Network for Studies on Pensions, Aging and Retirement

NETSPAR ACADEMIC SERIES

Labor or Leisure? Labor supply of older couples and the role of full retirement age

Markus Hersche, Elias Moor

DP 03/2018-023

Labor or Leisure? Labor Supply of Older Couples and the Role of Full Retirement Age*

Markus Hersche† ETH Zurich

Elias Moor‡ ETH Zurich

March 16, 2018

Abstract

This paper estimates the labor supply response when the spouse reaches full retirement age (FRA). We exploit the age difference within couples and changes in pension legislation in Switzerland to identify the causal effect. In contrast to the majority of previous contributions, we do not only estimate the effect on labor market participation (*extensive margin*), but also estimate the effect on the hours decision (*intensive margin*). We find that the labor force participation rate of women drops by around 3 percentage points in response to the spouse reaching full retirement age. We find no evidence that men adjust their labor force participation rate when their wife reaches FRA. At the intensive margin, we find only small and non-significant effects for both men and women. We argue that the response can be explained by *complementarity in leisure* and *liquidity* effects.

JEL Classification: H55, J14, J26, D13

Keywords: Full Retirement Age, Retirement Decision, Joint Labor Supply

*We are particularly thankful to Antoine Bommier, Hans Bloemen, Elena Stancanelli, Michael Siegenthaler and Michael Haliassos, as well as seminar participants of IRME, conference participants of ESPE meeting 2017 in Glasgow, SSES meeting 2017 in Lausanne and Netspar International Pension Workshop 2018 in Leiden for their comments. We gratefully acknowledge financial support from Swiss Re Foundation and ETH Zurich Foundation.

†Markus Hersche, Chair of Integrative Risk Management and Economics at ETH Zurich. E-mail: mhersche@ethz.ch.

‡Elias Moor, Chair of Integrative Risk Management and Economics at ETH Zurich. E-mail: emoor@ethz.ch.

1 Introduction

Declining fertility rates and increasing life expectancy force many developed countries to reform their pension systems. Designing policy reforms requires a detailed understanding of the labor supply behavior of older workers. For this reason, a large body of literature has estimated labor supply responses of individuals directly affected by pension reforms (*direct effect*), see e.g. Börsch-Supan & Schnabel (1999) or Mastrobuoni (2009).

The approach focusing on the direct effect abstracts from the fact that a large share of older workers is married.[1] Several studies find that older couples coordinate their exit from the labor force, see e.g. Gustman & Steinmeier (2004) or Hospido & Zamarro (2014). As a result, changes in incentives of one member of the couple may have spillover effects on labor supply of the spouse (*indirect effect*). In contrast to the evidence on the *direct effect*, existing studies on *indirect effects* find ambiguous effects depending on country and reform.

Previous studies examine the *indirect effect* on the participation decision (*extensive margin*).[2] Changes at the *extensive margin*, however, do not fully capture the change in total labor supply. Individuals may adjust their working hours to change their labor supply (*intensive margin*). The prevalence of gradual retirement indicates that older workers use working hours to adjust their labor supply, see Kantarci & Van Soest (2008) for a summary on evidence in Europe and the US.

In this paper, we estimate the effect of having a spouse at or above the full first pillar retirement age (FRA) on labor supply at *extensive margin* and *intensive margin* in Switzerland. FRA represents the age at which first pillar pensions can be claimed without deductions. The full retirement age is of interest in two ways. First, full retirement age in the first pillar represents the main policy instrument for the government. Knowing the spousal reaction will provide information on spillover effects of future pension reforms. Second, changes in hours and hazard rates of retirement peak at FRA. Therefore, the estimate on spousal labor supply reaction will be informative on the relationship between spousal retirement and own labor supply.

We find that the labor force participation rates of women drop by about 3 percentage points in response to the spouse reaching full retirement age. In contrast, men do not react at the extensive margin. At the intensive margin, we find only small and non-significant effects for both men and women. We argue that the response can be explained by *complementarity in leisure* and *liquidity* effects. For women, the absence of an intensive margin reaction can be explained by the presence of fixed costs of work.

We use two sources of variation to identify the effect. First, we exploit variation in age difference within couples. Second, we use a pension reform which increased the FRA of women in two steps from 62 to 64. In our analysis, the treatment group consists of individuals with a spouse who has reached FRA. The control group consists of individuals whose spouse has not yet reached FRA. The key identifying assumption of our approach is that after controlling for observables, a difference in labor supply arises from the variation whether the spouse has reached FRA.[3]

[1] According to Census data from the Swiss Federal Office for Statistics, 75% of men aged between 55 and 70 and 64% of women in Switzerland were married in 2010.

[2] An exception is Stancanelli (2017). Using survey data from France, she showed that working hours decrease upon spouse's retirement.

[3] For example, we compare the labor supply of a 61-year old woman with a husband aged 64 (FRA not reached) to

At the extensive margin, we compare the labor force participaton rate of individuals whose spouse has reached FRA to individuals whose spouse has not yet reached FRA. At the intensive margin, a simple treatment and control comparison of individuals with positive working hours does not provide a causal estimate for the intensive margin effect.[4] We employ a first-difference estimator on positive hours to resolve the potential selection problem.

The analysis is based on data drawn from the Swiss Labor Force Survey for the time period 1991 to 2009. In comparison to administrative Social Security data sets, this data set offers information on working hours. Furthermore, it includes rich information on labor supply and a large set of sociodemographic variables of the interviewed individual and the spouse. In this survey, individuals are interviewed in up to five consecutive years. We exploit the panel structure of the survey to estimate the effect at the intensive margin.

This paper relates to the literature on labor supply of older couples pioneered by Hurd (1990), Zweimüller et al. (1996) and Blau (1998). In this literature, two effects are studied. First, the literature studies the effect of spouse B retiring on the labor supply of spouse A. Second, the effect of spouse B reaching FRA on the labor supply of spouse A is studied. In this paper, we contribute to the latter literature.

This study is closely related to recent contributions from Cribb et al. (2013), Selin (2017), Stancanelli (2017) and Lalive & Parrotta (2017). These contributions use social security reforms or pension legislation to identify the causal effect of spouse reaching FRA. Using pension legislation and a reform, Stancanelli (2017) finds that the probability to retire for men increases when their wife reaches early retirement age. On the contrary, she finds no evidence that women react when their spouse reaches the early retirement age. Cribb et al. (2013) analyse the spillover effects of a increase in female FRA in England. They find positive spillover effects on the labor supply of men. Lalive & Parrotta (2017) use Swiss Census data from 1990 and 2000 to estimate the effect of the spouse reaching FRA. They find that labor supply of women drops by 3 percentage points whereas the labor supply of men did not change. Selin (2017) exploits an occupational pension reform in Sweden which primarily affected female workers. He finds no evidence for a response of males married to affected women.

In contrast to contributions from Cribb et al. (2013), Selin (2017) and Lalive & Parrotta (2017), we additionally investigate the causal effect of the spouse reaching FRA on hours worked. In this respect, our paper is related to Stancanelli (2017).

The remainder of this paper is organized as follows. Section 2 describes financial incentives of older couples in Switzerland. In section 3, we describe mechanisms that can explain the labor supply reaction when the spouse reaches FRA. Sections 4 and 5 describe the data and general labor supply patterns. In section 6, we present our empirical approach. Results are presented in section 7 and discussed in section 8. The last section concludes.

a 61-year old woman with a husband aged 65 (FRA reached).

[4] Comparing the positive hours of the treatment group to the positive hours of the control group involves a comparison of two possibly different groups: the group with positive hours under treatment and the group with positive hours under no treatment. The two groups will be different if some individuals are induced to switch from zero to positive hours because of treatment or vice versa.

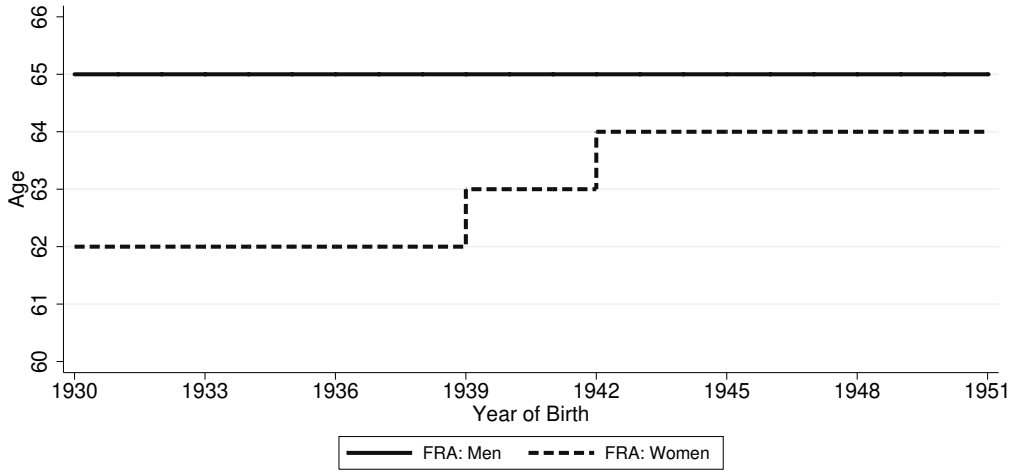
2 Incentives of Older Couples in Switzerland

In this section, we describe the financial incentives faced by older workers in Switzerland. In particular, we focus on the description of incentives for older married couples.

2.1 Pension System

The Swiss pension system consists of three pillars. The old age and survivor insurance (OASI) represents the first pillar. It is a pay-as-you-go insurance with a strong redistributive motive. OASI is financed by payroll taxes and government transfers. Its main purpose is to cover basic living costs. Individual pension entitlements are a function of contribution years and average earnings.[5] Individuals who contributed each year from age 20 to full retirement age (FRA) are entitled to a full pension. The FRA is defined as the age at which a first pillar pension can be claimed without deductions. For each missing contribution year, benefits are reduced by at least 2.3%. Depending on average earnings, the monthly full pension in 2005 ranged from a minimum of 1'055 CHF to a maximum of 2'110 CHF.[6] The sum of the two individual pensions within a couple is capped at 150% of a maximum individual pension. Furthermore, it is not possible to borrow against future first pillar entitlements.

Figure 1: Full retirement age of men and women by cohort.



