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Pension reforms and couples' labour supply decisions ☆

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ABSTRACT

This study examines how retirement options for husbands and wives impact their labour supply decisions using a regression discontinuity design. In the context of German pension reforms, which have tightened early retirement possibilities, we find that coordination in retirement decisions between spouses was more prevalent and symmetrical before the reforms, but less so after. This sheds light on the role of early retirement possibilities in shaping couples' reactions to one spouse's retirement age.

1. Introduction

Increasing longevity and declining fertility have led many industrialised countries to increase normal retirement ages and make early retirement schemes less generous, thereby motivating individuals to retire later (see Section 4.4.4 in Blundell et al. (2016), for a survey, or Börsch-Supan and Schnabel (1998), Börsch-Supan et al. (2020, for the case of Germany). The literature also emphasises an important context: household-level coordination of labour market exits. Indeed, increasing female labour force participation over the last few decades means that retirement decisions might increasingly involve labour market exits of both partners in heterosexual couples. As a result, in addition to directly affecting the targeted individuals, changes in retirement age can also indirectly affect spousal labour supply decisions.

The retirement eligibility of one spouse can affect the labour supply of the other spouse through two main channels. First, retirement typically involves an income loss to the household. It should increase the labour supply of other household members if leisure is a normal good, thus implying a negative correlation. Second, leisure complementarities may exist, which change the trade-offs between consumption and leisure once one of the spouses retires. It would imply a positive correlation due to coordinated joint retirement (Hurd, 1990; Coile, 2004). These two main channels intertwine with shocks, e.g., own health, or health of a related family member. Such events complicate the identification of the size of retirement coordination.

Our paper contributes to a small but burgeoning literature on couples' retirement coordination that uses exogenous variation in spousal retirement eligibility status (e.g., Lalive and Parrotta, 2017; Selin, 2017; Stancanelli, 2017; Atalay et al., 2019; Bloemen et al., 2019; Bonsang and Van Soest, 2020; Kruse, 2021; Carta and De Philippis, 2021; Johnsen et al., 2022). There is no consensus in the literature as far

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as symmetry of reactions of husbands and wives to their respective spouses' retirement is concerned. Studying labour force transitions of older workers in Germany, Blau and Riphahn (1999) find that employed wives are twice as likely to follow their non-employed husbands into non-employment than vice versa. Early structural studies find a higher response of husbands to wives' retirement than vice versa (e.g. Zweimüller et al., 1996; Gustman and Steinmeier, 2000; Coile, 2004; Gustman and Steinmeier, 2004, for Austria and for the United States, respectively). This result has been confirmed in some recent studies (e.g. Stancanelli, 2017; Carta and De Philippis, 2021, for France and for Italy, respectively). For Australia, however, Atalay et al. (2019) find symmetric effects of two retirement reforms – one affecting men's retirement age and another relevant for women – on the retirement decisions of the spouses. Similarly, for Germany, Bonsang and Van Soest (2020) in their Table 6 also report almost symmetric responses of husbands and wives to their spouses' crossing the early retirement threshold (it is true both for reduced-form and scaled effects). There are, however, also studies finding only wives reacting to husbands' retirement, but not vice versa (e.g. Lalive and Parrotta (2017), Hersche et al. (2018) for Switzerland, Sand and Lichtman-Sadot (2019) for Israel, and Kruse (2021) for Norway, but see Johnsen et al. (2022) as an exception for Norway when incomes of both spouses are similar).

We propose to reconcile this conflicted empirical evidence by exploring the *context* of early retirement eligibility. Here, Germany is a particularly interesting case, because the costs of retirement coordination were low (as compared to other countries)[1] and have increased due to the introduced reforms. Indeed, during the subsequent periods of our sample, major reforms reduced eligibility for early retirement programmes (Bonsang and Van Soest, 2020). We focus on how the effect of spouses crossing an early retirement age varies with the costs of early exits from the labour market. Exploiting the reforms of early retirement in the context of spouse "cross effects" constitutes the key contribution of this paper.

We show that the relative symmetry of spouses' reactions to the other spouses' reaching a retirement age may depend on the cost for workers to leave the labour market, e.g. through early retirement. Our results lend support to the leisure complementarity hypothesis for both spouses. We further show that a lower or no pension in case of an early labour market exit effectively raises the cost of retirement coordination, thus preventing joint retirement being an optimal decision. We demonstrate this by showing how spouses' reactions to their partner reaching a typical retirement age differ before and after major reforms in early retirement.

In doing so, we exploit two types of natural experiments: first, we estimate multi-cut-off regression discontinuity designs. We examine how husbands and wives react when they or their spouses cross key retirement age thresholds, that is, early retirement age of 60, 63, and normal retirement age 65. We include these retirement age thresholds for both wives and husbands in both labour supply equations. Based on German administrative data, Seibold (2021) and Boockmann et al. (2023) also observe a spike in retirements around these three age thresholds and so do (Bonsang and Van Soest, 2020), who use the German SOEP as we do. Second, we split the sample into groups of birth cohorts who were (i) not affected by early-retirement reform, (ii) affected by early retirement reforms mainly pertaining to men (because most women in these cohorts could still retire earlier than men) and (iii) affected by early-retirement reforms pertaining to both men and women. The reforms generally delayed the age at which a person could retire for a special reason and still receive a full pension. We control for time-invariant household-specific effects and for survey-year effects in a two-way fixed effects model, and thus take unobserved household and time heterogeneity into account.

We find that with several early retirement pathways at comparatively low cost, husbands' and wives' reactions to their spouse reaching early retirement age are almost symmetric: when the spouse reaches age 60, about 5 percent of husbands and wives (both numbers statistically significant) leave the labour market. Raising the constraints on early retirement diminishes these effects: the estimated coefficients become close to zero and insignificant except for wives, where they are still significant, but the point estimate is only around 1 percentage point. Consistent with this finding, when early retirement eligibility is constrained, both husbands and wives respond more strongly to reaching their own normal retirement eligibility age and less so to their spouses'.

The remainder of the paper is structured as follows. Section 2 briefly describes the German pension system and the reforms of retirement age exploited in the study. Section 3 introduces the data. Section 4 outlines the regression discontinuity design, which is followed by Section 5 reporting the empirical results. Section 6 concludes.

2. Institutional background

Germany has a defined benefit pay-as-you-go pension system with an earnings point system. The point system makes benefits proportional to relative lifetime earnings. The replacement rate depends on the points accumulated throughout the working periods, the points in turn depend on annual earnings relative to the national average. For most of the cohorts studied here, normal retirement eligibility is reached at 65 for both men and women.

Early retirement is possible after age 63 and after age 60 if one fulfils certain conditions, which Riphahn and Schrader (2021) term "retirement entry regimes" or "pathways to retirement". Table 1 exhibits some of the most important pathways to retirement before the "normal" retirement age of 65. These pathways experienced significant reforms during our study period, also depicted in Table 1.[2] A common feature of the pathways to early retirement was the absence of actuarial discount for earlier retirement (see Börsch-Supan and Schnabel, 1998). The only effective downward adjustment in pension benefits was due to a lower number of "earnings points" accumulated during a shorter working period, which made these pathways to early retirement particularly attractive in Germany.

Originally, one could retire as early as age 60 "due to unemployment" or "due to severe disability", or alternatively at age 63 if one had been actively contributing to social security insurance (for at least 35 years, aka "long-term insured").[3] In 2012, a new pathway to early retirement was introduced for the "very long-term insured" (contributing to social security for at least 45 years).

The mentioned pathways to retirement existed for both men and women. However, there was an additional retirement option for women to retire at 60 years of age. The eligibility for this additional pathway was related to the number of contribution years. Women were required

[1] Both the disproportionately low cut in pension benefits for individuals claiming pensions early and the multiplicity of alternative early labour market exit schemes compounded to this relatively low cost.

