I've Got You Covered: The Role of Spousal Information Sharing in Applying for Social Security Pensions in Rural Brazil.

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Abstract

In this paper, we assess the mechanism of spousal information sharing about retirement benefits as a key factor determining access to social security among married Brazilian couples residing in rural areas. Employing a regression discontinuity design, we unveil a significant increase in the probability of an individual's access to an age-related retirement benefit as a result of his/her partner gaining access to it, even in cases where the individual was previously already entitled to the benefit. We also show that the effect is stronger among low educated couples and that the hypothesis of retirement spillovers cannot account for this phenomenon.

JEL classification: D190, D620, D910, H550, I380.

Keywords: Information Sharing. Public Policy. Access to Social Security. Regression Discontinuity.

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1 Introduction

Driven by recent demographic trends involving population aging, ensuring access to social security has emerged as a critical concern in safeguarding the livelihoods of older individuals across developed and developing contexts (Kidd, 2017). Consequently, a number of countries have focused on expanding the coverage of retirement schemes, aiming to include those working in informal sectors, who face the risk of falling into poverty when difficulties associated with age dictates they can no longer keep working (International Labour Organization, 2016, 2021).

Despite recent governmental efforts, several challenges persist on the path towards achieving universal coverage. Researchers have delved on the reasons why certain eligible individuals refrain from participating in social protection initiatives and on the economic characteristics that are associated with this phenomenon. Early work by Moffitt (1983) shed light on the importance of costs associated with participation, specially the fear of being stigmatized, in diminishing the program's perceived benefits.[1] Although it has latter been found that stigma is likely not the leading driver of non-take up (Currie, 2006; Ranci & Arlotti, 2019) subsequent scholars found no difficulties in extending Moffitt (1983)'s model to include other types of transaction costs.

Commonly cited barriers that lead individuals not to benefit from policies designed to protect them include a number of socioeconomic characteristics such as lack of local government and social connections (Aizer & Currie, 2004; Asri, 2018; Stoeffler et al., 2016), disabilities (Banks et al., 2021; Hameed et al., 2023; Mitra, 2010), low literacy levels (Bargain et al., 2012; Heckman & Smith, 2004) and lack of information about program existence or eligibility (Bhargava & Manoli, 2015; Fuchs, 2007; Tempelman & Houkes-Hommes, 2016). Transaction costs can originate not only from individual's preferences and characteristics, but also from program design and institutional features, as noted by Van Oorschot (1991). Cumbersome bureaucratic procedures during enrollment is shown to be discouraging participation in experiments conducted by Bettinger et al. (2012) and Finkelstein and Notowidigdo (2019). Similarly, the complexity of the criteria in means-tested benefits breeds uncertainty of eligibility among target population (Asri et al., 2022), discouraging people to commit their time attempting to enroll (Kleven & Kopczuk, 2011). More importantly, the calculus of cost-benefit in deciding to apply for a program is found to be very sensitive to the benefit amount and duration (Dahan & Nisan, 2010; Daponte et al., 1999).

This paper adds to the literature by examining whether marriage (or co-habitation) impacts the ability of individuals in rural Brazil to receive a pension benefit. To conduct this research, we employ a fuzzy regression discontinuity design to examine the causal relationship between the spouse's pension status and its impact on the individual's own pension status. Our analyses yield empirical evidence substantiating a reciprocal influence

[1] Recent studies that consider the question of stigmatization of social programs beneficiaries include Baumberg (2016), Blumkin et al. (2015), and Friedrichsen et al. (2018).

between pension application timelines within rural couples in Brazil. We demonstrate that the partner access to pension benefits increases the likelihood of the individual receiving pensions by 24.1 percentage points for men and 21.5 percentage points for women.

Moreover, we show that married workers tend to receive retirement pensions after reaching minimum age at a higher rate than the single ones (an increase of 10 p.p. for men and 25 p.p. for women), especially when both partners can apply at the same time. Furthermore, our findings indicate that these spillover effects are still present even when the individual was already eligible based on the age criterion. This runs counter to the incentives embedded in the institutional framework of rural retirement, as rural workers face a legal framework that encourages immediate request of retirement benefits upon securing eligibility. Particularly, the absence of implicit taxes on labor, given that the pension amount remains unaltered even without a break in work activity, largely simplifies the decision-making process concerning whether to claim retirement benefits.

The absence of indirect partner effects in the sample of higher educated individuals, coupled with the fact that work retirement is not affected by pension access, lead us to conclude that behavioral and informational effects, rather than retirement coordination, are more likely driving these results.[2] This phenomenon is not novel in the literature, as previous studies have demonstrated not only the existence of considerable uncertainty among working individuals regarding social security rules and pension amounts (Chan & Stevens, 2008; Gustman & Steinmeier, 2005), but also that informational and assistance related interventions can influence retirement attitudes. Notably, through field experiments, researchers are able to show that such interventions can impact retirement planning (Beshears et al., 2013; Collins & Urban, 2016) and behavior (Liebman & Luttmer, 2015).

While previous studies have examined the relationship between marital status and program participation, the findings have been inconclusive. On one hand, being married can increase program awareness and participation through the dilution of transaction costs associated with information gathering and bureaucratic hassle (Chareyron & Domingues, 2018). Conversely, married individual's are likely to be less vulnerable as the other partner's income can cushion the family's consumption level, potentially dissuading them from seeking formal social assistance, especially if associated transaction costs are high (Lain & Julia, 2024). [3]

This article is structured as follows: Section 2 briefly describes the different legal retirement possibilities faced by individuals in our sample. Section 3 presents the utilized dataset, and Section 4 explains the methodology employed and potential limitations. We

[2] Complementarities in the taste for leisure in a couple refer to the additional utility derived from both partners sharing the same state in the discrete set of possibilities with the partner: {Working, Not Working}. See Gustman and Steinmeier (2004) and Maestas (2001).