Individuals reaching FRA can claim pensions and continue working. For pensions from the first pillar, there is no earnings test. In addition, workers are able to postpone claiming pensions from the first pillar. The pension increases from 5.2% for a one year delay to 31.5% for a five year delay. Individuals working past FRA continue paying payroll taxes with an allowance of 16'800 CHF. These contributions do not increase future pension entitlements.

From 1991 to 2009, the OASI was reformed once in 1997. Most prominently, the full retirement age for women was increased in two steps from 62 to 64. Furthermore, the possibility to claim early retirement benefits from the first pillar was introduced. Figure 1 depicts the evolution of the FRA for men and women by year of birth.

The second pillar is an occupational pension scheme. The objective is to ensure the continuation of the living standard held prior to retirement. Contributions to the occupational pension system are

[5] Average earnings depend on the lifetime earnings as well as on educational and care credits.
[6] As a comparison, the monthly median labor income in Switzerland amounted to 5'250 CHF (2005).

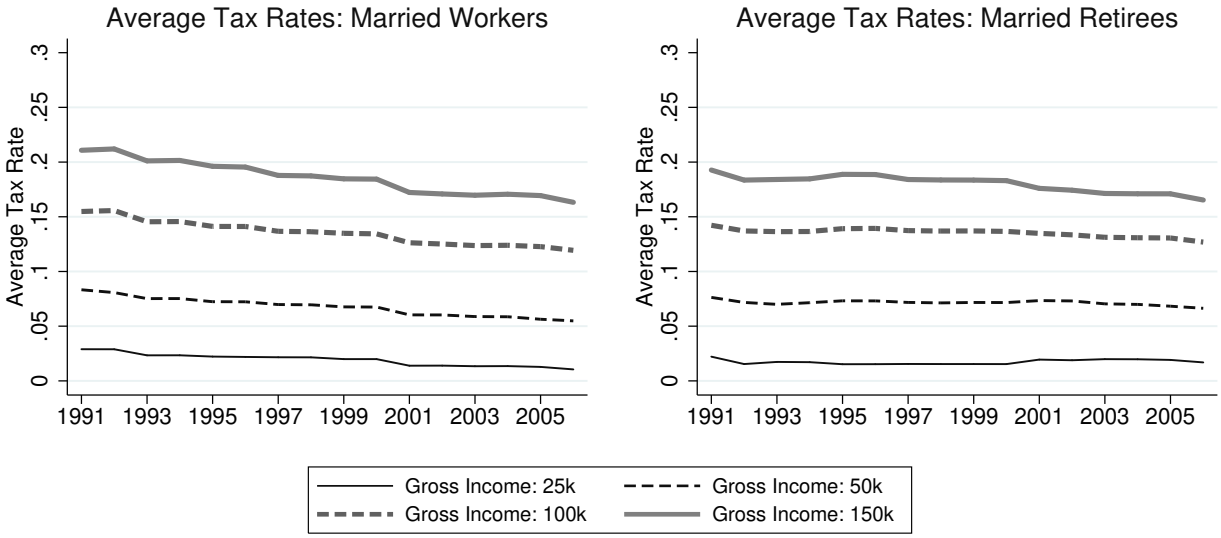
age-dependent and compulsory for wage employed above a given threshold.[7]

In general, the FRA of occupational pension schemes coincides with the FRA of the first pillar.[8] However, pension funds are free to set more generous regulations. Upon reaching the regulated retirement age, the retiree can choose between a lifelong monthly annuity, a lump-sum transfer of the accumulated capital, or a combination of both. The share of married men insured in the second pillar amounts to around 70%. In contrast, around 40% of women are insured in the second pillar.[9] This can be explained by the fact that women have lower labor force participation rates and are more likely to work part-time. The third pillar consists of voluntary, tax favoured savings.

2.2 Income Taxes

In contrast to the majority of OECD countries, Switzerland has a system where income of married couples is taxed based on the concept of family taxation. Income from both partners are aggregated and taxed as a single unit. Tax rates for unmarried individuals and married couples are different. Income is taxed at community, cantonal and federal level. Cantons are responsible for the collection of income and wealth taxes at community, cantonal and federal level. Cantons have fiscal sovereignty. Therefore, they are free to set the tax rates and establish deductions. The federal tax rates are determined by the federal state.

Figure 2: Average tax rates of married couples by gross labor income



Note: Average combined tax rates (federal, cantonal, community level) in cantonal capitals by year and gross labor/pension income for a married couple. Standard deductions without verification requirements for wage earners are applied. For retirees, standard deductions without verification requirements for the case where both individuals have reached FRA are applied. Data source: Own calculations, tax rates from Federal Tax Administration.

The income tax schedule in Switzerland is progressive by law. Gross labor income is subject to a set of deductions. The upper left graph in figure 2 displays the average tax rates for a given *gross*

[7] Only the amount exceeding the threshold is insured. Threshold 1991: yearly earnings 19'200 CHF, 2009: yearly earnings 20'520 CHF.

[8] The FRA of occupational pension schemes is the age at which occupational pensions can be claimed without deductions.

[9] See figure 12 in appendix C.

labor income before social security deductions for the time period 1991-2006. The average tax rates slightly decreased for all income brackets in the time period under consideration. Pension income is not exempted from income taxation. First, second and third pillar pensions are in general taxed at the same rate as labor income. Similar to labor income, retirees receive a set of tax deductions.

The upper right graph in figure 2 displays the average tax rates for a given *gross pension income*.[10] The average tax rates for retirees decreased moderately in the time period under consideration. The differences between the average tax rates, however, are small. In 2007, the Federal tax administration changed the methodology to compute the tax rates for retirees. Therefore, we do not report tax rates after 2007.

Occupational pension funds in Switzerland aim at a replacement rate of 50-60%. Combined with pension income from first and third pillar, this results in a total replacement rate of 70-80%, see Bütler (2009) for a discussion. Therefore, tax rates in general decrease when an individual reaches FRA.

3 Mechanisms

Table 1 presents a non exclusive list of mechanisms explaining a change in labor supply of individual A when spouse B reaches FRA. The labor supply reaction of A depends on whether the spouse B reduces labor supply when reaching FRA. Therefore, we divide the analysis into two parts: the case in which B reduces labor supply (left column), and the case in which B does not reduce labor supply (right column). The latter case includes the situation where B retired before FRA. Furthermore, it includes the case where B continues working without changing working hours. Although B does not reduce labor supply, reaching FRA allows to claim a full pension. The resulting change in income can have an impact on A's labor supply.

Table 1: Mechanisms and expected sign for labor supply reaction to spouse reaching FRA.

Mechanism	Expected sign change labor supply individual A when spouse B reaches FRA and ...	
	B reduces labor supply	B does not reduce labor supply
1. Complementarity in leisure	Negative	Zero
2. Liquidity Effect	Positive	Negative
3. Joint Taxation	Positive	Negative
4. Housework	Positive	Zero

First, we expect couples to enjoy leisure more when spent together. Previous studies have shown that *complementarities in leisure* are a strong driver of labor market decisions within older couples, see e.g. Coile (2004) or Banks et al. (2010). Therefore, if B reduces labor supply, *complementarities in leisure* lead ceteris paribus (c.p.) to a decrease in labor supply of individual A. If B does not reduce labor supply, the expected effect is zero.

[10] Before social security deductions.

Second, *liquidity effects* can occur as soon as the spouse B reaches FRA and claims a pension.[11] In case B reaches FRA, claims a pension, and reduces labor supply, there is a drop in household income since replacement rates are below 1.[12] Hence A c.p. increases labor supply to compensate the loss in household income. In case B reaches FRA and claims a pension, but does not reduce labor supply, the pension will c.p. increase household income. Hence A c.p. decreases labor supply.

Third, due to the system of progressive *joint taxation*, the marginal tax rate of A increases (decreases) if total household income increases (decreases). Evidence from other countries suggest that labor supply of older workers increases with decreasing tax rates (Alpert & Powell, 2014; Laun, 2017). If B reduces labor supply, household income c.p. decreases (see footnote 12). This decrease leads to a lower marginal tax rate for individual A and therefore to an expected increase in labor supply. If B does not reduce labor supply but claims a pension, the household income increases. Therefore, the marginal tax rate for A increases and we expect a negative effect on the labor supply of individual A.

Fourth, there is evidence that retirement increases hours of *housework* (Stancanelli & Van Soest, 2012; Ciani, 2016). If individual B reduces labor supply and increases housework, individual A may decrease housework. In this case, individual A may be willing to increase labor supply. If B does not reduce labor supply, we expect no effect on labor supply of individual A.

4 Data

For the analysis, we use data drawn from the Swiss Labor Force Survey (SLFS)[13] for the time period 1991-2009. The Swiss Labor Force Survey is a rotating yearly panel of individuals above age 15. Individuals were interviewed up to five times on a voluntary basis. For the sample of individuals aged 58 to 70, 30 % have participated in one interview, 19% in two interviews, 14% in three interviews, 9% in four interviews, and 27% in five interviews. In the time period under consideration, the Swiss-representative survey was carried out by telephone in the second quarter (April-June) each year. The number of observations aged 58-70 increased from 2'230 in 1991 to 8'825 in 2009.

The survey provides extensive information on sociodemographic variables, labor supply status, earnings and household income of the respondent. The survey provides a variable for the year of birth, but not the birth date. The spouse of the respondent is not directly interviewed. The respondent provides answers to questions on labor supply behavior and age of the spouse. There is information on age of the spouse, but not on the year of birth. We impute the year of birth using year of the interview and age of the spouse.[14] There is sparse information on health of the respondent and no information on health of the spouse.

[11] According to AVS statistics, the fraction not claiming a first pillar pension at FRA was less than 1% (2009). We neglect this possibility in the discussion of mechanisms.

[12] For both liquidity and tax mechanism, we assume a reduction in labor income is not fully replaced by pension income. Therefore we exclude the case that household income increases when labor supply decreases.

[13] In German: Schweizerische Arbeitskräfteerhebung (SAKE).

[14] Given year of interview and age, the exact year of birth of the spouse is not identified (only a range of two years is identified). Since treatment classification is based on year of birth, there are spouses in the sample for which we are not able to identify whether they have reached FRA or not. For example, a female spouse observed in 2000 with age 61 could have year of birth 1939 (FRA 63) or 1938 (FRA 62), depending on whether the birthday is before or after the day of the interview. Mastrobuoni (2009) and Barrett & Atalay (2015) dealt with this issue by assuming that the quarter of birth is uniformly distributed and thus weighted the observations with uncertain classification. In contrast to their approach, we decided to drop these observations to minimize false classification of treatment status.