[2] The reforms are described in Steffen (2024), for more detail, we consulted the laws published in BGB (1996, 1997, 2007, 2014). Trampusch (2005) provides an institutional perspective on changes in early retirement in Germany, including the increasing use of collectively bargained schemes of early exit from the labour market, which are outside the scope of our study.

[3] There are two forms of "disability retirement" in Germany, the retirement "due to severe disability" mentioned in Table 1 and second pathway, "due to reduced capacity to work" (in German *"verminderte Erwerbsfähigkeit"*), which to this day allows workers to retire at any age, that is even before age 60. There were no changes in retirement age in the case of this latter pathway to retirement for birth cohorts in our study, and therefore it is not presented in Table 1. Moreover, Fig. 1 shows that disability retirement "due to reduced capacity to work" is quantitatively more relevant for both men and women than retirement "due to severe disability".

Table 1
Graphical illustration of sampling Scheme 1 based on sketch of reforms of (early) retirement schemes.
Source: Table created on the basis of information taken from Steffen (2022) and the following laws: BGB (1996), BGB (1997), BGB(2007), and BGB (2014).

	Pre-Reform Sample			Male Reform Sample					Not in Sample			Male-Female Reform Sample							
Born	**1934**	**1935**	**1936**	**1937**	**1938**	**1939**	**1940**	**1941**	**1942**	**1943**	**1944**	**1945**	**1946**	**1947**	**1948**	**1949**	**1950**	**1951**	**1952**
60 in	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
65 in	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ret. due to unemployment	60	60	60	61	62	63	64	65	65										x
Early retirement with a discount				60	60	60	60	60	60	60	60	60	61	62	63	63	63	63	x
Ret. due to long-term insurance	63	63	63	64	65	65	65	65	65	65	65	65	65	65	65	65.25	65.33	65.42	65.50
Early retirement with a discount				63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63
Ret. due to very long-term insurance																65	64	63	63
Early retirement with a discount																			
Ret. due to severe disability	60	60	60	60	60	60	60	61	62	63	63	63	63	63	63	63	63	63	63.5
Early retirement with a discount								60	60	60	60	60	60	60	60	60	60	60	60.5
Ret. for women	60	60	60	60	60	60	61	62	63	64	65	65	65	65	65	65	65	65	x
Early retirement with a discount							60	60	60	60	60	60	60	60	60	60	60	60	x
Normal retirement age	65	65	65	65	65	65	65	65	65	65	65	65	65	65.08	65.17	65.25	65.33	65.42	65.50

Note: Based on birth cohorts, we build groups operating under three different early retirement regimes: the "Pre-Reform Sample" (born 1936 or earlier) has not been affected by any of the reforms. The transitional group, the "Male Reform Sample" (born between 1937 and 1941) experienced an increase in the age of retirement due to unemployment, which affected mostly men, although the reform for women also started for cohorts 1940 and 1941 (with only small pension discounts for women of these cohorts still retiring at age 60). We do not use the cohorts 1942 to 1944, because this would have entailed an even more complex mix of reforms. As we are mostly interested in comparing the "pre-reform sample" with a sample where key reforms have already played out for both men and women, we build the "Male–Female Reform Sample" using the group of cohorts born in 1945 and after. Note that for estimating our "cross-effects" we want husbands and wives to be operating under a similar regime of pension laws and so we apply the same cohort restriction to them. In the appendix, we carry out a robustness check using different groupings of cohorts.

to actively contribute to social security for at least 10 years during the ages 40 to 60, and for at least 15 years in total. According to Engels et al. (2017), roughly half of all women fulfilled these requirements.

As shown in Table 1, there have been reforms in all the pathways. In general, the pattern was to raise the age threshold at which individuals could be entitled to a dedicated pathway to retirement. By the end of our sample, in most cases, this age is equivalent to the normal retirement age. However, for many cohorts it was still possible to retire at 60 or 63 years of age, but with a downward adjustment in pension benefits of 0.3 percent per month (3.6 percent per year). In particular, for "retirement due to unemployment" and "retirement for women", the age of retirement associated with these pathways has been successively raised from 60 to 65 for the 1937 to 1941 and the 1940 to 1944 birth cohorts, respectively, whereas for "retirement due to long-term insurance" the age of retirement associated with this pathway has been successively raised from 63 to 65 for the 1937 to 1938 birth cohorts.

The retirement age during the transition period was usually raised monthly, depending on the month of birth, and the discount on the pension level for retiring at the former early retirement age was raised accordingly. From the birth cohort 1952 onwards, no early retirement options "due to unemployment" and "for women" exist (see Geyer and Welteke, 2021; Geyer et al., 2020, for an evaluation of this reform).

Figs. 1a and 1b show that the pathways to early retirement were extensively used. We show the shares of new pensions by pathways to retirement for men and women, respectively, during the period 1995 to 2020, using data every 5 years. The figures demonstrate that more than half of new pensions are due to pathways to retirement earlier than at the normal retirement age. This can be seen by comparing the orange area, which shows the share of new pensions due to retirement at the normal retirement age, to the other pathways.

3. Data and descriptive results

We use the German Socio-Economic Panel (SOEP) for 1984–2019 (Goebel et al., 2019).[4] In these data, we identify 27,234 observations for 4687 couples in which the male partner is aged 55 to 69 and the female partner is aged 50 to 69. Because men are on average older than their wives, we also keep couples in the sample where women are as young as age 50 in order to stabilise our estimates. Our sample also contains cohabiting heterosexual couples, but, for simplicity, we refer to the partners as husband and wife throughout the discussion.[5]

We use couples born within specific birth year intervals, defined on the state of the pension reforms discussed in Section 2. The "Pre-Reform" sample comprises couples where both husband and wife are born up to the year 1936, as none of the pension reforms affected these cohorts, as shown in Table 1. The "Male Reform Sample" comprises couples in which both husband and wife are born between 1937 and 1941. The labelling "Male Reform Sample" is somewhat imprecise, because wives of cohorts 1940 and 1941 are affected by the phasing in of the reform raising the pension age for women, although pension discounts for women still retiring at age 60 were small for these two cohorts. Because wives are typically a few years younger than their husbands, we need to have a wide enough interval of birth years to obtain a reasonably representative sample of couples born in this period.

[4] Although Engels et al. (2017) successfully used German pension insurance data to demonstrate that the raised female pension age (and/or early retirement penalties) motivated women to retire later, these data do not enable spousal identification.

[5] Observations where a man is not residing jointly with a woman in a household are deleted from the sample, for example once a couple splits up. We also remove 87 observations for which we observe a change in the partner.