[3] Most studies of cost-benefit analysis of social programs focus on lucrative but hardly highly consequential assistance such as the Supplemental Nutrition Assistance Program (SNAP, formerly know as Food Stamps) in the United States (Daponte et al., 1999; Finkelstein & Notowidigdo, 2019), job training initiatives (Heckman & Smith, 2004) and financial aid for college enrollment (Bettinger et al., 2012). One notable exception is Matsaganis et al. (2010) who similarly studies non-take up of non-contributory social insurance programs in Greece and Spain.

then move on to the results in Section 5, where we present the coefficients of the regression discontinuity, both the first and second stages of the fuzzy regression, demonstrating the existence of the phenomenon and then we test the hypothesis of informational spillovers. In the same section, we conduct robustness tests to ensure the strength of our results. Finally, in Section 6, we present our conclusion based on the results and the questions outlined at the beginning of the article.

2 Institutional context

The rural population in Brazil exhibits significant diversity in terms of the pension opportunities available to them. Residence in rural areas does not automatically entail participation in activities that qualify for rural retirement benefits. Each pension scheme is tailored to a specific demographic and is governed by a distinct set of legal regulations, influencing the optimal work decisions for its beneficiaries. This section aims to briefly elucidate the differences between various pension schemes.

The pension benefit by age can be requested when a worker reaches the age of 65 or 60 for men and women, respectively. However, for those engaged in rural activities, the eligibility age is lower, set at 60 for men and 55 for women. It is by far the most common type of pension in rural areas. Between 2015-2019, it accounted for 90.88% of the new benefits granted, according to data from the Statistical Yearbook of Social Security (Ministério do Trabalho e Previdência Social [AEPS], 2015 to 2019). Notably, this retirement category is marked by considerable uniformity in the benefit amount. In the same period, 98.72% of new rural retirements benefits granted were in amounts equal to the prevailing federal pension floor, equivalent to the current federal minimum wage.

Furthermore, breaking down the number of new age-related retirement benefits issued during the same period by age groups, as per AEPS (2015 to 2019), reveals that the rate of late retirement benefit is higher among women. Between 2015 and 2019, 17% of women who retired through the INSS became eligible for the benefit after the age of 59. In contrast, among men who applied, 94% did so within the expected age range, between 60 and 64 years.

In these regions, there are also special regimes depending on the nature of the activity performed. For those who can afford monthly contributions to the the system, either due to formal employment relationship, choosing to contribute on their own, or being affiliated with a cooperative that manages their contributions, the requirements for pension are similar to those for urban workers. Thus, in addition to the rural minimum age, they must show a minimum of 180 monthly contributions, equivalent to 15 years. The individuals falling under this category, whether residing in rural or urban areas, have their benefit amount determined by the same regulations applied to those in the length contribution employment category.

For workers whose main source of income precludes the access to regular pension schemes, seeking a special regime is an option if they are a rural producer, fisherman, indigenous, silviculturist, or plant extractivist, either as an individual or as part of a family-based small enterprise. This is a simplified retirement system, that assumes policyholders often lack extensive documentation regarding their activity and and don't have financial capacity to make monthly contributions to pension institutes. Retirement pensions are granted after working 15 years (180 months) in the agricultural sector in the period preceding the benefit application, without the necessity of contributions. The minimum age to apply for the pension is the same as for other rural workers. Since no contribution is required, the benefit is fixed at the prevailing federal minimum wage and updated annually.[4]

Entitlement to rural pension for the special policyholder extends beyond the rural worker directly responsible for production to family members whose support is crucial for the household's subsistence. In particular, spouses, partners, and children over 16 years old, contingent on the head of the family being considered by the social security institute as a special policyholder, can claim to the right to the same type of retirement benefits when they fulfill the age and work-time prerequisites. To this end, they can largely rely on documents demonstrating the work time of multiple individuals concurrently. Examples of such documentation include marriage certificates, birth certificates, school records, photos, and witness testimonies. These measures underscore a noteworthy legislative commitment to aligning the social security system with the economic dynamics of rural areas, where household units are often interlinked in a unified activity. Indeed, the norms governing the retirement process magnify the impact of one spouse's pension status on the other's, contributing to our empirical strategy.

Finally, it is also possible to access the pension benefit without necessarily meeting age or contribution time requirements. This is exemplified by disability pension, where the worker must substantiate, through a medical report, having a medical condition rendering them incapable of pursuing any employment activity, coupled with a lack of available treatments for rehabilitating any work capacity. Importantly, this condition does not necessarily have to have arisen due to accidents in the workplace. Between 2015 and 2019, 8.67% of pensions granted in rural areas fell into this category (AEPS, 2015 to 2019).

3 Data

The database employed was sourced through the Continuous National Household Sample Survey (PNADC), conducted quarterly from 2015 to 2019. The sample comprises 200 thousand households, averaging 360 thousand individuals per survey. Carried out by the Brazilian Institute of Geography and Statistics (IBGE), the survey investigates various

[4]Special policyholders are those whose main work, carried out individually or under a family-based enterprise, without the use of permanent employees, fits into one of the following categories: agricultural producer who exploits an area of up to four fiscal modules (5 to 110 hectares each, depending on the region and nature of the activity); plant extractivist or rubber tapper; artisanal fisherman.

facets of the Brazilian population, including employment, health, income, housing, race, among other dimensions, through a rotating panel of five interviews. The PNADC follows a rotating panel divided into five representative sample groups. Each group is tracked quarterly through five surveys. After the fifth interview, a new group is randomly selected from the population to be tracked over the same period. Thus, each new survey represents the renewal of 1/5 of the sample.

We specifically leveraged the annual edition of the survey, consisting exclusively of the first and last interviews, conducted with a one-year gap. This particular release has the advantage of providing individual data for income from various non-labor sources, such as financial investments, social programs, rents, and, notably, retirement income, which is pivotal for our analyses. In our analyses, we focused on a sample comprising women and men residing in rural areas, either serving as household heads or spouses of the household head, who reported having worked during the period of their first interview. To identify pension status, we considered those who responded affirmatively to being beneficiaries of social security benefits from federal (INSS), state, or municipal government.