For working individuals, the Swiss Labor Force Survey provides a set of variables describing the amount of time spent at work. The set includes usual hours, contracted hours and actual hours in the previous week. In this paper, we use contractually agreed working hours per week as a measure of labor supply for wage employed. The underlying survey question is: "How many hours do you work according to your written or verbal contract per week?".[15] For self-employed, our measure of labor supply is usual working hours. The underlying survey question is: "How many hours do you usually work per week?".[16] For teachers, the underlying survey question is: "How many hours do you usually teach per week?".[17] In the sensitivity analysis, we check whether the results differ when using actual working hours in the previous week as an alternative measure for labor supply.

Based on a set of questions, the SLFS classifies each respondent as being either employed, apprentice, unemployed, or non-participating. The group of non-participants includes disabled individuals, retirees and others. Non-participants are not asked about their working hours. We set hours of unemployed and non-participants to zero.

In order to examine possible labor market frictions, we use *desired hours* as measure of *desired labor supply*. The underlying question is: "How many hours per week would you like to work?".[18] Additionally, we use variables on the amount of housework to estimate the effect of retirement on home production. Last, we use data from the Swiss State Secretariat for Economic Affairs on aggregate GDP growth rates and aggregate unemployment rates.

[15] German: "Wieviele Stunden pro Woche schaffen Sie gemäss mündlichem oder schriftlichem Arbeitsvertrag?". The corresponding SLFS variable is EK01.

[16] German: "Wieviele Stunden schaffen Sie normalerweise pro Woche?". The corresponding SLFS variable is EK01.

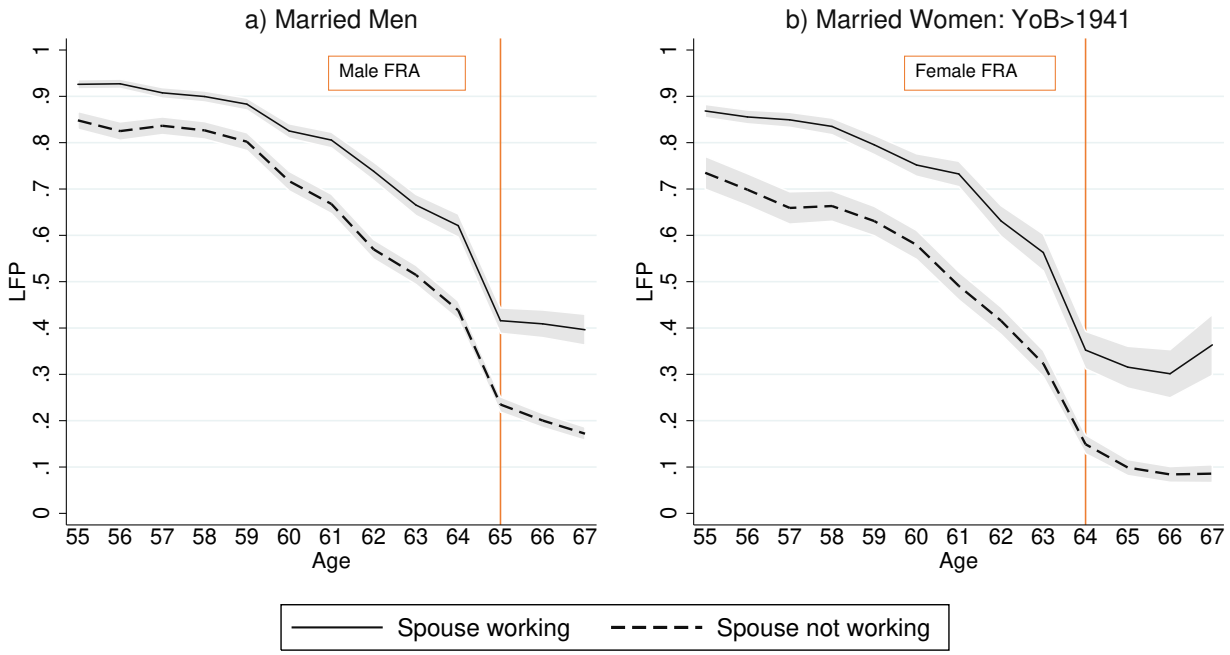
[17] German: "Wieviele Schulstunden pro Woche unterrichten Sie normalerweise?". The corresponding SLFS variable is EK17.

[18] German: Wieviele Stunden in der Woche würden Sie gerne schaffen? The corresponding SLFS variable is EK07. In contrast to similar surveys in other countries, individuals are not asked to assume a constant hourly wage rate when answering the question for desired hours.

5 Labor Supply Patterns

Before presenting the causal analysis, we examine the labor force patterns of older married individuals in Switzerland. Figure 3 displays the labor force participation rates by age and labor market status of the spouse for the time period 1991-2012.[19]

Figure 3: Labor force participation rates by labor market status of the spouse



Note: Estimated labor force participation rates (LFP) by age and labor market status of the spouse. Average values for period 1991-2012. Single and widowed individuals excluded. For women, only cohorts born after 1941 (FRA 64) are considered. Shaded grey area represents the 95% confidence interval for the mean estimate. Data source: Own calculations based on SLFS data, FSO.

As shown in figure 3a, labor force participation rates of married men with a working spouse are between 5 and 25 percentage points higher than the rates of men with a non-working spouse. The difference in participation rates between the two groups increases with age. Furthermore, male participation rates remain high at above 80% until the age of 60.

Female labor force participation rates are shown in 3b. Again, the labor force participation rates are substantially higher for women with a working spouse than for women with a non-working spouse. In contrast to men, female labor force participation rates start to drop before the age of 60.

Figure 4 displays the average weekly hours worked by individuals participating in the labor market. For men, average hours worked per week are around 40 before reaching FRA. In Switzerland, working 40 hours corresponds to a full-time employment.[20] There is a drop in hours worked at the FRA. Men with a wife being out of the labor market work on average fewer hours at all ages. The difference is increasing with age.

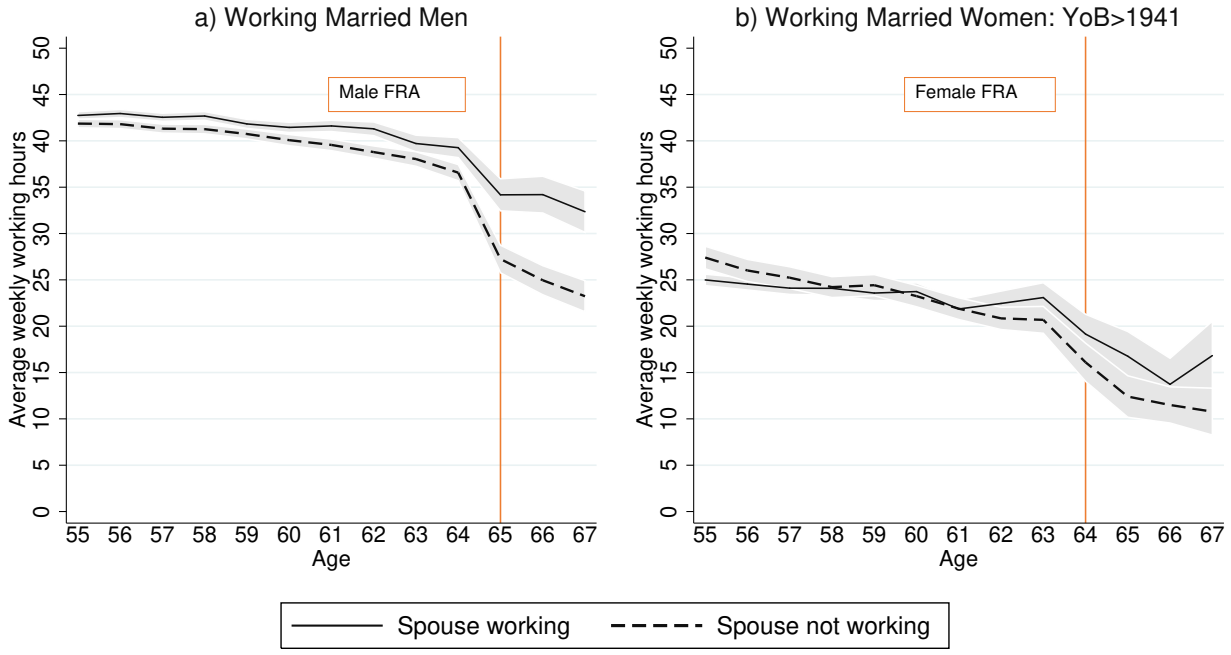
Until age 57, women having a working husband work on average fewer hours than women with a

[19] Unlike our estimation samples (1991-2009), we use data until 2012 to have a larger sample size for working individuals past FRA. The pattern is very similar for the time period 1991-2009.

[20] The legal maximum weekly working time in Switzerland is set at 45 hours fo industrial workers, administrative and commercial jobs, technical, sales assistants. All other sectors have a maximum of 50 hours. Working time regulation did not change in the period under consideration (1991-2009).

non-working husband. Between age 58 and 61, there is no difference in working hours. Beyond 62, women with a working husband work on average more hours than women with a nonworking husband. Since the confidence intervals for the mean estimate are mostly overlapping, the differences should be interpreted with caution.

Figure 4: Average weekly working hours (only workers) by labor market status of the spouse



Note: Estimated average weekly working hours conditional on positive hours by age and labor market status of the spouse. Contracted hours for wage employed and usual hours for self-employed are used. Average values for period 1991-2009. Single and widowed individuals excluded. For women, only cohorts born after 1941 (FRA 64) are considered. Shaded grey area represents the 95% confidence interval for the mean estimate. Data source: Own calculations based on SLFS data, FSO.

6 Empirical Approach

We estimate the causal effect of having a spouse B at or above FRA (treatment) on the labor supply of individual A. The total labor supply effect induced by having a spouse at or above FRA can be decomposed into 1) the average change in working hours of those working irrespective of treatment, plus 2) the average hours worked of those working in case of treatment and not working in case of no treatment, minus 3) the average hours worked of those not working in case of treatment and working in case of no treatment.[21]

We are interested in two causal effects. First, the causal effect of treatment on the probability of working (extensive margin).[22] Second, the causal effect of treatment on working hours of individuals having positive hours irrespective of treatment, i.e. individuals working irrespective whether their spouse has reached FRA or not (intensive margin).