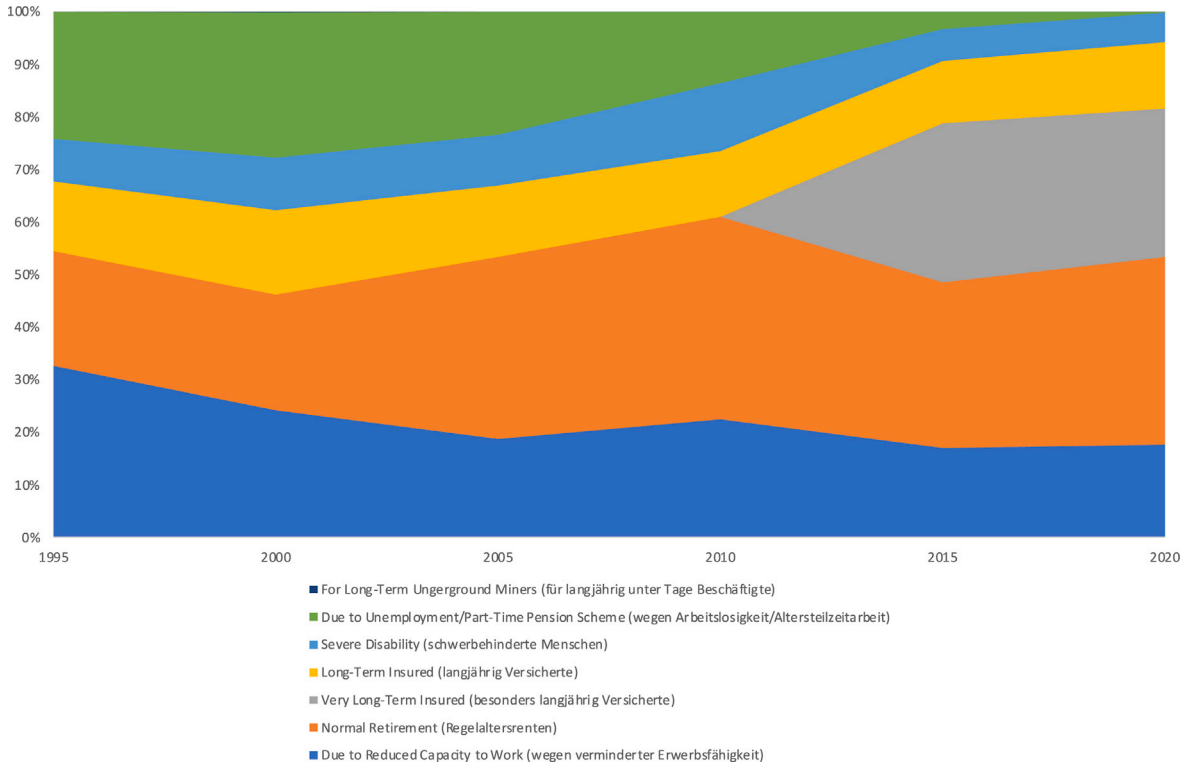

Fig. 1a. New pensions by pension type/pathway to retirement — Men. *Source:* Deutsche Rentenversicherung (2021), p.63; own illustration based on data every five years.

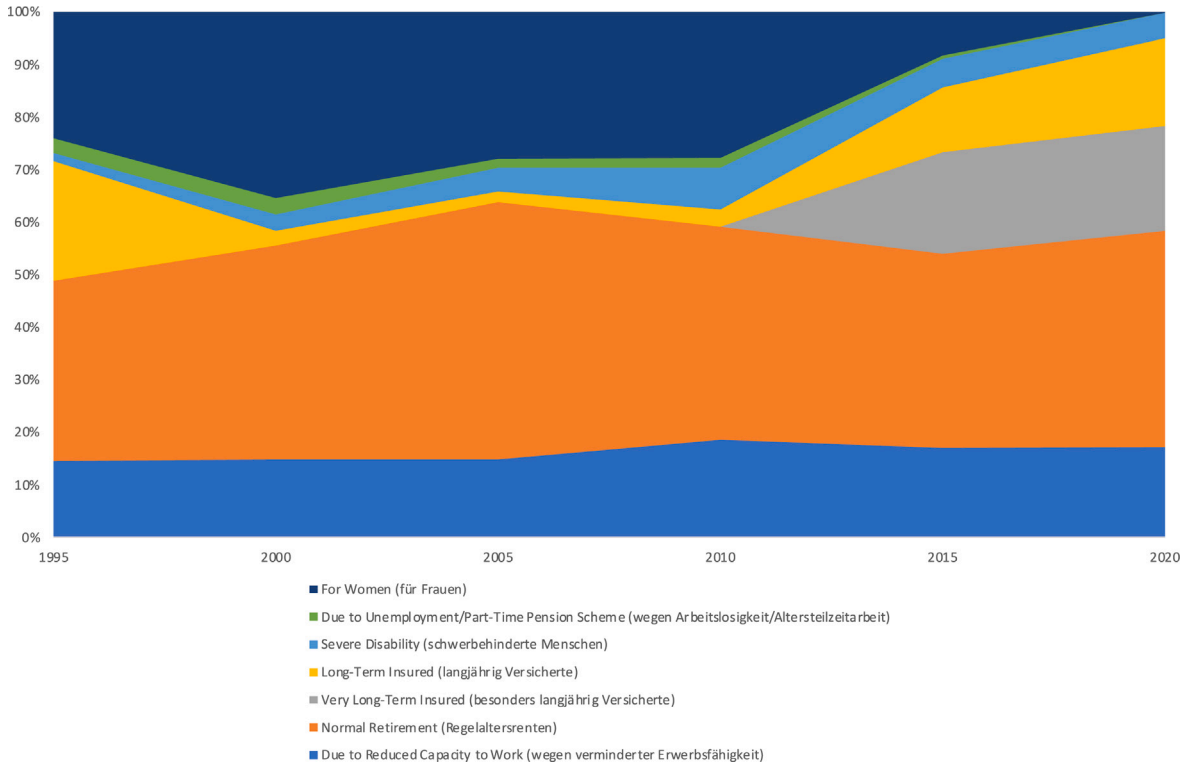

Fig. 1b. New pensions by pension type/pathway to retirement — Women. *Source:* Deutsche Rentenversicherung (2021), p.64; own illustration based on data every five years.

Our final sample, the "Male–Female Reform" sample uses couples from birth cohorts born in 1945 or later. We thus do not use birth cohorts 1942 to 1944 for whom the pension age for women was eventually raised to 65.

In the SOEP data, we observe age to the month, because both the month of interview and the month of birth are recorded in our data. This will be important for the regression discontinuity design below. Couples where one partner's age is out of the stated ranges are irrelevant to our research design and are hence not included in the sample in the respective calendar years. Because our sample is collected during the years 1984 to 2019, we use birth cohorts 1920 to 1969 who are in the stated age ranges at least some time during this period.

Sample means for the three subsamples are provided in Table 2. As expected, participation rates in the "Male–Female Reform" sample are higher than in the "Pre-Reform" sample, because the former cohorts are younger. The gap in participation rates between men and women is larger amongst the older "Pre-Reform" sample, which also confirms expectations, given recent trends in female labour force participation rates (Fitzenberger et al., 2004). In all subsamples and for both husbands and wives, we have observations on both sides of the typical retirement age thresholds 60, 63, and 65, as the means of the corresponding dummy variables are always between 0 and 1. Wives on average are between one and two and a half years younger than their husbands.[6]

For our further empirical analysis, we proxy retirement status by using an indicator for whether a person is participating in the labour force (employed or unemployed, a proxy for not being retired) or not (out of the labour force, proxy for being retired). In loose analogy to Fitzpatrick and Moore (2018), Figures Figs. 2a and 2b plot labour force non-participation rates by *own* age for husbands and wives for the three subsamples for our main sampling scheme. For both husbands and wives, labour market participation is higher at virtually every age for the "Male–Female Reform" sample. This difference is larger for wives than for husbands. In addition, for both husbands and wives, we observe that the drop in labour force participation becomes weaker at age 60 and stronger at age 65 after the reforms have played out ("own effects").[7] Figs. 2c and 2d plot labour force non-participation rates by *spouse's* age for husbands and wives, with local polynomial smooth linear trends allowing for jumps at ages 60, 63, and 65 ("cross effects"). For both husbands and wives, the Figures illustrate upward jumps in labour force non-participation at age 60 in the "Pre-Reform" sample, but this jump largely disappears in the "Male–Female Reform" sample.[8]

A more formal investigation of how husbands and wives react to their own and their spouses' crossing typical retirement ages before and after the implementation of early retirement reforms is examined in the econometric analysis below.

Table 2
Sample means — sampling scheme 1 (same birth cohort limits for husbands and wives).
Source: Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

	Pre-Reform	Male-Reform	Male–Female Reform
Husband participating	0.31	0.34	0.66
Wife participating	0.18	0.25	0.64
Age husband	63.84	63.21	60.91
Age wife	62.37	62.33	58.14
Husband older than 60	0.79	0.77	0.52
Husband older than 63	0.60	0.54	0.30
Husband older than 65	0.45	0.36	0.19
Wife older than 60	0.68	0.71	0.33
Wife older than 63	0.49	0.46	0.16
Wife older than 65	0.34	0.29	0.09
Calendar year	19.94	20.02	20.13
Observations	4577	3813	18,844
Number of households	536	427	3724

Notes: The "Pre-Reform Sample" involves couples with both spouses born before 1936. The "Male Reform Sample" includes couples with both spouses born between 1937 and 1941. The "Male–Female Reform Sample" consists of couples from cohorts born in 1945 or later.