Unfortunately, the database does not allow us to distinguish between benefits paid to retirees and pensions of different natures, such as those due to the death or disability of a family member. Moreover, we do not know the specific regime under which the worker requested retirement benefits, whether it be rural special retirement or length of retirement (urban or rural) — each characterized by distinct access rules. To address this limitation, we conducted robustness tests in some results by narrowing the sample to include only those workers who reported in the first interview that they were engaged in agricultural activities and were not contributing to the INSS. We estimate that this cohort consists of individuals with a high probability of retiring according to rural retirement rules, indicating that we are more likely capturing the effect of this set of social security regulations.

Due to the the enactment of Constitutional Amendment No. 103/2019 (BRASIL. Constituição (1988), 2019), which reformed the pension system and came into effect in the last quarter of 2019, we chose to exclude this period from our database, even though the reform did not introduce significant changes to rural retirement.

3.1 Descriptive statistics

In our broader specification, encompassing rural residents who were employed in the preceding year, our sample comprises 49,186 men and 25,546 women. Its important to note that the employment requirement from the previous survey does not apply to spouses, so they might have engaged in labor activities or not. In Tables 1 and 2, we provide statistics describing the proportion of some observable variables and the standard deviation, both in the overall sample and for individuals around the cutoff point.

Table 1: **Sample statistics: Women**

	All sample		*Ages 45 to 60*	
	Mean	SD	Mean	SD
Panel A: Demographic Characteristics				
Age (*years*)	42	12	51	4
Education (*years*)	8	4	7	4
Contribution (%)	39	49	40	49
White (%)	42	49	46	50
Agriculture (%)	42	49	49	50
Panel B: Income				
Household p.c. income (*R*$)	965	1556	1096	1604
Household p.c. income minus pensions (*R*$)	833	1461	907	1533
Individual income * (*R*$)	1206	1617	1330	1776
Individual income minus pensions ** (*R*$)	413	1223	460	1190
Pensions ** (*R*$)	1190	982	1251	1292
Social Transfers ** (*R*$)	259	398	251	422
Panel C: Working Status				
Pensions (%)	11	31	15	36
In labor market (%)	75	43	74	44
Work week (*hours*)	34	14	34	15

Notes: This table shows the sample means and standard-deviation of each variable. Sample is restricted to married women living in rural areas who reported working in the previous year.
* Restricted to individuals who reported income from work or other sources in the current year (80% of all sample).
** Restricted to individuals who reported receiving pensions/social transfers in the current year.

Table 2: **Sample statistics: Men**

	All sample		*Ages 50 to 65*	
	Mean	SD	Mean	SD
Panel A: Demographic Characteristics				
Age (*years*)	46	13	56	4
Education (*years*)	6	4	5	4
Contribution (%)	43	50	44	50
White (%)	38	50	43	50
Agriculture (%)	63	48	71	46
Panel B: Income				
Household p.c. income (*R*$)	806	1341	981	1439
Household p.c. income minus pensions (*R*$)	675	1249	771	1364
Individual income * (*R*$)	1682	3027	1831	3066
Individual income minus pensions ** (*R*$)	1190	3944	1204	2706
Pensions ** (*R*$)	1227	981	1238	823
Social Transfers ** (*R*$)	544	1270	518	520
Panel C: Working Status				
Pensions (%)	13	33	19	39
In labor market (%)	89	32	86	35
Work week (*hours*)	41	13	42	14

Notes: This table shows the sample means and standard-deviation of each variable. Sample is restricted to married men living in rural areas who reported working in the previous year.
* Restricted to individuals who reported income from work or other sources in the current year (91% of all sample)
** Restricted to individuals who reported receiving pensions/social transfers in the current year.

The education was categorized by the highest level of attainment and through a categorical variable ranging from 1 to 7. In this scale, 1 denotes individuals with no formal education, 2 signifies those with incomplete primary education, and 7 corresponds to those with completed college education. We note that our sample of women has, on average, almost two more years of education compared to their male counterparts. At the same time, men are 0.21 percentage points more likely to have worked in agriculture. This suggests that the regression with male individuals potentially better captures the effect of a partner's requesting retirement in a pension environment governed by specific rules for rural workers.

Digging deeper into the characteristics of the male sample, Figure 1 shows the age when men, married and single, first report receiving pensions in our sample. As we can observe, the ratio of first access access to retirement pensions as a function of age exhibit similar patterns for married and single individuals until reaching eligibility age, when they visually diverge. This phenomenon also occurs in the sample of women, as displayed in Figure 2, despite the fact a portion of single women beggining to receive pensions at an earlier age. This can be attributed to a substantial number of these women gaining early entitlement to social security benefits following the death of their husbands. [5]

[5] Close relatives who were financially dependent on a deceased individual are be eligible to claim permanent or temporary survivor pensions, provided that the deceased was enrolled in a federal pension scheme.

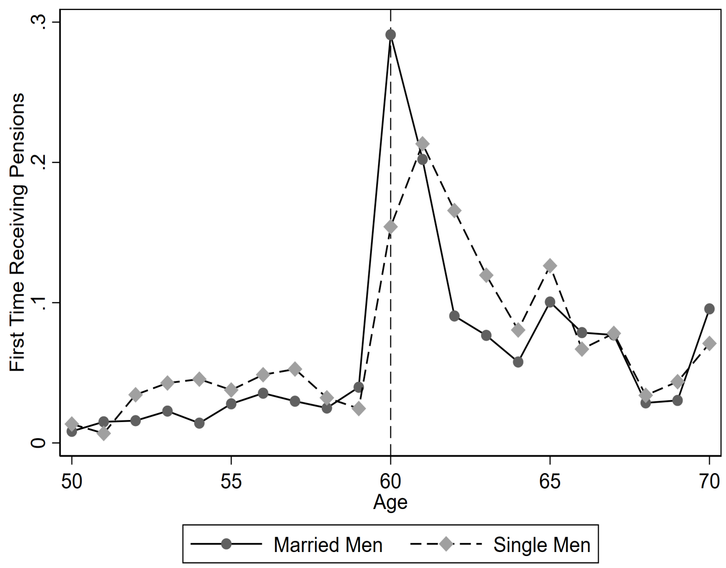

Figure 1: **First time receiving pensions by marital status** This figure shows the frequency of when men first report receiving pensions in our sample by marital status. (N = 49,186).