6.1 Extensive Margin

Let h_{it} denote weekly working hours of individual i in interview year t. We estimate the extensive margin effect using a probit model of the form

$$P(h_{it} > 0 | T_{it}, \mathbf{X_{it}}) = \mathbf{\Phi}(\beta_0 + \beta_1 T_{it} + \mathbf{X_{it}} \boldsymbol{\beta_2}) \tag{6.1}$$

where the treatment T_{it} is defined as

$$T_{it} = \begin{cases} 1 & \text{if the spouse of individual i is at or above FRA in period t} \\ 0 & \text{otherwise} \end{cases}$$

where $\Phi(\cdot)$ denotes the cumulative normal distribution. The matrix of controls $\mathbf{X}$ includes dummies for age, education, whether the respondent is a Swiss citizen, and whether the household size is larger than two. Furthermore, $\mathbf{X}$ includes age of the spouse, age of the spouse squared, the log of GDP and the unemployment rate.

We are interested in the average partial effect of T_{it}, which measures the causal effect of having a spouse at or above the full retirement age on the probability of working. Our identifying assumption is that after controlling for potential confounders $\mathbf{X}$, respondents whose spouse has not yet reached FRA (non-treated) do not differ from respondents whose spouse has reached FRA (treated) with respect to the distribution of unobservables. Therefore, remaining differences in labor supply participation rates between the treated and the non-treated can be attributed to having a spouse at or above the full retirement age.

A threat to our identification strategy are unobserved confounders correlated with whether spouse B has reached FRA and labor supply of individual A. Potential unobserved confounders include

[21] The formal decomposition is based on the joint distribution of potential outcomes (Staub, 2014), and given by: $ATE = E(h_i^1 - h_i^0) = E(h_i^1 - h_i^0 | h_i^1 > 0, h_i^0 > 0)P(h_i^1 > 0, h_i^0 > 0) + E(h_i^1 | h_i^1 > 0, h_i^0 = 0)P(h_i^1 > 0, h_i^0 = 0) + E(-h_i^0 | h_i^1 = 0, h_i^0 > 0)P(h_i^1 = 0, h_i^0 > 0)$, where h_i^1 denotes the potential outcome in case of treatment and h_i^0 the outcome in case of no treatment.

[22] The difference in probabilities $P(h_i^1 > 0) - P(h_i^0 > 0)$ corresponds to the difference in the group fractions $P(h_i^1 > 0, h_i^0 = 0) - P(h_i^1 = 0, h_i^0 > 0)$ outlined in footnote 21, since $P(h_i^1 > 0, h_i^0 = 0) - P(h_i^1 = 0, h_i^0 > 0) = \{P(h_i^1 > 0, h_i^0 = 0) + P(h_i^1 > 0, h_i^0 > 0)\} - \{P(h_i^1 = 0, h_i^0 > 0) + P(h_i^1 > 0, h_i^0 > 0)\} = P(h_i^1 > 0) - P(h_i^0 > 0)$.

health of spouse B, birth of grand children and unobserved preferences. The health of spouse B potentially affects the decision whether and how much individual A works. Moreover, health status of spouse B is associated with age of spouse B, and therefore also with whether the spouse has reached FRA. On average, the older a spouse is, the lower is the health status. We control for age of the spouse with a linear and a quadratic term. If this approximation is not sufficient to capture the effect of spousal health, this poses a threat to our identification strategy. If however reaching FRA affects health of spouse B directly, we would not want to control for health of spouse B. This case is part of the causal effect we want to measure. The case of birth of grandchildren is very similar. Grandchildren potentially affect the decision whether and how much individual A works. Furthermore, having grandchildren is associated with age of spouse B, and therefore also with whether the spouse has reached FRA. On average, the older a spouse is, the older are the children. The older the children, the more likely are the children to have children themselves. Again, we assume that controlling for age of individual A using dummies and age of spouse B with a linear and a quadratic term is sufficient to capture unobserved effects from grandchildren. Lastly, characteristics and preferences of individual A affecting labor supply of A may also be associated to age of spouse B, see e.g. Bloemen & Stancanelli (2015). For example, individuals with preferences for a younger spouse could be willing to work more or work longer.

6.2 Intensive Margin

At the intensive margin, we are interested in the causal effect of treatment on working hours of individuals working irrespective of whether their spouse has reached FRA or not. In general, comparison of labor supply of treated and non treated conditional on positive hours does not provide an unbiased estimate for the causal intensive margin effect (Angrist, 2001; Staub, 2014). The reason is that the sample of working individuals includes two different groups. Individuals who have positive hours irrespective of treatment (the group of interest) and individuals who have positive hours only because they are treated, and would leave the labor market if they were not treated.[23]

To deal with the selection issue, we apply a first difference estimator on positive outcomes . We estimate the following linear regression

$$\Delta h_{it} = \gamma_1 \Delta \mathrm{T}_{it} + \Delta \mathbf{X_{it}} \boldsymbol{\gamma_2} + \nu_{it} \qquad \text{for } h_{it} > 0, h_{it-1} > 0, \tag{6.2}$$

where $\Delta z_{it} = z_{it} - z_{i,t-1}$ for $z \in \{h_{it}, T_{it}, \mathbf{X}_{it}\}$, and treatment T_{it} is defined as

$$T_{it} = \begin{cases} 1 & \text{if the spouse of individual i is at or above FRA in period t} \\ 0 & \text{otherwise} \end{cases}$$

We are interested in γ_1, the causal intensive margin effect. The coefficient γ_1 captures the effect of having a spouse B at or above FRA on labor supply of individual A. The matrix of controls $\mathbf{X}$ includes dummies for age and whether the household size is larger than two. Furthermore, $\mathbf{X}$ includes

[23] The simple comparison of positive outcomes is unbiased in two cases. First, if individuals leaving the labor market due to treatment have the same distribution of working hours as the individuals working irrespective of treatment. Second, if there is no extensive margin reaction, i.e. there are no individuals who have positive hours only because they are treated, and would leave the labor market if they were not treated.

age of the spouse, age of the spouse squared, the log of GDP and the unemployment rate. Time constant dummies such as education and being a Swiss citizen are excluded.

Under assumptions stated below, we show in an accompanying note that the first difference estimator on positive outcomes (6.2) identifies the causal effect at the intensive margin.[24]

1. Common trend in positive outcomes: We assume that individuals in the treatment group would experience the same change in hours as the control group from $t-1$ to t in the absence of treatment. The credibility of the common trend assumption can be examined in the data using pretreatment observations. We compare the change in hours from the penultimate $(t-2)$ to the previous period $(t-1)$ for the treatment group (spouse reaches FRA in period t) and the non-treatment group (spouse does not reach FRA in period t). We find no evidence for a difference in hours trends between the two groups, see table 5 in appendix A.

2. Treatment monotonicity at the extensive margin: Given an individual works in case the spouse has reached FRA, we assume the individual also works in case the spouse has not yet reached FRA. This assumption excludes the possibility that individuals work when their spouse has reached FRA and do not work when their spouse has not yet reached FRA. It is important to note that we do not assume monotonicity with respect to the hours worked, but only with respect to the participation decision.

3. Negative time monotonicity at the extensive margin: We assume that having positive hours in period t also implies having positive hours in $t-1$. In our case, this assumption excludes unretirement, a return to the labor market after a period of non activity. In our estimation sample, we find that 9.1% of men and 8.1% of women who work in period t were retired in $t-1$. These individuals are excluded from the analysis since we condition on having positive outcomes in both periods.

4. No anticipation: We assume that having a spouse who reaches FRA in period t does not affect the respondents labor supply in period $t-1$. If this assumption is violated, it is likely that individuals adjusted their labor supply in the same direction in $t-1$. In this case, the estimated causal effect is biased downwards in absolute terms and would therefore represent a lower bound of the true causal effect (again in absolute terms).

Table 6.2 presents the summary statistics for the sample used to estimate the extensive margin effect (left panel) as well as the sample used to estimate the intensive margin effect (right panel).

The differences between the means of treatment and control group are largest for *age* and *age spouse*. For differences in *age* we control using age dummies. For differences in *age spouse* we control using a linear and a quadratic term of age of the spouse.

[24] See Hersche & Moor (2018).

Table 2: Summary Statistics

	Extensive Margin Sample				Intensive Margin Sample			
	Men		Women		Men		Women	
	Treatment Mean / SD	Control Mean / SD	Treatment Mean / SD	Control Mean / SD	Treatment Mean / SD	Control Mean / SD	Treatment Mean / SD	Control Mean / SD
Year of Interview	2003.19	2003.78	2003.70	2002.33	2002.14	2002.94	2002.74	2002.53
	(4.08)	(4.36)	(3.98)	(4.47)	(5.18)	(4.65)	(4.73)	(4.38)
Age	66.05	63.12	64.66	61.64	63.13	62.44	61.79	61.06
	(2.87)	(3.01)	(2.81)	(2.68)	(2.54)	(2.82)	(2.27)	(2.48)
Age Spouse	65.74	60.17	67.41	61.75	62.92	61.42	65.02	63.43
	(2.18)	(1.56)	(1.68)	(1.84)	(0.84)	(3.03)	(0.13)	(3.39)
Swiss Citizenship	0.78	0.74	0.81	0.84	0.85	0.81	0.87	0.86
	(0.41)	(0.44)	(0.39)	(0.36)	(0.35)	(0.40)	(0.33)	(0.34)
Houshold size > 2	0.07	0.16	0.09	0.11	0.14	0.17	0.12	0.14
	(0.26)	(0.37)	(0.28)	(0.32)	(0.34)	(0.37)	(0.33)	(0.34)
Education								
Lower Education	0.18	0.17	0.41	0.34	0.12	0.13	0.34	0.31
	(0.38)	(0.38)	(0.49)	(0.47)	(0.33)	(0.34)	(0.47)	(0.46)
Secondary Education	0.53	0.49	0.51	0.55	0.49	0.49	0.52	0.56
	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
Higher Education	0.30	0.34	0.08	0.10	0.38	0.37	0.13	0.12
	(0.46)	(0.47)	(0.27)	(0.30)	(0.49)	(0.48)	(0.34)	(0.33)
GDP growth in %	0.72	0.81	0.77	0.76	0.61	0.84	0.77	0.85
	(0.80)	(0.82)	(0.81)	(0.73)	(0.80)	(0.76)	(0.79)	(0.71)
Unemployment Rate in %	3.76	3.83	3.80	3.76	3.81	3.83	3.84	3.84
	(0.63)	(0.57)	(0.60)	(0.63)	(0.54)	(0.57)	(0.59)	(0.59)
Observations	7012	7878	8151	5765	313	3682	290	2703