4. Methodology

In examining how the two spouses' labour supply decisions interact, we apply a combined regression discontinuity and two-way fixed effects model. Our approach focuses on the three threshold ages of 60, 63, and 65 for both husbands and wives.[9] We use these thresholds as the basis for a Regression Discontinuity Design (RDD). In our baseline regressions, we include six binary indicators: equal to 1 when the wife (w) is at least 60 (AGE^{60w}), 63 (AGE^{63w}), and 65 (AGE^{65w}) years of age; and when the husband (h) is at least 60 (AGE^{60h}), 63 (AGE^{63h}), and 65 (AGE^{65h}) years of age, respectively, and zero otherwise. We estimate an equation that includes first-order polynomials for both husbands' and wives' ages. In line with standard practices in RDD, we allow for different slopes on either side of each age threshold by interacting a linear age variable for each spouse with each age cutoff of interest. Additionally, we control for fixed household-specific effects to account for unobserved household heterogeneity using SOEP longitudinal household survey data. The dependent variable $participating_{it}$ is a binary indicator for whether or not individual i at year t is participating in the labour force (working or unemployed). The baseline estimating equation is as follows:

$$participating^{g}_{it} = \alpha^{g} + \rho^{g}_{1} AGE^{60g}_{it} + \rho^{g}_{2} AGE^{63g}_{it} + \rho^{g}_{3} AGE^{65g}_{it} + \beta^{g} age^{g}_{it} \quad (1)$$

[6] In order to separately identify "cross" and "own" effects of oneself or one's spouse reaching an early retirement age, we still need a variation of age within couples in these samples defined on comparatively narrow birth year intervals. However, it turns out that only between 1.1 and 2.5 percent of the observations share the exact same calendar month of birth, so that there are hardly any couples where both partners have the same age measured in months. The share of observations where the difference in age is smaller or equal to 6 months is between 11 and 22 percent in these three samples, so that at least 78 percent of observations do not have a partner who has a similar age in terms of a maximum half a year difference. When counting the number of observations with at least one year age difference between the spouses, these are 67 percent in the "Pre-Reform" sample, 57 in the "Male Reform Sample", and 80 percent in the "Male–Female Reform" sample. Hence, within couples, there is still ample variation in age (measured in months) to separately identify "cross" and "own" effects of reaching critical retirement ages, although this variation is smallest in the transitional "Male Reform Sample". Another potential identification issue might arise if both spouses cross different (early) retirement thresholds at the same time. For example, one spouse might turn 63 in exactly the same month the other spouse turns 60. However, the share of spouses who are exactly (to the month) 2, 3 or 5 years apart is very small: the shares of observations born 2 years (exact to the month) apart are between 1.5 and 2.5 percent in the three samples, the corresponding shares of observations born 3 years apart are below 1 percent in all three samples and the shares of observations born 5 years apart are below 0.5 percent in all three samples.

[7] Male labour force participation in the age group 55 to 64 is comparatively high in Germany by OECD standards, with an increasing trend between 2010 and 2019 (OECD, 2020). Male labour force participation in this age group was 77 percent according to this source in Germany in 2016, whereas it was 56, 59, 66, 70, 72, 83, and 86 percent in France, Poland, Italy, USA, UK, Sweden, and Japan in the same year, respectively.

[8] Second-order polynomial estimates of labour force participation depending on spouse's age with jumps at ages 60, 63, and 65 confirm these findings in Figures C1 and C2 in Online Appendix C.

[9] See Bonsang and Van Soest (2020) who use a similar specification using SOEP data by focusing on these three ages 60, 63, and 65. Based on German administrative data, Seibold (2021) also observes a spike in retirements around these three age thresholds. A paper by Eibich (2015) also uses multiple discontinuities in the context of retirement's effect on health.

Fig. 2a. Sampling scheme 1 – Local polynomial smooth estimates of husbands' labour force non-participation (proxy for retirement) by husband's age by cohort group. *Source:* Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

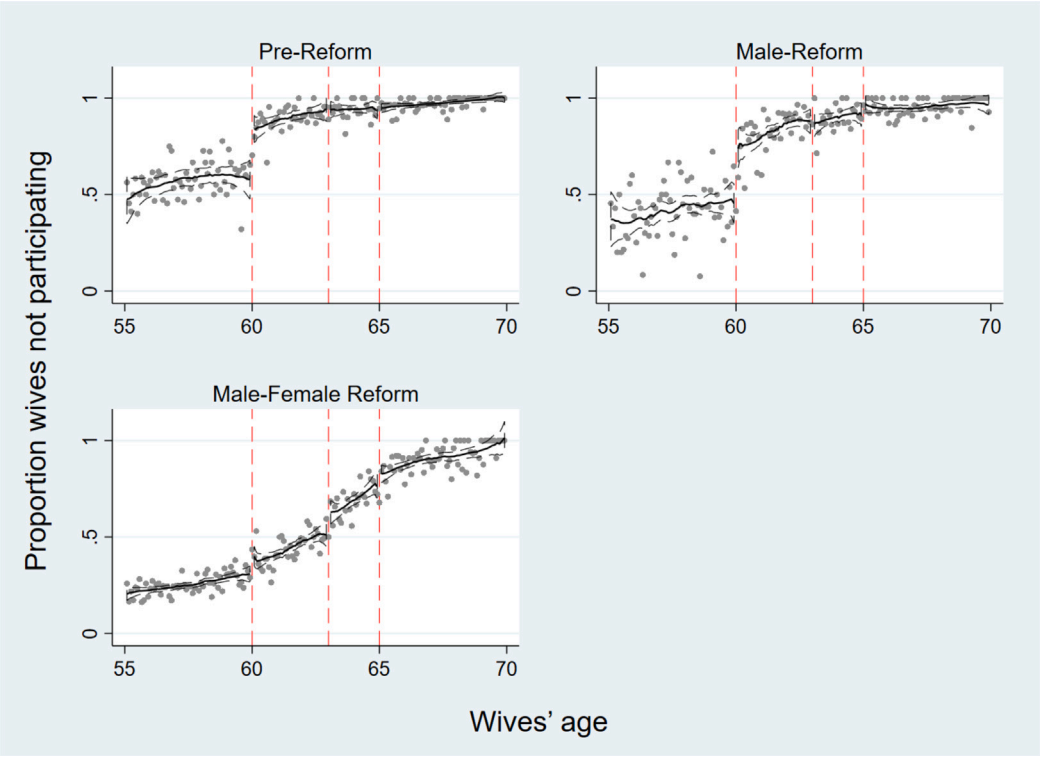

Fig. 2b. Sampling scheme 1 – Local polynomial smooth estimates of wives' labour force non-participation (proxy for retirement) by wives' age by cohort group. *Source:* Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