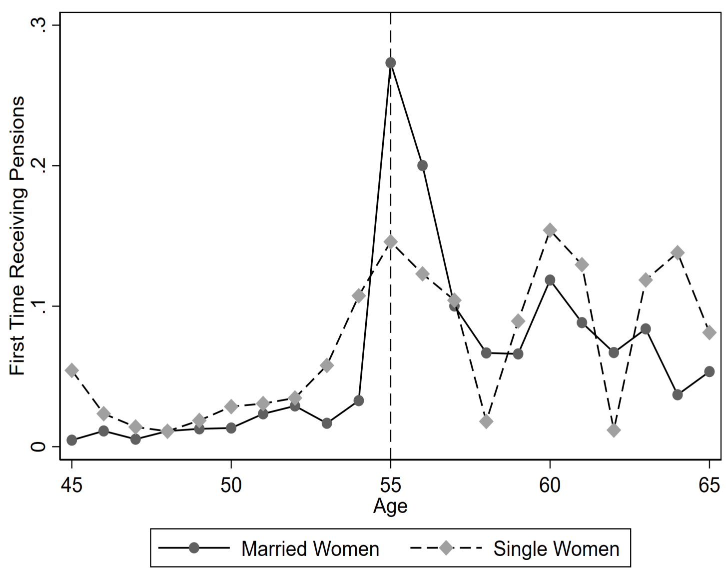

Figure 2: **First time receiving pensions by marital status** This figure shows the frequency of when women first report receiving pensions in our sample by marital status. (N = 25,546).

It is important to acknowledge that the data introduce certain limitations on our exercise. In particular, as discussed in section 3, having more precise information regarding receipt of retirement benefits, segregated from beneficiaries of diverse types of assistance, would be desirable. However, in the PNADC dataset, the individuals we focus on are grouped with those receiving other types of pensions, such as survivor's pension. Nevertheless, we argue that this fact does not undermine our identification strategy under the assumption that the probability of receiving different types of benefits evolves continuously with the spouse's age and does not exhibit jumps upon reaching the access age.

4 Methodology

4.1 Regression discontinuity

In our study, our primary goal is to estimate the causal relationship between the spouse's pension status and the probability of the individual's also receiving retirement benefits. Therefore, we focus on within-couple spillover effects. To achieve this, we employ Regression Discontinuity Designs (RDDs), leveraging the discontinuity in age related to access to rural retirement for both females and males, where the minimum age is set at 55 and 60, respectively. Since reaching the minimum age does not mandate individuals to request retirement benefits, reflecting a scenario of imperfect compliance, the estimated regression discontinuity should be fuzzy, measuring, through an instrumental variables strategy, the treatment impact only amongst individuals whose behavior was altered by the discontinuity in the access policy (local average treatment effect).

Accordingly, we adopt a two-stage model, with the treatment being the spouse currently receiving pension payments, instrumentalized by the minimum age criterion, whereas the outcome variable is the individual-level access to the a retirement benefit. In each stage, we seek to estimate discontinuous jumps in the probability of receiving the pension due to the spouse's surpassing the minimum age retirement. In the first stage, we analyze the impact of the minimum retirement age policy on the spouse being recipient to pension benefits. In the second stage, we examine the effect of the spousal benefit on the individual's probability of receiving the benefit, as described in the following equation:

$$Pens_i^{spouse} = \alpha + \beta_1 Age_i^{spouse} + \beta_2 \mathbb{1}(Age_i^{spouse} > c) + \beta_3 Age_i^{spouse} \times \mathbb{1}(Age_i^{spouse} > c) + \pi \mathbf{X}_i + \epsilon_i \quad (1)$$

$$Pens_i = \gamma + \delta_1 \widehat{Pens_i^{spouse}} + \delta_2 Age_i^{spouse} + \delta_3 Age_i^{spouse} \times \mathbb{1}(Age_i^{spouse} > c) + \kappa \mathbf{X}_i + \mu_i \quad (2)$$

Where $Pens_i^{spouse}$ and $Pens_i$ are dummy variables indicating, respectively, the pension status of the spouse and the individual, while Age_i^{spouse} refers to the spouse's age measured in years and $\mathbf{X}_i$ a vector of control variables. Additionally, the cutoff point (c) represents the minimum access age according to the spouse's gender, set at 55 years for wives and 60 years for husbands. We also interact the spouse's age with the discontinuity in order to allow our linear model to have different slopes above and under the cutoff. In all regressions, we use the optimal bandwidth, which possesses the desirable property of minimizing the mean squared error in fuzzy regression discontinuities (Calonico et al., 2017). As robustness, we also estimate the regression above using second order polynomials of the running variable.

A crucial requirement for correctly assessing the estimators found in the second stage as the causal effect of spousal pension on the individual's is the exclusion restriction of the instrumental variable. In our case, this implies that the discontinuous effect of the spouse's age on the individual's pension status should occur exclusively through its impact on the spouse's pension status, which, in turn, affects the individual's decision. Given that the establishment of the minimum access age is subject to the arbitrariness of past political choices and remains fixed over time, this hypothesis seems plausible.

Another concern in the empirical literature of regression discontinuity designs is the issue of manipulation of the running variable which threatens the assumption of continuity of individual's potential outcome around the cutoff value. If individuals have control over the running variable and use this to change their treatment status, regression discontinuity designs will not be able to estimate meaningful parameters (Lee, 2008). In our context, we do not expect this issue to be prevalent for two reasons: first, individuals can only misrepresent their age to the social security provider through fraud, which requires considerable effort and luck; second, there's no incentive to misreport their age to the PNADC researcher, as the information collected is not directly used for granting access to any social security policies.