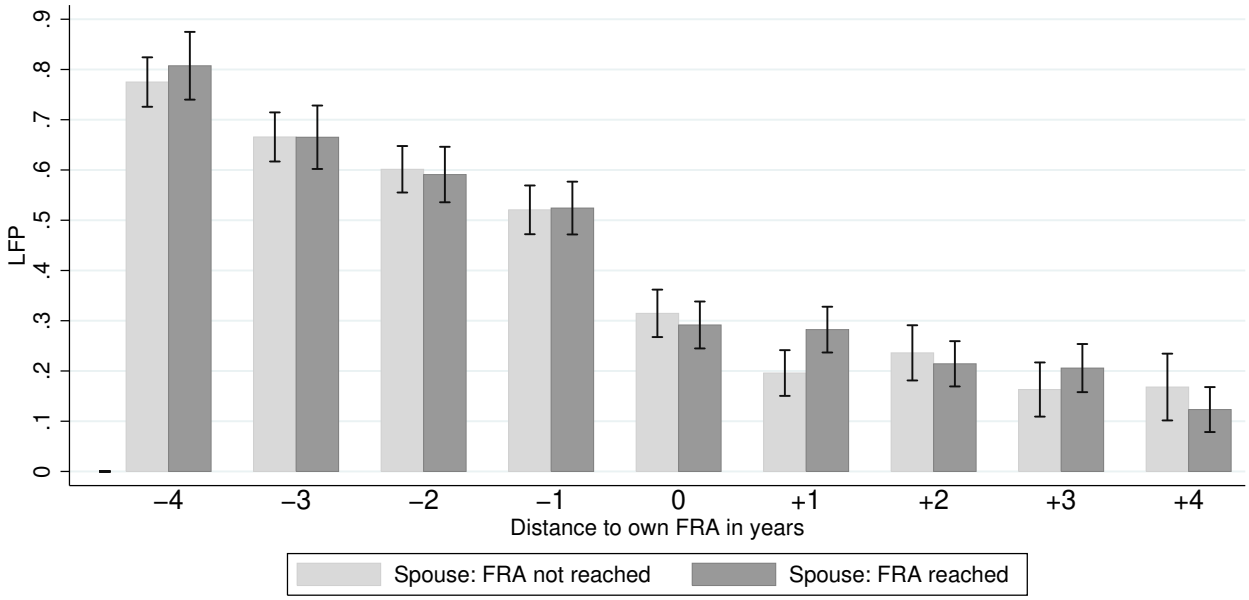
7 Results

7.1 Extensive Margin

Graphical Evidence

Figure 5 plots the LFP rates for men. Negative years to own FRA indicates that the respondent has not yet reached FRA, zero or positive years to own FRA indicates that the respondent has reached FRA. For each age bin, the left light-grey bar indicates the LFP rate of men with a spouse who is one or two years before reaching the full retirement age. The right dark-grey bar indicates the LFP rate of men with a spouse who has reached FRA (at or one year above FRA). For almost all ages, the differences in LFP between men with a spouse who is below and men with a spouse who is above FRA are neither economically nor statistically significant. The only exception is at age 66 (distance to own FRA equals +1). At age 66, men with a spouse who is above FRA are around nine percentage points more likely to be in the labor force.[25]

Figure 5: Labor force participation rate of men by FRA status of spouse

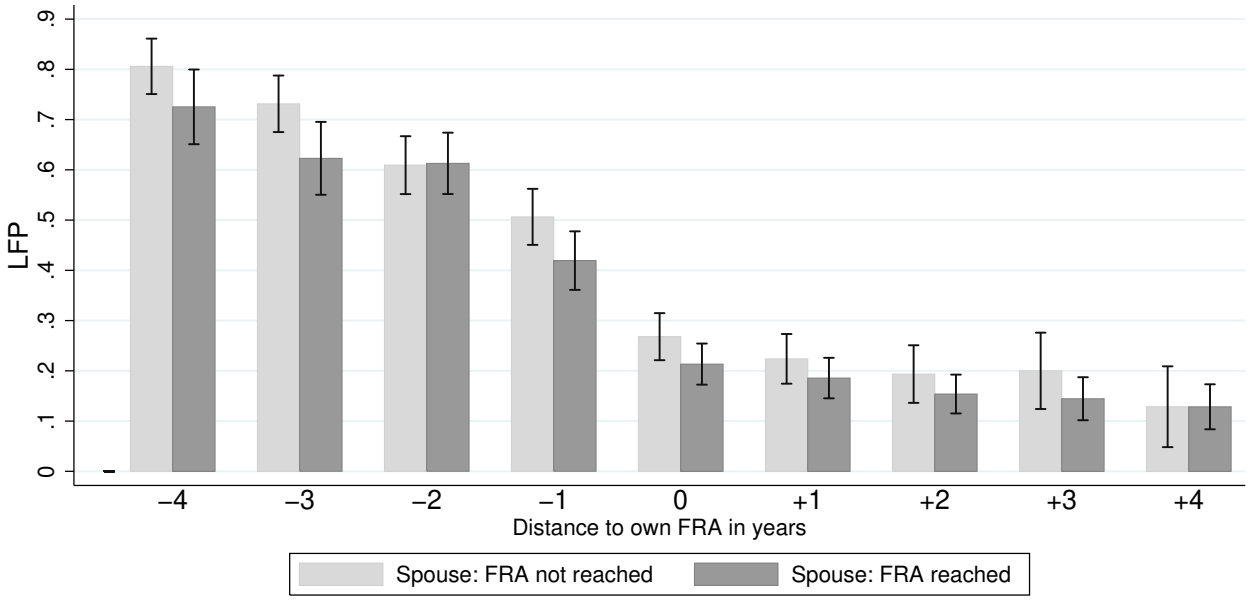


Note: Labor force participation rates (LFP) of men by FRA status of their wife. Only married men with a spouse between two year before reaching FRA and two years after FRA are considered. Disabled and unemployed individuals are dropped. Data source: Own calculations based on SLFS data, FSO.

Figure 6 plots the LFP rates for women. The graph indicates that labor force participation rates among women whose spouse has reached FRA are lower compared to women whose spouse has not yet reached FRA.

[25] Confidence intervals of the mean estimate are overlapping. This indicates that the difference in means is not significantly different from zero.

Figure 6: Labor force participation rate of women by FRA status of spouse



Note: Labor force participation rates (LFP) of women by cohort and by FRA status of their husband. Only married women with a spouse between two years before reaching FRA and two years after reaching FRA are considered. Disabled and unemployed individuals are dropped. Data source: Own calculations based on SLFS data, FSO.

Estimation Results

In the graphical analysis, we controlled for age, but not for other potential confounders. By running a linear regression, we can both control for potential confounders and increase precision of the estimate of interest. The results are shown in table 3.

Table 3: Estimation extensive margin

	Dependent variable: Indicator $\mathbb{1}$(working hours > 0)			
	Men		Women	
	APE	SE(APE)	APE	SE(APE)
Spouse FRA reached	0.013	(0.014)	-0.033^{***}	(0.013)
FRA reached			-0.137^{***}	(0.015)
Age dummies	Yes		Yes	
Age spouse	Yes		Yes	
Age spouse squared	Yes		Yes	
Education dummies	Yes		Yes	
Household size > 2	Yes		Yes	
Swiss citizenship	Yes		Yes	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	14890		13916	

Note: Results Probit estimation. Average partial effects (APE) reported. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Besides controlling for age and age of the spouse, we additionally control for education, household size, whether the respondent is Swiss, GDP and the unemployment rate. For men, in line with the

graphical results, there is no effect of having a spouse at or above the full retirement age on labor force participation. On the contrary, women react when their spouse reaches FRA. On average, women whose spouse has reached FRA are 3.3 percentage points less likely to be in the labor force than women whose spouse has not yet reached FRA. Since there is variation in FRA of women, we are also able to identify the effect of women reaching their own full retirement age on labor force participation.[26] Women who have reached their own FRA are 13.7 percentage points less likely to work compare to women who have not yet reached their own FRA. Therefore, the *direct* effect of -13.7 percentage points is around four times larger than the *indirect* effect of -3.3 percentage points. Our results are in line with Lalive & Parrotta (2017). Using Census data for Switzerland, they find that reaching their own FRA reduces the LFP rate of women by around 12 percentage points. For the indirect effect, they find that women reduce their LPF rate by around 2 to 3 percentage points when their spouse reaches FRA.

We checked whether the effect of having a spouse at or above FRA varies with respect to education levels and the different full retirement ages of the women. We do not find significant heterogeneity.

7.2 Intensive Margin

Graphical Evidence

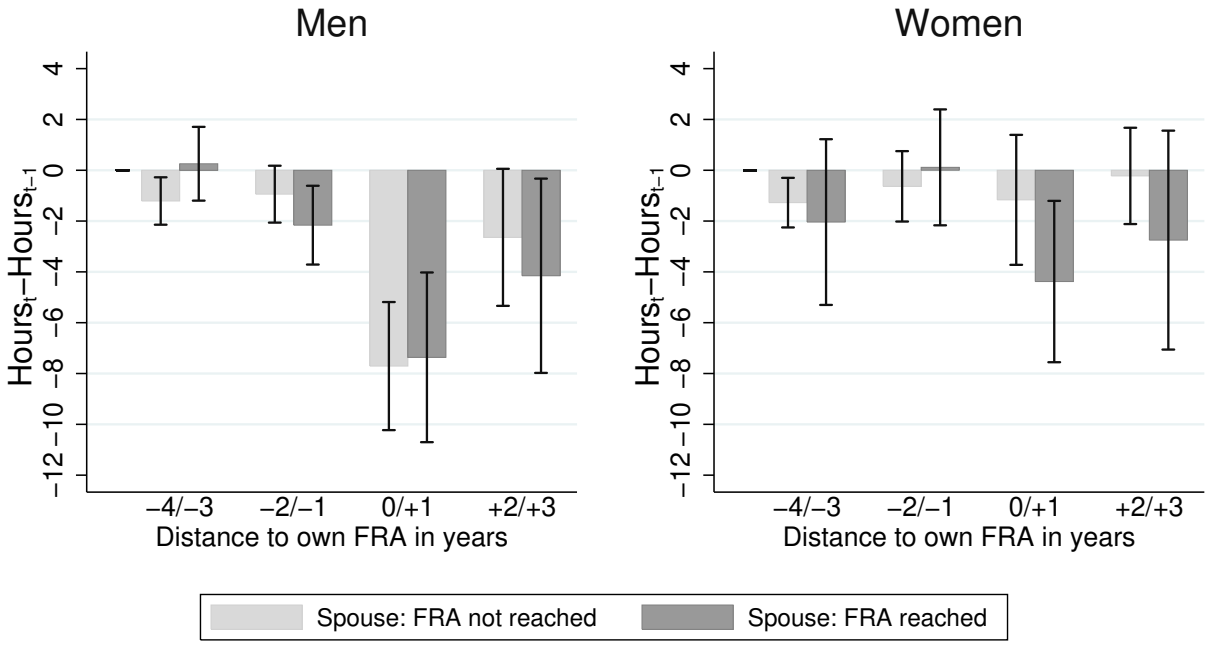
We first illustrate the differences in working hours among respondents with a spouse around full retirement age. For respondents with at least two consecutive observations in which they were working, figure 7 plots the average change in working hours for different distances to their own FRA. Negative years to own FRA indicates that the respondent has not yet reached FRA, zero or positive years to own FRA indicates that the respondent has reached FRA. The left panel plots the change in hours for men, the right panel the change for women. Again, the left light-grey bars indicate the change in hours for respondents whose spouse has not yet reached FRA, the right dark-grey bars indicate the change in hours for respondents whose spouse has reached FRA. For both men and women, there is no pattern observable between respondents whose spouse has reached FRA and respondents whose spouse has not yet reached FRA.