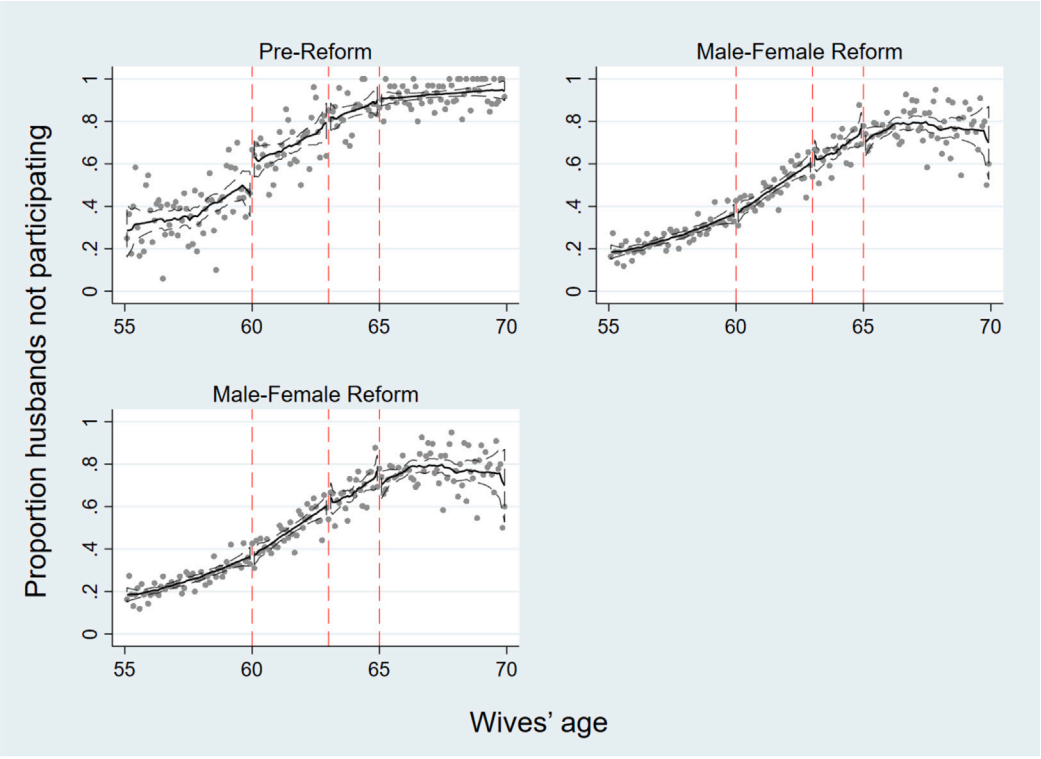

Fig. 2c. Sampling scheme 1 – Local polynomial smooth estimates of husbands' labour force non-participation (proxy for retirement) by wives' age by cohort group. *Source:* Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

Fig. 2d. Sampling scheme 1 – Local polynomial smooth estimates of wives' labour force participation (proxy for retirement) by husbands' age by cohort group. *Source:* Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

$$\gamma_1^g AGE_{it}^{60g} * age_{it}^g + \gamma_2^g AGE_{it}^{63g} * age_{it}^g + \gamma_3^g AGE_{it}^{65g} * age_{it}^g + \rho_1^{\bar{g}} AGE_{it}^{60\bar{g}} + \rho_2^{\bar{g}} AGE_{it}^{63\bar{g}} + \rho_3^{\bar{g}} AGE_{it}^{65\bar{g}} + \beta^{\bar{g}} age_{it}^{\bar{g}} + \gamma_1^{\bar{g}} AGE_{it}^{60\bar{g}} * age_{it}^{\bar{g}} + \gamma_2^{\bar{g}} AGE_{it}^{63\bar{g}} * age_{it}^{\bar{g}} + \gamma_3^{\bar{g}} AGE_{it}^{65\bar{g}} * age_{it}^{\bar{g}} + \mu_i^g + \lambda_t^g + \epsilon_{it}^g$$

where $g \in \{h, w\}$ and $\bar{g}$ is the gender of the spouse. Under the model assumptions, $Own_{60}^g = \rho_1^g + 60\gamma_1^g$, $Own_{63}^g = \rho_2^g + 63\gamma_2^g$, and $Own_{65}^g = \rho_3^g + 65\gamma_3^g$ are the own effects of the husband (wife), and $Cross_{60}^{\bar{g}} = \rho_1^{\bar{g}} + 60\gamma_1^{\bar{g}}$, $Cross_{63}^{\bar{g}} = \rho_2^{\bar{g}} + 63\gamma_2^{\bar{g}}$, and $Cross_{65}^{\bar{g}} = \rho_3^{\bar{g}} + 65\gamma_3^{\bar{g}}$ are the cross effects of the wife (husband) reaching the age thresholds of 60, 63, and 65 on the husband's (wife's) labour force participation probability, respectively. The β^g and $\beta^{\bar{g}}$ coefficients are those of the running variables (age^g and $age^{\bar{g}}$) of the regression discontinuity design. We allow for couple fixed effects μ_i^g and calendar year fixed effects λ_t^g. Standard errors are clustered at the couple level.

Although age can hardly be manipulated, there might still be differential sample attrition by age, so that in Figures C3 and C4 in Online Appendix C, we report McCrary (2008) density tests on our "running variable" "age" at the cut offs 60, 63, and 65 for the two main samples we are interested in, that is the "Pre-Reform" and the "Male–Female Reform" samples. As can be seen from the confidence intervals plotted in these graphs, they always overlap, so that the samples pass the McCrary (2008) test.

We will also carry out robustness checks estimating the effects by non-parametric regression discontinuity design with local polynomial regressions. Calonico et al. (2014b) suggest corresponding bias-corrected estimates with mean-square-error-optimal bandwidths and confidence intervals which take into account the additional variability generated by the estimation of the bias correction. These results have been extended to the inclusion of covariates in the local polynomial regressions in Calonico et al. (2019). We carry out these estimates using the Stata package *rdrobust* provided by the same authors and documented in Calonico et al. (2014a, 2017). The estimation strategy employs weighted least squares with kernel weights. With a triangular kernel which we use, the weights decrease towards zero the further away an observation is off the cutoff (see Calonico et al., 2017, p. 376).[10]

5. Results

5.1. Main results

Table 3 shows the reduced-form regression coefficients for the age discontinuities at the typical retirement ages 60, 63 and 65. The first three columns show the labour force participation estimates for husbands, the last three columns show the labour force participation estimates for wives. As we are mainly interested in the "cross effects", that is, how husbands react to their wives' reaching typical retirement ages and vice versa, we highlight the "cross effects" which are reported in the lower left and upper right parts of the tables.

As shown in Table 3, in the "Pre-Reform" sample, when the generosity of early retirement schemes still allows many workers of both sexes to retire early at low cost, both husbands and wives significantly reduce their labour supply when the spouse reaches age 60: wives reduce their labour supply by 4.5 percentage points (significant at the 10 percent level) when the husband reaches age 60, whereas husbands reduce their labour supply by 5.5 percentage points (significant at the 10 percent level), when the wife reaches age 60. Hence, in this setting, the "cross effects" between husbands and wives are almost symmetric, as previously found by in Table 6 in Bonsang and Van Soest (2020)—also based on SOEP data for Germany with a slightly different model specification – and by Atalay et al. (2019) for Australia. As might be expected – as husbands are more than a year older than their wives in the "Pre-Reform" sample – wives also reduce their labour supply by 7.7 percentage points (significant at the 1 percent) level when their husbands reach age 63. The corresponding estimate for husbands when their wives reach age 63 is smaller at statistically insignificant 2.3 percentage points.