Nevertheless, we are able to assess if there's manipulation in the assignment variable conducting a test designed to detect the presence of bunching just above or below the cutoff value. Although McCrary (2008) has become the literature standard for this test (Imbens & Lemieux, 2008; Lee & Lemieux, 2010), its design is not suited to discrete running variable contexts where it is shown to over reject the null hypothesis of no manipulation (Frandsen, 2017). Therefore, we conduct the alternate density test for suggested by Frandsen (2017) as shown in figures 3 and 4. They both fail reject the hypothesis of no manipulation.

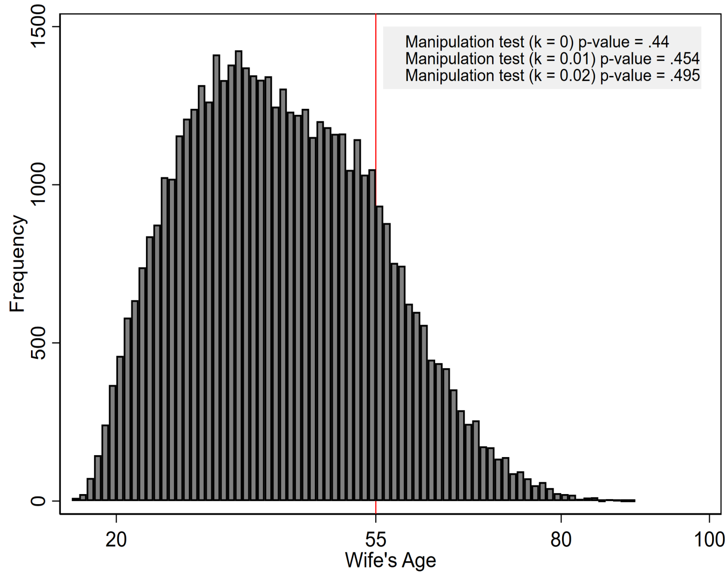

Figure 3: **Manipulation test** This graph depicts a manipulation test for a discrete running variable as suggested by Frandsen (2017). A vertical line marks the cutoff point at 55 years old. Sample restricted to married men living in rural areas who reported working in the past year (N = 49,186). The running variable tested is the wife's age as depicted in equation 2.

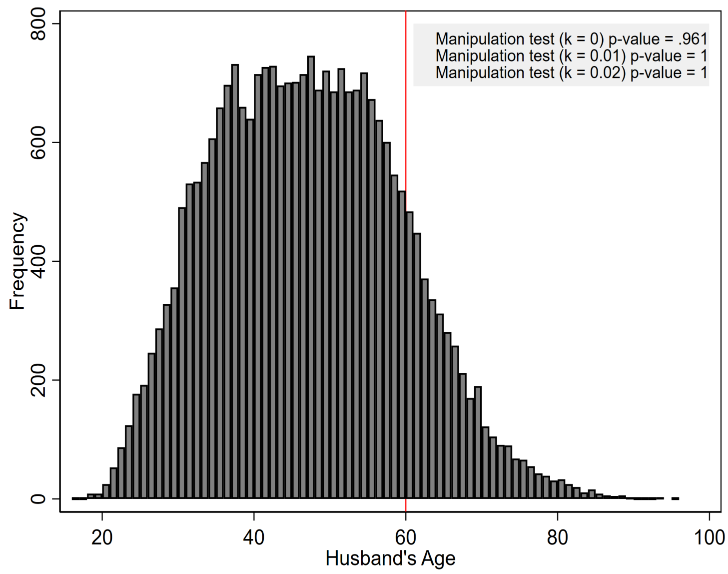

Figure 4: **Manipulation test** This graph depicts a manipulation test for a discrete running variable as suggested by Frandsen (2017). A vertical line marks the cutoff point at 60 years old. Sample restricted to married women living in rural areas who reported working in the past year (N = 25,546). The running variable tested is the husband's age as depicted in equation 2.

On the other hand, a relevant concern that could threaten our estimation of the causal effect is the possibility that spouses' pension statuses are being influenced by a competing intervention occurring simultaneously with the assignment criterion (Cunningham, 2021). Note that, given that the minimum age for rural retirement is 60 years for men and 55 years for women, couples where the husband is five years older than the wife will reach the access age in the same year. If this rule truly influences individuals' behavior, the pension status within the couple will be highly correlated. However, we understand that this correlation does not necessarily imply the existence of indirect effects of the spouse's behavior influence on the individual, as we are not able disentangle this potential indirect influence from the direct impact of reaching the minimum age.

To address this issue, we propose analyzing the sample stratified by the age difference between the man and the woman, where we expect the estimated effect to persist even when the sample indicates that the partner already had the legal possibility of retiring based on the age criterion (1 to 4 years younger for women, 6 to 10 years older for men). The strategy and its implications for the simultaneity of interventions can be visualized in figures 5 and 6 below.