Estimation Results

The results of the first-difference on positive hours estimation are presented in table 4. We do not find evidence that men or women adjust their working hours when the spouse reaches FRA. The estimated causal effects are negative, but not significantly different from zero. We can not rule out that there is an effect, but if so, the effect is likely to be small in magnitude. In combination with the graphical evidence of figure 7, we find that the intensive margin is a margin at which workers adjust their labor supply, but there is no evidence on spillover effects within a couple.

[26] If there was no variation in the full retirement age, reaching the own full retirement age would be multicollinear with the age dummies.

Figure 7: Year-on-year change in weekly working hours by FRA status of the spouse



Note: Year-on-year change in weekly working hours between time $t-1$ and t. Spouse between two years before reaching FRA and two years after reaching FRA. Disabled and unemployed individuals are dropped. Data source: Own calculations based on SLFS data, FSO.

Table 4: Estimation intensive margin

	Dependent variable: Δ weekly working hours			
	Men		Women	
	Coef.	SE(Coef.)	Coef.	SE(Coef.)
Spouse FRA reached	−0.796	(0.698)	−1.176	(0.768)
FRA reached			−1.769	(1.177)
Age dummies	Yes		Yes	
Age spouse	Yes		Yes	
Age spouse squared	Yes		Yes	
Education dummies	No		No	
Household size > 2	Yes		Yes	
Swiss citizenship	No		No	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	3995		2993	

Note: Results first-difference on positive hours estimation. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

7.3 Robustness

Extensive Margin

Our results are not sensitive with respect to the definition of labor supply. Instead of using contracted working hours as the dependent variable, we use actual working hours of the previous week as an alternative measure for labor supply. The estimation results are presented in table 7 in appendix

D. The results are very similar in both sign and magnitude. For men, spouse FRA reached has no significant effect on LFP. The LFP of women is 2.6 percentage points lower when their spouse has reached FRA.

As discussed in section 6, we control for the age of the spouse with a linear and a quadratic term in the main specification. In a robustness check, we test whether the results are robust to this specification. We exclude age of the spouse as control variable but restrict the age of the spouse to be between two years before and two years after reaching FRA. The results are shown in appendix D, table 9. For men, the effect of the spouse reaching FRA is again not significant. For women, the effect is -4.4 percentage points and significant.

We further examine whether the inclusion of the years during the financial crises changes the results. Therefore, we rerun the analysis for the limited dataset including only interviews from 1991 to 2006. The results remain very similar to the main dataset (1991 to 2009).

In the spirit of treatment effect analysis, we examine the results of two placebo treatments. The original treatment variable equals 1 if the spouse has reached FRA, and 0 else. The first placebo treatment variable equals 1 if the spouse is older than FRA minus two years (63 for men, 60/61/62 for women), the second placebo treatment variable equals 1 if the spouse is older than FRA plus two years (67 for men, 64/65/66 for women). Table 12 in appendix E presents the results of the placebo analysis. We find no significant placebo treatment effect.

Intensive Margin

At the intensive margin, the results are again not sensitive with respect to the definition of the dependent variable. Instead of using contracted working hours, we used actual working hours of the previous week. Table 8 in appendix E reports the results. For both men and women, the estimated causal effect is negative but not significant. As for the extensive margin, the results remain unchanged if we include the age of the spouse (appendix D, table 11) or if we limit the time period to 1991 to 2006. Furthermore, we conduct the same placebo treatment analysis as we did at the extensive margin. Table 13 presents the results. For both placebo treatments, there is no significant effect of having a spouse reaching FRA on working hours.

8 Discussion

As shown in table 1, the sign of the expected labor supply reaction of individual A to spouse B reaching FRA depends on whether B reduces labor supply. In our estimation sample, around 33% of men and 22% of women reduce their labor supply by 8 or more hours when reaching FRA. Of those who do not reduce their labor supply, around 74% of men / 70% of women are already retired, and 26% of men / 30% of women are still working.

For women, we observe a negative labor supply reaction. If the effect is mostly driven by women whose husband reduces labor supply at FRA, complementarities in leisure must be sufficiently large to outweigh liquidity, joint taxation, and housework effects. The negative labor supply reaction, however, can also be explained by liquidity and joint taxation effects of women whose husband does not reduce labor supply at FRA. For men, we do not find evidence for a labor supply reaction. This does not rule

out that men enjoy leisure more when spent together, since liquidity, joint taxation and housework effects possibly outweigh complementarity in leisure effects.

Difference Men/Women

There is heterogeneity in complementarity for leisure, liquidity, joint taxation and housework effects, which may explain part of the asymmetric reaction of men and women. The change in labor supply of men reducing their workload when reaching their *own FRA* is larger than the reaction of women. Considering only individuals who adjust labor supply at FRA, men reduce weekly working hours on average by 33 hours (extensive and intensive reaction combined) whereas women decrease their weekly working hours by 23 when reaching *own FRA*. This difference can explain part of the asymmetry in the indirect effect since ceteris paribus, the complementarity effect is stronger the larger the labor supply reaction of the spouse.

The *liquidity* and *joint taxation* effect depend on the labor supply reaction of the spouse. We consider first the case where spouse B reduces labor supply at own FRA. In the analysis above, we found that men react stronger to their own FRA. Assuming men and women achieve the same replacement rate, the drop in household income is larger when the husband reaches his FRA. Therefore, tax and liquidity effects are positive and larger for women than for men. For this reason, tax and liquidity effects partially offset the asymmetry yielding from differences in complementarity for leisure effects. In the case the spouse B does not reduce labor supply at own FRA, we do not find evidence for asymmetries with respect to *liquidity* and *joint taxation* effects. Our calculations suggest that tax considerations are only of second order importance when deciding when to retire. Using questions on early retirement in the Swiss Labor Force Survey (SLFS), we find that only 0.93% of men and 0.85% of women answered that taxes were the main determinant of their early retirement decision.

The change in housework when retiring is similar for men and women. Using questions on housework in the Swiss Labor Force Survey, we find that men increase their amount of homework by around 40 minutes a day whereas women increase housework by around 60 minutes.

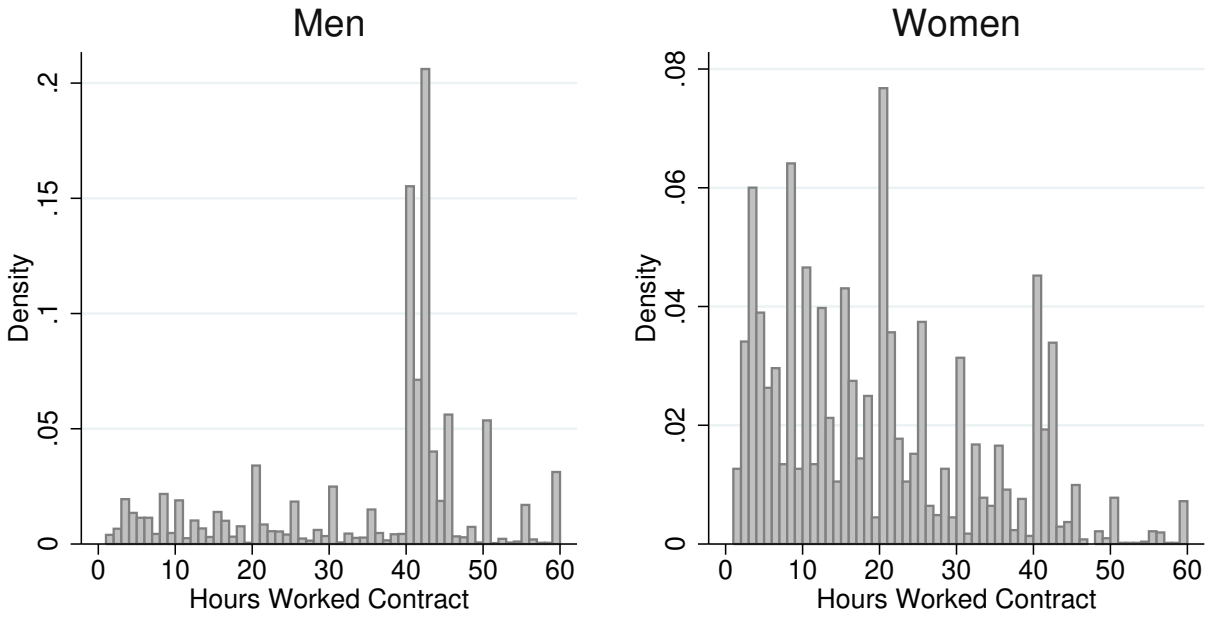
To sum up, our analysis provides evidence that *complementarity in leisure effects* are an important mechanism for the indirect effect. *Liquidity effects* may play a role when reacting to the spouse reaching FRA. Finally, we cannot exclude the possibility the asymmetric reaction is mainly driven by gender differences in preferences.