How do these almost symmetric "cross effects" in labour supply (when the spouse reaches age 60) change for the cohorts affected by reforms of the early retirement schemes? As shown in Table 3, the cross effects become much smaller and mostly statistically insignificant, most notably for husbands, but also for wives: for the "Male Reform" and "Male–Female Reform" sample, the coefficients for the wives crossing age 60 are close to zero in the labour supply regression for husbands and not statistically significant. In the regression for wives, the coefficients for the husband crossing age 60 are an insignificant minus 1.0 percentage points in the "Male Reform" and minus 1.2 percentage points (significant at the 10 percent level) in the "Male–Female Reform" sample. Still, the point estimate of minus 1.2 percentage points for the "Male–Female Reform" sample is only slightly more than a quarter of the point estimate of minus 4.5 percentage points for the "Pre-Reform" sample. Note that the wives' labour supply reaction to the husbands' crossing the age 63 threshold also becomes close to zero and statistically insignificant in the "Male–Female Reform" sample. These findings confirm that the reforms making early retirement more costly to workers decreased or even eliminated the "cross effects" of one spouse reacting to the other crossing an age threshold for an early retirement scheme. It might also have made these cross effects less symmetric by eliminating the husbands' reactions to their wives' crossing age 60, whilst there is still a small reaction of the wives' labour supply to their husbands' crossing the age 60 threshold.[11]

We can obtain the "scaled effects" by dividing the "cross effects" for husbands by the "own effects" for wives. The reduced form "cross effects" combine the effects of the spouse reacting to crossing the age 60 threshold *and* the own reaction to the spouse's choice to retire, the latter being the "scaled effect". Calculating the "scaled effects" for husbands in Table 3 results in −0.055/−0.202 = 0.272 in the "Pre-Reform" and −0.007/−0.054 = 0.130 in the "Male–Female Reform" sample, respectively. These point estimates imply that "Pre-Reform", slightly more than 1 in 4 husbands retire when their wife actually retires at age 60, whereas after several of the reforms have played out, only slightly more than 1 in 8 husbands retire. For wives, however, the point estimates of the "scaled effects" even increase from −0.045/−0.177 = 0.254 "Pre-Reform" to −0.012/−0.032 = 0.375 in the "Male–Female Reform" sample. Hence, whereas the point estimates

[10] In our application, we specify a local linear regression for the point estimator and a local quadratic regression for the bias correction. "BW est". in Table A7 in Online Appendix A refers to the optimal bandwidth of the triangular kernel used in the local polynomial regression. For example, a "BW est". of 2.1 at the cutoff age of 60 means that observations outside of the age interval of 57.9 and 62.1 years will be ignored in the non-parametric local polynomial regressions.

[11] We do not go into detail discussing the "own effects" in Table 3, as these are not the main focus of the paper. In general, we find that after most the reforms have played out, both husbands and wives react more strongly to the normal retirement age of 65, but less strongly to the early retirement age of 60. One oddity occurs for the "Male-Reform" sample, where the point estimate of the reaction to the age 60 threshold is larger than for the "Pre-Reform" sample, that is in spite of the reform. This may be due to sampling variation or due to the sampling scheme, because the range of birth cohorts for this transitional sample is rather small with both spouses born between 1937 and 1941. Hence, as shown in the sample means of Table 2, the age gap of both spouses in this sample is smaller than in the other two samples. There might hence be a stronger incentive to retire jointly in a sample where both partners are more likely to have the same age.

Table 3
Sampling scheme 1 – Main results – Baseline model.
Source: Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

	Regressions for Husbands				Regressions for Wives		
	Pre-Reform	Male-Reform	Male-Female Reform		Pre-Reform	Male-Reform	Male-Female Reform
Own^{h}_{60}	-0.177***	-0.201***	-0.032***	$Cross^{h}_{60}$	-0.045*	-0.010	-0.012*
	(.035)	(.035)	(.011)		(.027)	(.033)	(.009)
Own^{h}_{63}	-0.099***	-0.039	-0.079***	$Cross^{h}_{63}$	-0.077***	-0.007	0.010
	(.032)	(.028)	(.018)		(.022)	(.023)	(.014)
Own^{h}_{65}	-0.045**	-0.029	-0.103***	$Cross^{h}_{65}$	-0.008	0.024	0.004
	(.022)	(.025)	(.019)		(.016)	(.017)	(.016)
$Cross^{w}_{60}$	-0.055*	-0.010	-0.007	Own^{w}_{60}	-0.202***	-0.287***	-0.054***
	(.029)	(.031)	(.013)		(.030)	(.038)	(.012)
$Cross^{w}_{63}$	-0.023	-0.002	0.016	Own^{w}_{63}	0.002	0.046*	-0.067***
	(.026)	(.025)	(.020)		(.017)	(.024)	(.020)
$Cross^{w}_{65}$	-0.012	0.019	0.021	Own^{w}_{65}	-0.003	-0.014	-0.061***
	(.020)	(.022)	(.021)		(.015)	(.020)	(.021)
Observations	4,577	3,813	18,844		4,577	3,813	18,844

Notes: The table shows regression discontinuity estimates for the own and the cross effects of reaching age 60, 63, and 65 thresholds for both husbands ("h") and wives ("w"). The regressions also contain a first-order polynomial for both husbands' and wives' age, couple and calendar year fixed effects. Standard errors are in parentheses and clustered by person identifier. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

of the "scaled effects" are very similar between husbands and wives before the reforms, an asymmetry emerges after most of the reforms have played out. In the "Male–Female Reform" sample, wives react in a similar way to their husbands' actual retirement at age 60, but the "cross effects" for wives are still smaller, because their husbands are less likely to retire. Husbands, on the other hand, react less to their wives' actual retirement at age 60 in the "Male–Female Reform" sample.

As mentioned by Trampusch (2005) and Riphahn and Schrader (2021), unemployment may be used "as a bridge to retirement". In Table A1 of Online Appendix A, we therefore provide estimates with a binary indicator for employment instead of labour market participation as the dependent variable. If a lot of workers are unemployed and hence not working before reaching any of the aforementioned retirement ages, we will expect the coefficients in Table A1 to be mostly smaller than the ones in Table 3. This is indeed the case for most of the "own effects". Indeed, Table A2 of Online Appendix A shows that when using a binary indicator for unemployment as the dependent variable, the "own effects" show that in the "Pre-Reform" and "Male Reform" samples, both men and women leave unemployment when crossing age 60 by between 9.2 and 14.6 percentage points and these effects are significant at the 1 percent level. The effects are larger for men than for women and for men there is even a statistically significant reduction in unemployment by 1.9 percentage points in the "Male–Female Reform" sample. For men, the reduction in unemployment when crossing age 60 even dominates the reduction in employment, supporting (Trampusch, 2005; Riphahn and Schrader, 2021) that unemployment is also used "as a bridge to retirement", so that a significant share of workers already stopped working before age 60 and received unemployment benefits, before transiting from the unemployment into the pension system when reaching age 60.

However, when comparing the "cross effects" at age 60, that is the labour force participation versus employment behaviour when the spouse reaches age 60, we find hardly any differences in the point estimates between Table 3 and Table A1. For husbands, the "cross effect" is even somewhat larger at 6.4 percentage points and statistically significant at the 5 percent level when considering employment instead of labour force participation as the dependent variable.[12] Hence, it seems that our finding of the "cross effects" vanishing after the early retirement reforms is unaffected by the fact that some workers use unemployment as a bridge to early retirement.[13]

One explanation for why the effects of unemployment as a bridge to retirement might not be so pervasive as to effect our "cross-effect" estimates might be that the effects for unemployment benefit receipt are lower than the effects for unemployment in general. This can be seen by comparing Tables A2 and A3 in Online Appendix A: for men, when the dependent variable is unemployment with unemployment benefit receipt, the "own effects" at age 60 are only two thirds or less

[12] The "scaled effects" for employment as dependent variable are higher than the "scaled effects" for labour force participation as dependent variable: they are −0.064/−0.110 = 0.582 and 0.003/−0.049 = -0.061 for husbands in the "Pre-Reform" and "Male–Female Reform" samples, respectively, and −0.046/−0.050 = 0.920 and −0.011/−0.014 = 0.786 for wives in the "Pre-Reform" and "Male–Female Reform" samples, respectively.