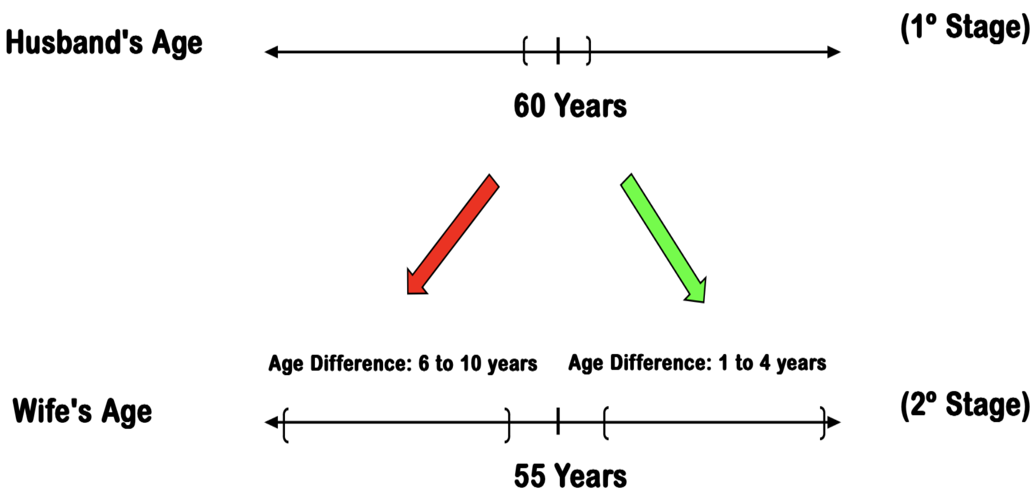

Figure 5: **Possibility of Acquiring Pensions with Respect to Husband's Age** This figure illustrates the age range for women whose husband is 60 years old based on the age difference categories. The age difference is obtained according to the following equation: Age Difference = Husband's Age − Wife's Age

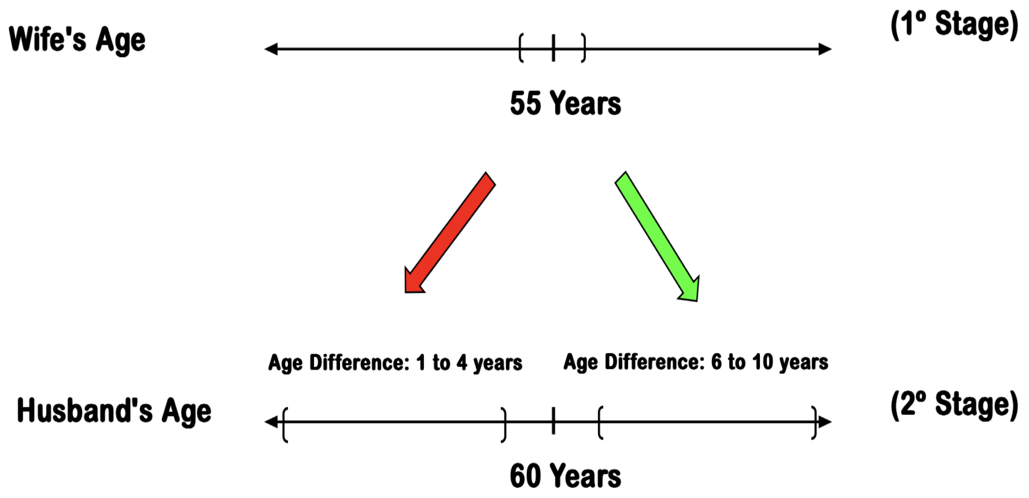

Figure 6: **Possibility of Acquiring Pensions with Respect to Wife's Age** This figure illustrates the age range for men whose wife is 55 years old based on the age difference categories. The age difference is obtained according to the following equation: Age Difference = Husband's Age − Wife's Age

It is worth mentioning that, as we present the results stratifying the sample based on the age differences within the couple, most husbands who are one to four years older and most wives who are six to ten years younger are not yet eligible for retirement benefits when the partners reaches their respective access age. However, due to the size of the bandwidth, first stage observations were the individuals' partner is older than the minimum age are included in estimating the results. Consequently, some individuals' at the extremes of the age difference interval will be eligible for retirement and some will do so. This caveat should be considered when interpreting these findings.

Regression discontinuity designs are only able to estimate local average treatment effects because individuals observable and unobservable characteristics tend to the similar around the cutoff, with the only difference between them being their respective treatment status. While we cannot hope to test this hypothesis for unobservable characteristics and potential outcomes, it is possible to use the RD framework to check baseline covariate balance between treatment and control group. Table 3 display results of a sharp regression discontinuity to test whether the treatment status is correlated with a selection of relevant characteristics. Most variables exhibit no jumps around the cutoff, consistent with the RD fundamentals. The only exception is the treatment group being marginally less white, as observed in column (1) of Panel B. However, the small magnitude of the coefficient and its significance being almost rejected at a 10% level suggests its only a product of statistical mishaps.

Table 3: **Sharp RDD regression results**

Dependent Variable:	White (1)	Age (2)	Household Size (3)	Educ. (Years) (4)	Agro (5)	Contributing (6)
Panel A: Men						
Age $> c$	0.00661	-0.00680	-0.0572	0.0276	-0.0340	0.000978
	(0.0225)	(0.336)	(0.0633)	(0.0506)	(0.0200)	(0.0212)
Observations	49,185	49,186	49,186	49,186	49,186	49,186
$P > \|Z\|$ (Conventional)	0.769	0.984	0.367	0.586	0.0889	0.963
$P > \|Z\|$ (Robust)	0.895	0.946	0.471	0.647	0.115	0.972
Bandwidth	8.077	7.779	12.17	8.137	8.637	9.129
Panel B: Women						
Age $> c$	-0.0443*	-0.111	-0.0126	-0.0299	0.000581	-0.0142
	(0.0264)	(0.376)	(0.0849)	(0.111)	(0.0268)	(0.0297)
Observations	25,546	25,546	25,546	25,546	25,546	25,546
$P > \|Z\|$ (Conventional)	0.0925	0.768	0.882	0.787	0.983	0.632
$P > \|Z\|$ (Robust)	0.0992	0.715	0.802	0.916	0.916	0.771
Bandwidth	9.750	8.234	7.366	6.305	9.589	7.655
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: `https://bit.ly/microdadospnad`
Notes: This table shows the results from a sharp regression discontinuity design of individual's age on his or her own characteristics, analogous to the one described by equation 1. Sample is restricted to married individuals living in rural areas who reported working in the previous year. Columns report the impact of spouse's pension status on different dependent variables. The running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5 Results

5.1 First Stage Results

In Table 4, we present the first stage of the regression discontinuity design, highlighting the effect of reaching the minimum age on individuals' access to the pension benefits. As observed below, the entitlement to the benefit acquired through the age criterion serves as a strong incentive to gain access. Note that this impact, in column (1), represents a significant increase of 35.2 percentage points in the probability of receiving the pension for women. Among men, column (4), the effect is similar, assessed as a discontinuous jump of 36.2 p.p in the same condition. Moreover, the coefficients, aside from being highly significant, remain stable after the inclusion of controls and the use of higher-degree polynomials in the independent variable. Table 4 presents these alternative results in columns (2) and (3) for women and (5) and (6) for men.

