reference person or as his/her spouse or partner = Sample (25,004 observations).
2. We drop couples with incomplete records = Sample (19,318 observations).
3. We select individuals aged 50-69 = Sample (9,850 observations).
4. Keep only those couples in which both were working at wave 1 = SAMPLE (1,275 couples and 2,550 observations).

Table A.1: Distribution of couples by country.

Country	No. observations
Austria	104
Belgium	292
Denmark	324
France	288
Germany	292
Greece	190
Italy	98
Netherlands	250
Spain	60
Sweden	520
Switzerland	132
Total	2,550

Table A.2: Descriptive Statistics by gender.

	[1] Men	[2] Women	Dif=[1]-[2]
Age	57.895	56.300	1.595***
	(3.751)	(3.435)	
Over Early Age	0.322	0.201	0.121***
Over Normal Age	0.085	0.032	0.052***
Out of the labor force	0.165	0.153	0.012
Declared as retired	0.127	0.076	0.051***
Housemakers	0.005	0.040	-0.035***
Bad Health	0.133	0.147	-0.013
Low Education	0.267	0.285	-0.019
Medium Education	0.386	0.357	0.029*
High Education	0.347	0.358	-0.010
Dummy of having children	0.622		
Dummy of having grandchildren	0.496		

Notes: Wave 2. Standard deviations of non-binary variables in parentheses.
Significant at the * 10%, ** 5%, and *** 1% level.

B Additional tables

Table B.1: Probit (Average marginal effects): Partner leaving LF (MEN).

	[1]	[2]	[3]	[4]
Partner age>early	0.223***	0.226***	0.235***	0.216***
	(0.047)	(0.048)	(0.048)	(0.048)
Age>early	0.046	0.044	0.038	0.035
	(0.031)	(0.031)	(0.030)	(0.030)
Age>full	0.089**	0.086**	0.087**	0.085**
	(0.047)	(0.047)	(0.047)	(0.047)
Age difference	0.000	-0.000	0.001	-0.000
	(0.004)	(0.004)	(0.004)	(0.004)
High education		0.011	0.010	0.018
		(0.031)	(0.030)	(0.031)
Medium edu.		0.039	0.038	0.036
		(0.028)	(0.027)	(0.027)
Partner high edu.		-0.041	-0.035	-0.032
		(0.027)	(0.028)	(0.028)
Partner med. edu.		-0.027	-0.021	-0.019
		(0.024)	(0.025)	(0.025)
Bad health			-0.042	-0.042
			(0.024)	(0.024)
Partner bad health			0.077***	0.080***
			(0.032)	(0.032)
Having children				-0.012
				(0.019)
Having grandchild				0.056***
				(0.020)
Pseudo R^2	0.152	0.157	0.165	0.172

Notes: N. obs=1,275. All specifications include country dummies.
Standard errors in parentheses. Significant at *10%, ** 5%, *** 1%.

Table B.2: Probit (Average marginal effects): Partner leaving LF (WOMEN).

	[1]	[2]	[3]	[4]
Partner age>early	0.122***	0.118***	0.124***	0.113***
	(0.035)	(0.034)	(0.035)	(0.034)
Partner age>full	0.304***	0.305***	0.293***	0.285***
	(0.070)	(0.071)	(0.070)	(0.070)
Age>early	0.106***	0.104***	0.106***	0.089**
	(0.042)	(0.041)	(0.041)	(0.040)
Age>full	-0.060	-0.063	-0.065	-0.061
	(0.034)	(0.031)	(0.030)	(0.030)
Age difference	0.008*	0.007*	0.007*	0.006
	(0.004)	(0.004)	(0.004)	(0.004)
High education		0.019	0.025	0.028
		(0.031)	(0.031)	(0.031)
Medium edu.		-0.002	0.005	0.006
		(0.026)	(0.026)	(0.026)
Partner high edu.		-0.112***	-0.105***	-0.097***
		(0.025)	(0.025)	(0.025)
Partner med. edu.		-0.027	-0.027	-0.030
		(0.024)	(0.024)	(0.023)
Bad health			0.018	0.024
			(0.028)	(0.028)
Partner bad health			0.085***	0.080***
			(0.034)	(0.033)
Having children				-0.018
				(0.019)
Having grandchild				0.080***
				(0.020)
Pseudo R^2	0.192	0.212	0.220	0.234

Notes: N. obs=1,275. All specifications include country dummies.
Standard errors in parentheses. Significant at *10%, ** 5%, *** 1%.