[13] As mentioned by Engels et al. (2017) and Steffen (2024), there was a reform of the duration of unemployment benefit receipt for workers aged 57 and older, which was reduced from a maximum of 32 months to 18 months from February 2006, to be somewhat increased again to 24 months in 2008. The birth cohorts turning 57 in year 2006 or later were born in 1949 or later and hence these cohorts form part of the "Male–Female Reform" sample. As a consequence, these reforms of the maximum unemployment benefit duration might also have contributed to the "cross effects" vanishing for the younger cohorts. However, insofar as the unemployment benefit system was de facto used as a bridge to early retirement, these reforms might also be seen as a de facto reform of early retirement by making early exit from the labour market more costly. Another change affecting most cohorts of long-term unemployed workers (more precisely workers on "unemployment benefit II", in German *ALG-II*) of the "Male–Female Reform" sample was the 2008 abolition of mandatory retirement for older workers still below the age of 63, see p. 113 of Steffen (2024). However, whereas this reform delayed retirement for some workers, it remains unclear in which way it made the co-ordination of joint retirement more difficult for couples.

as large as for unemployment. For women, the corresponding effects are not even half as large. This suggests that a significant part of unemployment which appears as a bridge to early retirement is not unemployment accompanied by unemployment benefit receipt.[14,15]

Because the pension reforms were implemented over a period of several years, the "Pre-Reform" and "Male–Female Reform" cohorts were born at least 8 years apart. We cannot exclude that there were trends other than the pension reforms affecting successive cohorts, although this would only matter if these trends impacted on the costs and benefits of early retirement. Still, in order to attenuate this potential problem, we provide estimates without the very oldest and youngest birth cohorts in Table A5, only using birth cohorts 1929 to 1951 (rather than 1920 to 1969), thus significantly reducing sample sizes for the "Pre-Reform" and "Male–Female Reform" cohorts. As shown in Table A5, the results are qualitatively robust and estimates for the "Pre-Reform" cross effects for the spouse turning 60 are even slightly larger than in Table 3, at 7.9 and 6.5 percentage points for husbands and wives, respectively.

As a further robustness check, we make the functional form of our model even more flexible. In Table A6, we introduce dummy variables to allow for discontinuous changes in labour force participation at all ages between 60 and 65, that is at ages 60, 61, 62, 63, 64 and 65. This does not only make the functional form more flexible, but also allows for potential focal retirement ages in between the typical ages 60, 63, and 65: some workers might be allowed to retire at age 60, but might personally aim for a different age, say 62. In addition, the reforms successively increased retirement ages so that for a few cohorts and retirement pathways, the early retirement age effectively was 62 or 64. Table A6 shows that in this more flexible model, the "Pre-Reform" results for the "cross effects" for the spouse turning 60 are qualitatively robust to the inclusion of further discontinuities between ages 60 and 65. Quantitatively, the estimates are even larger than in Table 3, at minus 12.9 percentage points for husbands and minus 9.1 percentage points for wives, but so are the standard errors at 4.5 and 3.6 percentage points, respectively. Similar to our main model of Table 3, the "cross effects" for the spouse turning age 60 are close to zero and statistically insignificant for the "Male–Female Reform" cohorts.

In Table A7, we provide an alternative, more flexible specification by estimating the non-parametric local polynomial regression discontinuity estimator, as discussed in Section 4. As in Table A6, the point estimates of the "own effects" for the spouse turning 60 are larger in Table A7 than in Table 3 at minus 8.8 and minus 13.4 percentage points for husbands and wives, respectively, with larger standard errors at 5.1 and 6.3 percentage points, respectively. The local polynomial estimates confirm our results based on a parametric specification, in that the cross effects for the "Pre-Reform" sample are negative and statistically significant for both husbands and wives when the spouse crosses the age 60 threshold, whereas the corresponding estimates move closer to zero and become statistically insignificant in the "Male-Reform" and "Male–Female Reform" samples.

5.2. Results by age difference

One remarkable result from Table A6 that we have not discussed so far is the fact the "cross effects" for husbands in the "Pre-Reform" cohorts are statistically significant for almost all ages between 60 and 65, so that men react to their wives crossing these ages, but the reverse is not true: wives only react to their husbands crossing age 60, but not the subsequent ages 61, 62, to 65. As husbands are usually older than their wives, this result could be consistent with a situation where older husbands wait until their wives reach an early retirement age in order to retire jointly. We might not see this effect in the coefficients for wives, because of the comparatively low share of wives who are older than their husbands and the propensity of wives to retire earlier (because many women could retire at age 60 in the "Pre-Reform" cohorts).

In order to delve deeper into this issue, we split the sample in Table 4 in order to present separate estimates for the subsample where husbands are older than their wives and the smaller subsample where wives are older than their husbands. Because of the reduced sample size, we only provide discontinuity estimates for ages 60, 63, and 65. As Table 4 shows, significant cross effects at age 60 are only observed for the older spouse when the younger spouse reaches age 60 in the "Pre-Reform" cohorts: for husbands older than their wives in the "Pre-Reform" cohorts, Table 4 states a statistically significant reduction in labour force participation of 6.6 percentage points (compared to the overall effect of 5.5 percentage points in Table 3). For husbands younger than their wives, the corresponding point estimate is very close to zero and not statistically significant. Hence, it seems that the effect we observe in Table 3 is driven by husbands who are older than their wives and hence older than 60 years of age. A similar result is obtained for wives of the "Pre-Reform" cohorts: the "cross effect" for wives whose husband becomes older than age 60 is only statistically significant for wives who are older than their husband: the point estimate is statistically significant at minus 9.4 percentage points for older wives, whereas for wives who are younger than their husband the point estimate is statistically insignificant at 2.9 percentage points. Hence, the significant "cross effect" effect observed for wives in Table 3 is mainly driven by wives who are older than their husbands. For Denmark, García-Miralles and Leganza (2024) similarly find that joint retirement is primarily achieved by older spouses waiting for younger spouses to reach their early retirement age. Using an alternative German data set, Etgeton et al. (2023) show that couples with the older spouse (here husbands) dominate the observed labour market and savings reactions to the abolition of the early retirement options for women at age 60 for cohorts born in 1952 or later.

Even for the "Male–Female Reform" cohorts, Table 4 exhibits a comparatively large reduction of wives' labour force participation when their younger husbands turn 60 or 63: the statistically significant point estimates are minus 6.7 and minus 10.2 percentage points respectively. No such effects are observed for husbands who are older than their wives in the "Male–Female Reform" cohorts. Hence, for these cohorts, for whom early retirement is costlier, there is an asymmetry in the reaction of older wives and older husbands to their spouses' crossing early retirement ages. This result to some extend concurs with García-Miralles and Leganza (2024), who find that wives respond a bit more to their husbands than vice versa in Denmark.

Only allowing couples in the sample where both spouses are born within a rather short birth year interval raises the question of the representativeness of our sampling procedure. As a robustness check and to take account of the fact that wives tend to be younger than their husbands, we use a second sampling scheme, where we shift the birth year intervals of wives forward by three years. In our second sampling scheme, we observe 14,899 observations for 1868 couples. Table B1 in Online Appendix B illustrates the second sampling scheme in connection with the pension age reforms. The "Pre-Reform" sample thus contains husbands born up to 1936, whereas their wives may be born up to 1939. In such defined couples, neither husbands nor wives are affected by any of the discussed pension reforms. The "Transition Sample" contains husbands born between 1937 and 1941 with wives born between 1940 and 1944. Both husbands and wives experienced

[14] The positive "cross-effects" for husbands when their wives turn 63 or 65 in the "Male-Reform" sample might be surprising. However, when we split the sample according to whether the husband or wife is older, Table A4 shows that husbands who are younger than their wives seem to enter unemployment and draw benefits when their older wives turn 63 or 65. This is another indicator for unemployment benefits being used as a bridge to early retirement.

[15] Because data on retirement due to "reduced earnings capacity", which is available even before age 60, has only been collected in the SOEP since 2013, we cannot investigate whether this pathway to early retirement – which requires a medical examination – has significantly replaced other pathways as a bridge to early retirement, too.

Table 4
Sampling scheme 1 – Own and cross effects by subsamples based on the age differences between spouses.
Source: Socio-Economic Panel (SOEP), data for years 1984–2019, SOEP-Core v36, 2021, doi:10.5684/soep.core.v36; own calculations.