Margin of Reaction

We would like to point out several potential explanations for the result why women react at the extensive, but not at intensive margin. First, women may want to reduce their working hours, but are prevented from adjusting due to hours constraints set by firms. We examine this mechanism by analysing desired working hours. We run the same first difference estimator on positive hours, but instead of contracted working hours as dependent variable, we use desired hours. The results are presented in table 6 in appendix B. We do not find evidence that women would like to reduce their working hours in response to their husband reaching FRA. Second, social norms of working hours may discourage women to adjust working hours when their husband reaches FRA. The hours distribution for men and women is presented in figure 8. Graphical evidence suggests that social norms are less

pronounced for women than for men. Third, *fixed costs of work* imply that individuals are not willing to work below a minimum number of hours. A large share of women works 21 or less hours per week, see figure 8. This group is likely to react at the extensive margin because of the presence of fixed costs of work. Fourth, *complementarities in leisure* may be discontinuous at zero working hours. For example, it may be necessary that both partners are out of labor force if the couple wants to change residence for retirement or travel for a longer period.

Figure 8: Weekly Hours Distribution of Women



Distribution of weekly working hours of married men and women aged 58-70. Only women with hours between 1 and 60 are included. Own calculations based Swiss Labor Force Survey (SLFS).

9 Conclusion

In this paper, we estimate labor supply responses to the spouse reaching FRA. We find that the labor force participation rates of women drops by around 3 percentage points when the spouse reaches FRA. In contrast, labor force participation rates of men do not respond to the spouse reaching FRA. At the intensive margin, we find only small and non-significant effects for both men and women, although older workers use working hours to adjust their labor supply.

We identify four different mechanisms which can explain the effect of having a spouse at or above FRA on labor supply: complementarities in leisure, joint taxation, liquidity and housework effects. Since we find a negative indirect effect for women, we argue that complementarities in leisure and liquidity effects are important mechanisms for the indirect effect. For women, we explain the absence of an intensive margin reaction by the presence of fixed costs of work.

References

Alpert, A., & Powell, D. (2014). Estimating Intensive and Extensive Tax Responsiveness: Do Older Workers Respond to Income Taxes? *Working Paper*.

Angrist, J. D. (2001). Estimation of Limited Dependent Variable Models With Dummy Endogenous Regressors Joshua. *Journal of Business & Economic Statistics*, *19*(1), 2–28.

Banks, J., Blundell, R., & Casanova Rivas, M. (2010). The Dynamics of Retirement Behavior in Couples: Reduced-Form Evidence from England and the US. *Working Paper*.

Barrett, G. F., & Atalay, K. (2015). Pension Incentives and the Retirement Decisions of Couples. *Working Paper*.

Blau, D. M. (1998). Labor Force Dynamics of Older Married Couples. *Journal of Labor Economics*, *16*(3), 595–629.

Bloemen, H. G., & Stancanelli, E. G. (2015). Toyboys or Supergirls? An Analysis of Partners' Employment Outcomes When She Outearns Him. *Review of Economics of the Household*, *13*(3), 501–530.

Börsch-Supan, A., & Schnabel, R. (1999). Social Security and Retirement in Germany. In J. Gruber & D. Wise (Eds.), *Social security and retirement around the world* (pp. 135–180).

Bütler, M. (2009). Switzerland: High Replacement Rates and Generous Subsistence as a Barrier to Work in Old Age. *The Geneva Papers*, *34*, 561–577.

Ciani, E. (2016). Retirement, Pension Eligibility and Home Production. *Labour Economics*, *38*, 106–120.

Coile, C. (2004). Retirement Incentives and Couples ' Retirement Decisions. *Topics in Economic Analysis & Policy*, *4*(1).

Cribb, J., Emmerson, C., & Tetlow, G. (2013). Incentives, Shocks or Signals: Labour Supply Effects of Increasing the Female State Pension Age in the UK. *IFS Working Paper*, *W13/03*.

Gustman, A. L., & Steinmeier, T. L. (2004). Social Security, Pensions and Retirement Behaviour Within the Family. *Journal of Applied Econometrics*, *19*, 723–737.

Hersche, M., & Moor, E. (2018). Estimation of Causal Intensive Margin Effects by Means of Panel Data. *Unpublished Note*.

Hospido, L., & Zamarro, G. (2014). Retirement Patterns of Couples in Europe. *IZA Journal of European Labor Studies*, *3*(12).

Hurd, M. D. (1990). The Joint Retirement Decision Of Husbands And Wives. In D. A. Wise (Ed.), *Issues in the economics of aging* (pp. 231–258). University of Chicago Press.

Kantarci, T., & Van Soest, A. (2008). Gradual Retirement: Preferences and Limitations. *Economist (Leiden)*, *156*(2), 113–144.

Lalive, R., & Parrotta, P. (2017). How Does Pension Eligibility Affect Labor Supply in Couples? *Labour Economics*, *46*, 177–188.

Laun, L. (2017). The Effect of Age-Targeted Tax Credits on Labor Force Participation of Older Workers. *Journal of Public Economics*, *152*, 102–118.

Mastrobuoni, G. (2009). Labor Supply Effects of the Recent Social Security Benefit Cuts: Empirical Estimates Using Cohort Discontinuities. *Journal of Public Economics*, *93*, 1224–1233.

Selin, H. (2017). What Happens to the Husband's Retirement Decision When the Wife's Retirement Incentives Change? *International Tax and Public Finance*, *24*(3), 432–458.

Stancanelli, E. (2017). Couples' Retirement Under Individual Pension Design: A Regression Discontinuity Study for France. *Labour Economics*, *49*, 14–26.

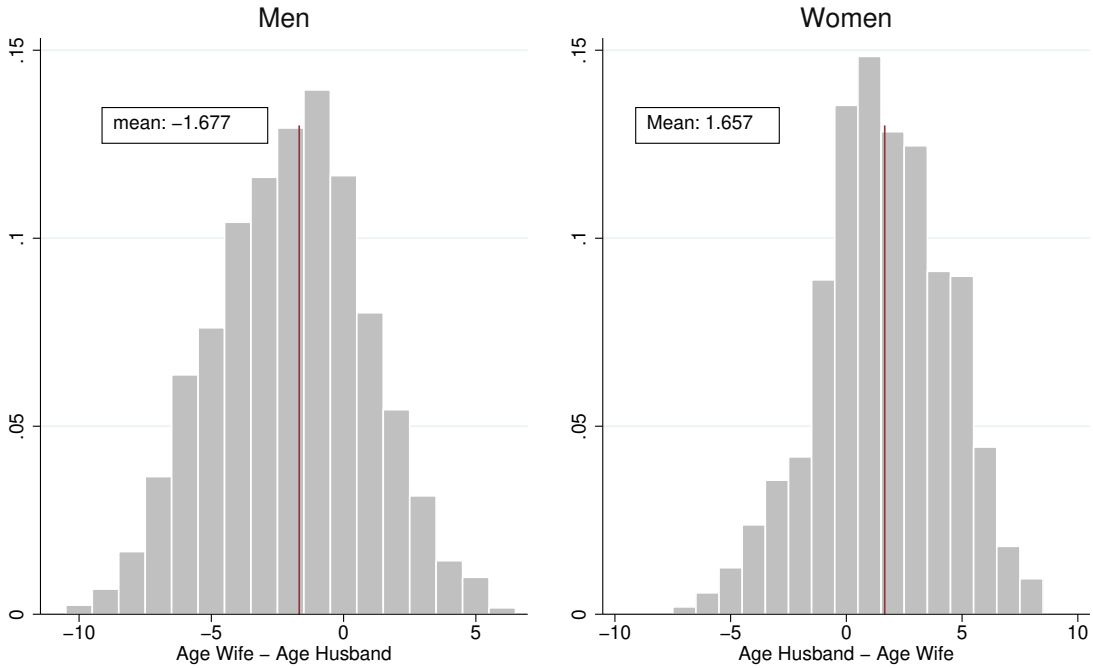
Stancanelli, E., & Van Soest, A. (2012). Retirement and Home Production: A Regression Discontinuity Approach. *American Economic Review*, *102*(3), 600–605.

Staub, K. (2014). A Causal Interpretation of Extensive and Intensive Margin Effects in Generalized Tobit Models. *The Review of Economics and Statistics*, *96*(2), 371–375.

Zweimüller, J., Winter-Ebmer, R., & Falkinger, J. (1996). Retirement of Spouses and Social Security Reform. *European Economic Review*, *40*, 449–472.

A Identification

Figure 9: Identifying variation in age difference within couples



Note: Data source: Own calculations based on SLFS data, FSO.

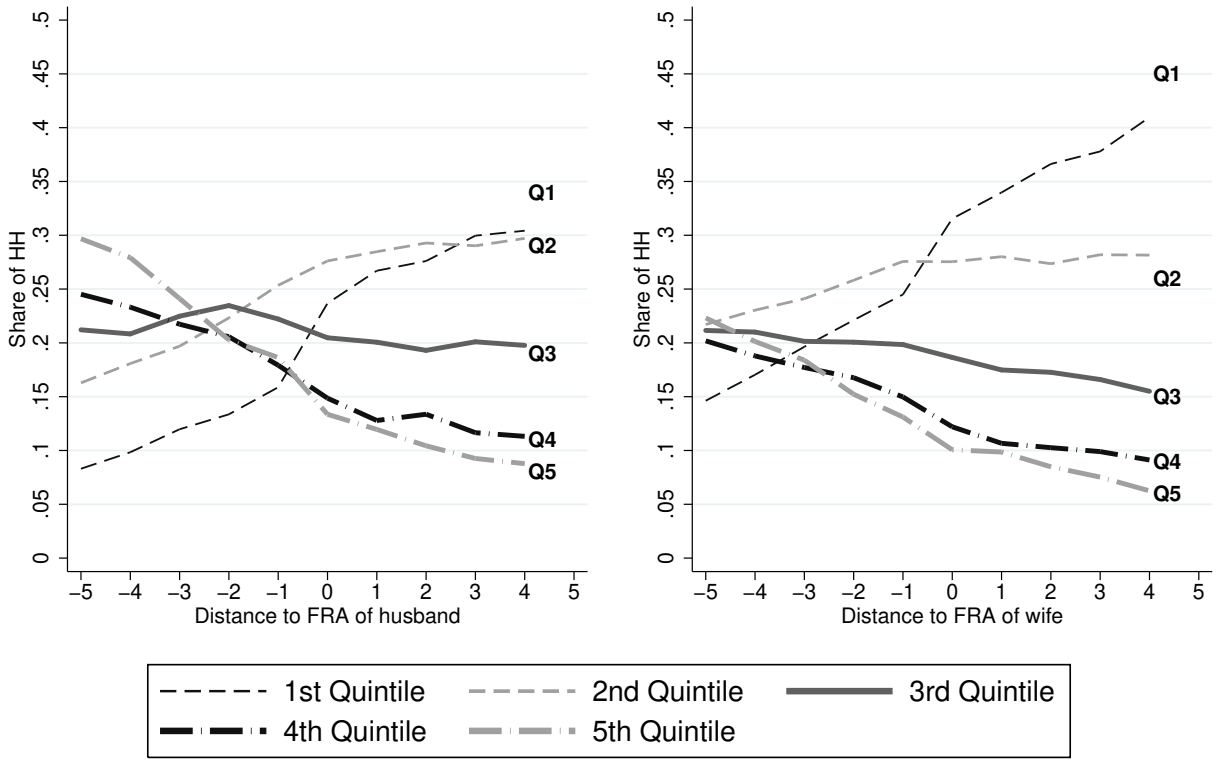
Table 5: Estimation intensive margin $t-1$