The figures 7 and 8 below provide a visual demonstration of the discontinuity around the access age. It is observed that the trend is quite similar for men and women, with almost no individuals receiving retirement benefits until the age of 50, when there is a subtle increase due to other types of pensions, as well as certain professional categories that enjoy the possibility of early retirement. After reaching the minimum age, we observe a significant discontinuous jump in the percentage of pensions received.

Table 4: **First stage regression results**

	Wife			Husband		
	(1)	(2)	(3)	(4)	(5)	(6)
Age $> c$	0.352***	0.320***	0.308***	0.362***	0.359***	0.331***
	(0.014)	(0.016)	(0.017)	(0.023)	(0.023)	(0.028)
Observations	49,186	49,186	49,186	25,546	25,546	25,546
$P > \|Z\|$ (Conventional)	0.000	0.000	0.000	0.000	0.000	0.000
$P > \|Z\|$ (Robust)	0.000	0.000	0.000	0.000	0.000	0.000
Bandwidth	13.083	8.066	9.238	9.361	9.100	12.982
Controls	No	age, age^2	No	No	age, age^2	No
Polynomial Order	1	1	2	1	1	2

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the coefficients obtained from the first stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 1. Sample is restricted to married individuals living in rural areas who reported working in the previous year. The dependent variable is the partner's pension status and the running variable is the partner's age. When included, variables age and age^2 control for a second degree polynomial of individual's own age. Age $> c$ represents the impact of the spouse reaching legal retirement age on his/her own pension outcomes.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

As evidence in favor of our hypothesis, we employ this exercise to estimate heterogeneities in the impact of the minimum age criterion based on the individuals' marital status. Similar to the discussion on Section 1, we can observe in columns (2) and (5) of Table 5 that married individuals' pensions status exhibit high sensitivity exceeding the access age, particularly when compared to the sample of single individuals in columns (1) and (4). It is worth noting that the result presented in column (4), while it bodes well for our research hypothesis, is likely not indicative of single woman experiencing a great deal of difficulties accessing social security pensions. Quite the opposite, in fact: older single woman are often widows who, provided the late husband had contributed to pensions institutes, have early access social security benefits in form of survivor's pensions. Consequently, surpassing the minimum age requirement represents a comparatively small jump in their access to pensions.

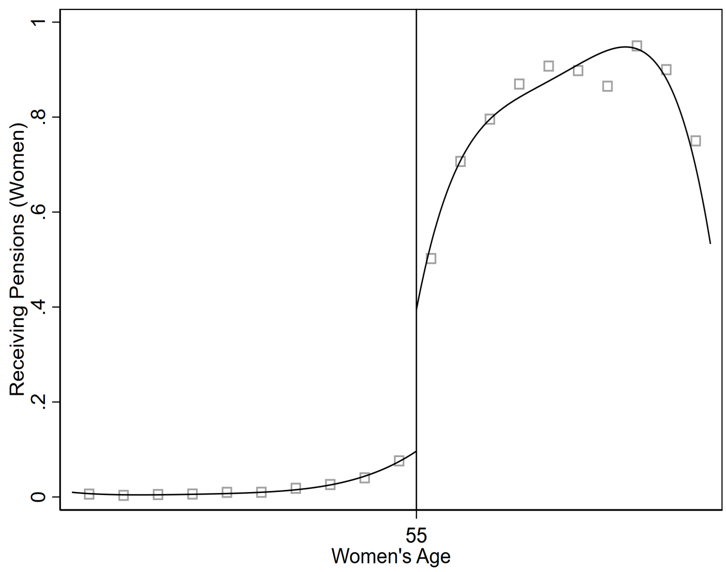

Figure 7: **Women's Pension Status by Women's Age.** This graph depicts the discontinuity on the women's pension status after reaching minimum retirement age. A vertical line marks the cutoff point at 55 years old. Sample restricted to married women living in rural areas who reported working in the previous year (N = 25,546).

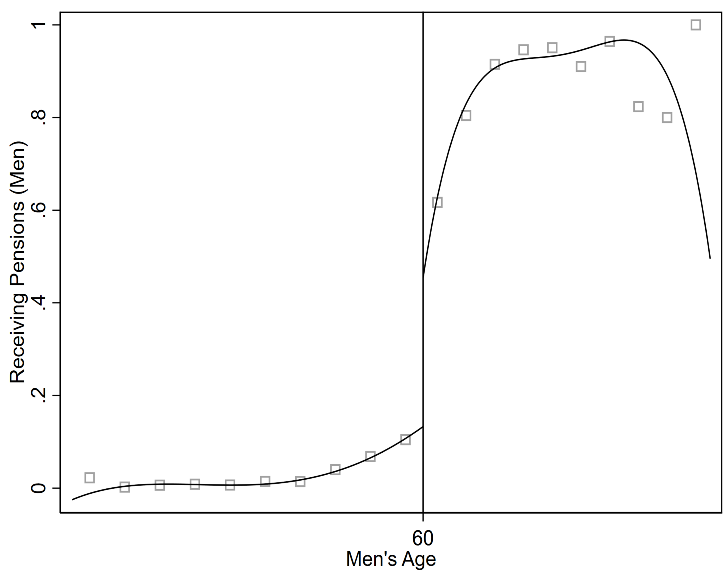

Figure 8: **Men's Pension Status by Men's Age.** This graph depicts the discontinuity on the men's pension status after reaching minimum retirement age. A vertical line marks the cutoff point at 60 years old. Sample restricted to married men living in rural areas who reported working in the previous year (N = 49,186).