Table B.3: Bivariate probit (Average marginal effects): Retiring (MEN).

	[1]	[2]	[3]	[4]
Partner retiring	0.221***	0.213***	0.215**	0.181**
	(0.065)	(0.069)	(0.068)	(0.072)
Age>early	0.098***	0.100***	0.099***	0.092***
	(0.022)	(0.022)	(0.022)	(0.022)
Age>full	0.124***	0.123***	0.125***	0.123***
	(0.030)	(0.030)	(0.030)	(0.029)
Age difference	0.011***	0.011***	0.011***	0.011***
	(0.003)	(0.003)	(0.003)	(0.003)
High education		-0.093***	-0.094***	-0.089***
		(0.026)	(0.026)	(0.026)
Medium edu.		-0.024	-0.025	-0.027
		(0.020)	(0.020)	(0.020)
Partner high edu.		0.037	0.039	0.045*
		(0.024)	(0.024)	(0.024)
Partner med. edu.		-0.006	-0.005	-0.005
		(0.021)	(0.021)	(0.021)
Bad health			-0.046*	-0.050**
			(0.025)	(0.025)
Partner bad health			0.031	0.040*
			(0.021)	(0.021)
Having children				-0.011
				(0.016)
Having grandchild				0.077***
				(0.017)
Log-likelihood	-593.30	-582.44	-579.25	-566.91
ρ	-0.285	-0.263	-0.273	-0.162
	(0.248)	(0.269)	(0.268)	(0.287)
LR test of $\rho = 0$	1.051	0.812	0.875	0.286
	[0.305]	[0.367]	[0.349]	[0.593]

Notes: N. obs=1,275. All specifications include country dummies. Delta-method standard errors in parentheses. Significant at *10%, ** 5%, *** 1% level. $\rho = corr(u_h, \epsilon_h)$. p-values in squared brackets.

Table B.4: Bivariate probit (Average marginal effects): Retiring (WOMEN).

	[1]	[2]	[3]	[4]
Partner retiring	0.108**	0.112**	0.104**	0.088*
	(0.052)	(0.049)	(0.050)	(0.048)
Age>early	0.090***	0.092***	0.095***	0.097***
	(0.022)	(0.021)	(0.022)	(0.021)
Age>full	0.090***	0.092***	0.093***	0.094***
	(0.025)	(0.024)	(0.024)	(0.024)
Age difference	-0.007**	-0.006*	-0.006*	-0.005*
	(0.003)	(0.003)	(0.003)	(0.003)
High education		0.012	0.011	0.012
		(0.020)	(0.020)	(0.020)
Medium edu.		-0.002	-0.004	-0.005
		(0.019)	(0.018)	(0.018)
Partner high edu.		0.019	0.016	0.015
		(0.023)	(0.023)	(0.023)
Partner med. edu.		0.038**	0.038**	0.037*
		(0.019)	(0.019)	(0.019)
Bad health			-0.012	-0.010
			(0.018)	(0.018)
Partner bad health			-0.018	-0.018
			(0.021)	(0.021)
Having children				-0.012
				(0.013)
Having grandchild				0.012
				(0.015)
Log-likelihood	-585.86	-573.51	-570.89	-559.05
ρ	-0.067	-0.089	-0.038	0.046
	(0.297)	(0.284)	(0.291)	(0.287)
LR test of $\rho = 0$	0.050	0.097	0.017	0.026
	[0.823]	[0.755]	[0.897]	[0.871]

Notes: N. obs=1,275. All specifications include country dummies. Delta-method standard errors in parentheses. Significant at *10%, ** 5%, *** 1% level. $\rho = corr(u_w, \epsilon_w)$. p-values in squared brackets.

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