	Dependent variable: Δhours (t-1)			
	Men		Women	
	Coef.	SE(Coef.)	Coef.	SE(Coef.)
Spouse FRA reached	−0.670	(0.945)	0.338	(0.801)
Age dummies	Yes		Yes	
Education dummies	No		No	
Household size > 2	Yes		Yes	
Swiss citizenship	No		No	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	2367		1751	

Note: Results first difference estimation on positive hours in period $t-1$. Dependent variable is weekly contracted hours for wage employed and weekly usual hours for self employed. Interviewed person are aged between 58 and 70 and born between 1930 and 1946. Spouse of the interviewed person are aged between 2 years prior and 2 years after reaching retirement age. Disabled and Unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

B Discussion

Figure 10: Membership Household Quintiles and Distance to Full Retirement Age.



Data source: Own calculations based on SLFS data, FSO.

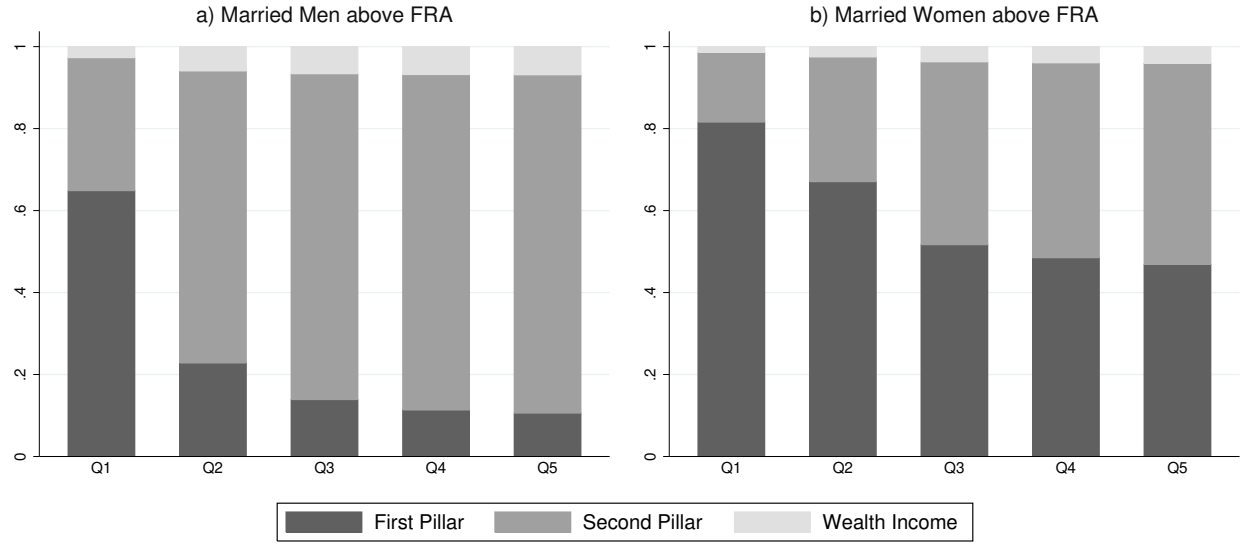
Table 6: Estimation desired intensive margin

	Dependent variable: Δ desired weekly hours			
	Men		Women	
	Coef.	SE(Coef.)	Coef.	SE(Coef.)
Spouse FRA reached	−0.209	(0.950)	0.369	(0.552)
FRA reached	No		Yes	
Age dummies	Yes		Yes	
Age spouse	Yes		Yes	
Age spouse squared	Yes		Yes	
Education dummies	No		No	
Household size > 2	Yes		Yes	
Swiss citizenship	No		No	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	988		2176	

Note: Results first-difference on desired hours estimation. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

C Institutional Background

Figure 11: Sources of income after reaching FRA by household income quintile



Note: Fraction of income from different sources after reaching FRA by gender and household income quintile. Q1 represents the lowest income quintile, Q5 the highest quintile. Labor income is not considered. Data source: Own calculations based on special module on social security in Swiss Labor Force Survey (SLFS).

Figure 12: Fraction of individuals insured in the 2nd pillar

Note: Fraction of individuals insured in 2nd pillar by gender and cohort. Data source: Own calculations based on special module on social security in Swiss Labor Force Survey (SLFS).

D Sensitivitiy Analysis

D.1 Alternative dependent variable: Hours worked last week

Table 7: Estimation extensive margin hours worked last week

	Dependent variable: Indicator $\mathbb{1}$(Hours worked last week > 0)			
	Men		Women	
	APE	SE(APE)	APE	SE(APE)
Spouse FRA reached	0.015	(0.014)	-0.026^{**}	(0.013)
FRA reached			-0.122^{***}	(0.016)
Age dummies	Yes		Yes	
Age spouse	Yes		Yes	
Age spouse squared	Yes		Yes	
Education dummies	Yes		Yes	
Household size > 2	Yes		Yes	
Swiss citizenship	Yes		Yes	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	14890		13916	

Note: Results Probit estimation. Average partial effects (APE) reported. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Table 8: Estimation intensive margin hours worked last week

	Dependent variable: Δ weekly working hours			
	Men		Women	
	Coef.	SE(Coef.)	Coef.	SE(Coef.)
Spouse FRA reached	-0.671	(0.727)	-1.304	(1.018)
FRA reached			-2.516^{*}	(1.293)
Age dummies	Yes		Yes	
Age spouse	Yes		Yes	
Age spouse squared	Yes		Yes	
Education dummies	No		No	
Household size > 2	Yes		Yes	
Swiss citizenship	No		No	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	3193		2231	

Note: Results first-difference on positive hours estimation. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Table 9: Estimation extensive margin

	Dependent variable: Indicator $\mathbb{1}$(hours > 0)			
	Men		Women	
	APE	SE(APE)	APE	SE(APE)
Spouse FRA reached	0.005	(0.013)	-0.044^{***}	(0.012)
FRA reached			-0.169^{***}	(0.025)
Age dummies	Yes		Yes	
Age spouse	No		No	
Age spouse squared	No		No	
Education dummies	Yes		Yes	
Household size > 2	Yes		Yes	
Swiss citizenship	Yes		Yes	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	4887		5190	

Note: Results Probit estimation. Average partial effects (APE) reported. Interviewed individuals are aged between 58 and 70. Spouse of the interviewed person aged between 2 years prior and 2 years after reaching FRA. Disabled and Unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Table 10: Estimation intensive margin

	Dependent variable: Δ weekly working hours			
	Men		Women	
	Coef.	SE(Coef.)	Coef.	SE(Coef.)
Spouse FRA reached	-0.580	(0.807)	-0.945	(0.867)
FRA reached			-2.616	(1.770)
Age dummies	Yes		Yes	
Age spouse	No		No	
Age spouse squared	No		No	
Education dummies	No		No	
Household size > 2	Yes		Yes	
Swiss citizenship	No		No	
Log GDP	Yes		Yes	
Unemployment rate	Yes		Yes	
Observations	1326		1150	

Table 11: Note: Results first-difference on positive hours estimation. Interviewed individuals are aged between 58 and 70. Spouse of the interviewed person aged between 2 years prior and 2 years after reaching FRA. Disabled and Unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

E Placebo Tests

Table 12: Estimation extensive margin placebo test

	Dependent variable: Indicator $\mathbb{1}$(working hours > 0)			
	Men APE	Women APE	Men APE	Women APE
Placebo Spouse FRA-2years reached	0.022	0.002		
	(0.015)	(0.015)		
Placebo Spouse FRA+2years reached			−0.014	0.000
			(0.016)	(0.014)
Age dummies	Yes	Yes	Yes	Yes
Age spouse	Yes	Yes	Yes	Yes
Age spouse squared	Yes	Yes	Yes	Yes
Education dummies	Yes	Yes	Yes	Yes
Household size > 2	Yes	Yes	Yes	Yes
Swiss citizenship	Yes	Yes	Yes	Yes
Log GDP	Yes	Yes	Yes	Yes
Unemployment rate	Yes	Yes	Yes	Yes
Observations	14890	13916	14890	13916

Note: Results Probit estimation. Average partial effects (APE) reported. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.

Table 13: Estimation intensive margin placebo test

	Dependent variable: Δ weekly working hours			
	Men Coef.	Women Coef.	Men Coef.	Women Coef.
Placebo Spouse FRA-2years reached	0.301	−0.337		
	(0.506)	(0.595)		
Placebo Spouse FRA+2years reached			0.841	0.076
			(0.863)	(0.765)
Age dummies	Yes	Yes	Yes	Yes
Age spouse	Yes	Yes	Yes	Yes
Age spouse squared	Yes	Yes	Yes	Yes
Education dummies	No	No	No	No
Household size > 2	Yes	Yes	Yes	Yes
Swiss citizenship	No	No	No	No
Log GDP	Yes	Yes	Yes	Yes
Unemployment rate	Yes	Yes	Yes	Yes
Observations	3995	2993	3995	2993

Note: Results first-difference on positive hours estimation. Interviewed individuals and spouses are aged between 58 and 70. Disabled and unemployed dropped. Standard errors are clustered on individual level. $^{*}p < 0.1$. $^{**}p < 0.05$. $^{***}p < 0.01$.