	Regressions for Husbands				Regressions for Wives		
	Pre-Reform	Male-Reform	Male-Female Reform		Pre-Reform	Male-Reform	Male-Female Reform
Husbands older than their wives							
Own_{60}^{h}	-0.122***	-0.162***	-0.036***	$Cross_{60}^{h}$	-0.029	0.014	-0.004
	(0.040)	(0.044)	(0.011)		(0.037)	(0.046)	(0.009)
Own_{63}^{h}	-0.127***	-0.043	-0.073***	$Cross_{63}^{h}$	-0.101***	-0.011	0.023
	(0.038)	(0.034)	(0.019)		(0.028)	(0.030)	(0.014)
Own_{65}^{h}	-0.075***	-0.028	-0.101***	$Cross_{65}^{h}$	-0.006	0.024	0.008
	(0.027)	(0.032)	(0.021)		(0.022)	(0.024)	(0.017)
$Cross_{60}^{w}$	-0.066*	-0.016	0.016	Own_{60}^{w}	-0.206***	-0.332***	-0.058***
	(0.035)	(0.042)	(0.015)		(0.036)	(0.044)	(0.014)
$Cross_{63}^{w}$	-0.037	-0.036	0.020	Own_{63}^{w}	0.004	0.070**	-0.074***
	(0.026)	(0.032)	(0.023)		(0.022)	(0.029)	(0.022)
$Cross_{65}^{w}$	0.007	-0.023	0.012	Own_{65}^{w}	0.006	0.001	-0.050*
	(0.020)	(0.027)	(0.024)		(0.019)	(0.024)	(0.026)
Observations	3,315	2,708	16,167		3,315	2,708	16,167
Husbands younger than their wives							
Own_{60}^{h}	-0.278***	-0.286***	0.006	$Cross_{60}^{h}$	-0.094**	-0.054	-0.067*
	(0.071)	(0.063)	(0.029)		(0.044)	(0.073)	(0.036)
Own_{63}^{h}	-0.066	-0.024	-0.120**	$Cross_{63}^{h}$	-0.024	-0.004	-0.102**
	(0.059)	(0.059)	(0.052)		(0.028)	(0.034)	(0.044)
Own_{65}^{h}	-0.018	-0.103**	-0.100*	$Cross_{65}^{h}$	-0.026	0.032	-0.056
	(0.042)	(0.042)	(0.057)		(0.023)	(0.027)	(0.042)
$Cross_{60}^{w}$	-0.001	0.107*	-0.064***	Own_{60}^{w}	-0.169***	-0.207**	-0.029
	(0.058)	(0.056)	(0.022)		(0.058)	(0.084)	(0.026)
$Cross_{63}^{w}$	0.025	0.075	0.010	Own_{63}^{w}	0.003	-0.006	-0.032
	(0.060)	(0.048)	(0.036)		(0.029)	(0.049)	(0.044)
$Cross_{65}^{w}$	-0.015	0.148***	0.039	Own_{65}^{w}	0.008	-0.047	-0.089**
	(0.056)	(0.044)	(0.045)		(0.029)	(0.032)	(0.037)
Observations	1,262	1,105	2,677		1,262	1,105	2,677

Notes: The table shows regression discontinuity estimates for the own and the cross effects of reaching age 60, 63, and 65 thresholds for both husbands ("h") and wives ("w"). These estimates are further broken down by subsamples based on the age differences between spouses. The regressions also contain a first-order polynomial for both husbands' and wives' age, couple and calendar year fixed effects. Standard errors are in parentheses and clustered by person identifier. ***, **, and * indicate statistical significance at the 1, 5, and 10% levels, respectively.

reforms of early retirement schemes that made retirement at age 60 costlier through discounts in the pension received. The "Post-Reform Sample" consists of husbands born between 1949 and 1953 and wives born between 1952 and 1956. For these couples, the pension reforms discussed here have mostly been completed: women born in 1952 or later could not retire under the "retirement for women" scheme at the age of 60 any more, not even with a discount. For these cohorts, therefore, the available retirement schemes were identical to the ones for men.[16]

The sample means for the subsamples under this alternative sampling scheme are displayed in Table B2: the age gaps between husbands and wives are slightly larger than for the subsamples of the main sampling scheme, namely between about 2 and 3 years.[17]

[16] Note that there were still some reforms playing out, such as a very gradual increase of the regular retirement age as well as of the age of retirement under the retirement "due to severe disability" scheme. There were also gradual shifts in the retirement age due to "long-term insurance" and "very long-term insurance".

[17] Another fact worth mentioning is that the "Post-Reform Sample" under sampling scheme 2 is of similar size as the first two subsamples of this sampling scheme, whereas the "Male–Female Reform" sample in our main sampling scheme contains many more observations than the first two subsamples under this sampling scheme. The reason is that the "Male–Female Reform" sample only has an age, but not a year of birth restriction for the younger cohorts,

Table B3 shows results analogous to Table 3, estimated on this alternative sampling scheme. The results reflect those of the upper panel of Table 4, that is for the subsample where husbands are older than their wives. That is, in Table B3, only the "cross effect" for husbands when their wives are turning 60 is statistically significant for the "Pre-Reform" sample at minus 4.3 percentage points. This effect vanishes for the other cohort groups with more costly early retirement options (which might include dropping out of the labour market without any personal income except for the legal right to share the spouse's income). For wives, only one "cross effect" in the "Pre-Reform" sample is significant at minus 6.8 percentage points, which is when their husbands turn 63. This corresponds to the significant but less precisely estimated minus 10.1 percentage point estimate in the upper panel of Table 4.

6. Discussion and conclusions

This paper uses German SOEP data to investigate how husbands and wives react to their spouse's reaching a typical (early) retirement age before and after a period of several early retirement reforms. It is these "cross effects" that we are interested in. We find evidence for leisure complementarities between husbands and wives in that during the "Pre-Reform" period, when several pathways to early retirement were still relatively accessible, husbands and wives react almost symmetrically to their spouses' reaching age 60. The point estimates for a labour force participation indicator regressed on – amongst others – an indicator for the spouse being 60 years of age is around minus 5 percentage points for the "Pre-Reform" period cohorts. This implies that about one in 20 spouses retires when the other spouse reaches age 60. This effect becomes smaller or disappears for the cohorts affected by the early retirement reforms, which have made early retirement costlier.

Our findings provide novel insights on how to interpret the asymmetry of "cross effects" identified in some of the earlier studies. Specifically, asymmetric leisure complementarities were suggested as interpretation of the empirical observation that husbands react to wives' reaching a retirement age differently than vice versa. We show that the observed labour supply choices depend not only on preferences, but also on constraints. We show that the observed symmetry of these cross effects during a period of very generous early retirement options disappears as early retirement options become less accessible and more costly in terms of pension benefit reductions.

We find almost no "cross-effects" for the "Male–Female Reform" cohorts, but robust effects for the "Pre-Reform" cohorts. In addition to early retirement eligibility, these two groups of cohorts differ by age, which could imply differences in other relevant aspects, such as health, education, or occupational structure. However, the "cross effect" is not only insignificant at age 60, but it is also not shifting to older ages for the cohorts affected by the majority of reforms. Furthermore, studies relying on administrative data for Germany find that the reform had "own effects" based on a cohort by cohort analysis. We interpret these facts jointly as evidence that the reforms or abolition of early retirement pathways were major drivers of couples being less likely to retire jointly.

CRediT authorship contribution statement

Hamed Markazi Moghadam: Writing – review & editing, Formal analysis, Data curation. **Patrick A. Puhani:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Funding acquisition, Conceptualization. **Joanna Tyrowicz:** Writing – review & editing, Project administration, Funding acquisition, Conceptualization.

whereas the "Post-Reform Sample" starts with comparatively young birth cohorts and only contains five birth year cohorts for each sex.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

We are happy to make our do files (code) available. The SOEP data themselves are easily available to researchers and can be accessed from DIW, Berlin. Email: soepmail@diw.de.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.labeco.2024.102627.

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