Moreover, as evident in columns (3) and (6), which display results for the sample of married individuals where the husband is precisely five years older than the wife, the amplified magnitude of the estimated effect, when compared to the results displayed in columns (2) and (5), is evidence of behavioral effects at play in their pension access. We argue that the statistical difference between coefficients can be interpreted as a result of lower transaction costs for this subgroup, as they become eligible within a one-year window of each other. As such, they can reasonably apply at the same time, diluting the bureaucratic hurdles they would otherwise encounter.

Table 5: **First stage regression results: heteronegeneity by marital status**

Marriage Status	**Men**			**Women**		
	Single (1)	Married (2)	5 Years Diff. (3)	Single (4)	Married (5)	5 Years Diff. (6)
Age $> c$	0.190***	0.290***	0.424***	0.0534	0.297***	0.445***
	(0.0376)	(0.0223)	(0.0642)	(0.0572)	(0.0218)	(0.0762)
Observations	6,963	49,186	3,833	3,898	25,546	1,991
$P > \|Z\|$ (Conventional)	4.75e-07	0	0	0.351	0	5.15e-09
$P > \|Z\|$ (Robust)	5.11e-05	0	1.10e-07	0.698	0	1.30e-06
Bandwidth	7.922	4.413	7.599	7.440	7.063	8.783
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results of a sharp regression discontinuity design of individual's age on individual's pension status described by Equation 1. Sample is restricted to individuals living in rural areas who reported working in the previous year. Columns stratify the sample based on marriage status and age difference. The dependent variable is the individual's pension status and the running variable is the individual's age. Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 9: **Pension Status by Age.** This graph depicts the discontinuity on the individual's pension status after reaching minimum retirement age. A vertical line marks the cutoff point at 60 or 55 years old. Sample restricted to individuals living in rural areas who reported working in the previous year.

5.2 Main Results

Table 6 provides the coefficients of the second stage of the fuzzy regression discontinuity, where we measure the impact of the spouse's pensions status, instrumentalized by the discontinuity in pension rules, on the individual's probability of having access to the same policy. We consider this strategy more suitable for capturing the causal effect in question, particularly because, in the absence of rules obliging individuals to request retirement benefits the moment they become eligible, the probability of receiving the treatment (spouse's pension status) is not a deterministic function of the partner reaching a minimum age.

In columns (1) and (4), we provide, for men and women, respectively, the impact of the spouse's gaining access to monthly pension benefits on their decision to request retirement obtained in our preferred model. For men, we estimate that the wife's pension represents an increase of 24.1 percentage points in their probability of receiving benefits. Women, on the other hand, appear marginally less sensitive to the husband's behavior, as the coefficient reveals a smaller but still significant increase of 21.5 percentage points.

Table 6: **Second stage regression results**

	Men			**Women**		
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.241***	0.174***	0.154**	0.215**	0.161*	0.157
	(0.0398)	(0.0468)	(0.0583)	(0.0653)	(0.0599)	(0.0900)
Observations	49,186	49,186	49,186	25,546	25,546	25,546
$P > \|Z\|$ (Conventional)	1.35e-09	0.000196	0.00823	0.000961	0.00729	0.0820
$P > \|Z\|$ (Robust)	0.000295	0.00443	0.0284	0.0244	0.0998	0.147
Bandwidth	13.08	8.066	16.04	9.238	9.100	12.98
Controls	No	age, age^2	No	No	age, age^2	No
Polynomial Order	1	1	2	1	1	2

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported working in the previous year. The dependent variable is the individual's pension status and the running variable is the partner's age. When included, variables age and age^2 control for a second degree polynomial of individual's own age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6 also displays the coefficients of the second-stage regression conducted under different specifications. In columns (2) and (5), we observe the results when controlling for a second-degree polynomial of the individual's age. We note that, for men, this alteration reduces the magnitude of the coefficient to 17.4 percentage points, but it does not affect the significance of the estimator.

On the other hand, for women, we observe greater sensitivity of the results to the functional form. In addition to a reduction in the coefficient, the estimator becomes only marginally significant. As we shall see, the estimation of the impact of husbands' pensions on their wives is significantly less robust compared to the impact of wives' pensions on their husbands.

Furthermore, in columns (3) and (6), we report the second stage of the regression using a second-order polynomial without the inclusion of controls. In the sample of male individuals, we observe that this specification returns a coefficient that is both lower and less significant compared to the base result observed in column (1). In the case of women, we see that although the drop in the estimator's magnitude is smaller, this change renders the result statistically insignificant. Figures 10 and 11 below graphically represent the estimated regression, highlighting significant discontinuities in the probability of receiving social security benefits around the spouse's access age.

The results presented provide evidence of mutual influence of pension status among couples. This spillover effect appears to contradict the rational choice paradigm for individuals, however. As discussed in section 2, the rural pension system does not provide any incentives for individuals to delay their request for social security benefits after acquiring the right to do so. Thus, the to substantial loss incurred due to individual's protracted responses to changes in their retirement entitlements suggests the results above can only fit the rational choice paradigm, following the framework of Moffitt (1983), under two conditions: either by accounting for exceptionally high transaction costs or by assuming a lack of awareness among the target population regarding the program's eligibility rules. Otherwise one spouse's pension status should be entirely independent of the other's, which is not evidenced in the results above.

We posit that the explanation for these results lies in the latter alternative: rural couples' limited awareness of the specific pension regulations governing their work. This lack of information, we conjecture, would be corrected at the time of the spouse's interaction with the pension institute. Particularly, we hypothesize that this effect is more pronounced among special insured individuals. In this category, we encounter a cluster of characteristics that amplify the influence of information sharing, including low education, intricate pension regulations, heightened levels of litigation, and a strong correlation between the retirement entitlements of the couple, given that the special insured status extends to family members aiding in agricultural activities.

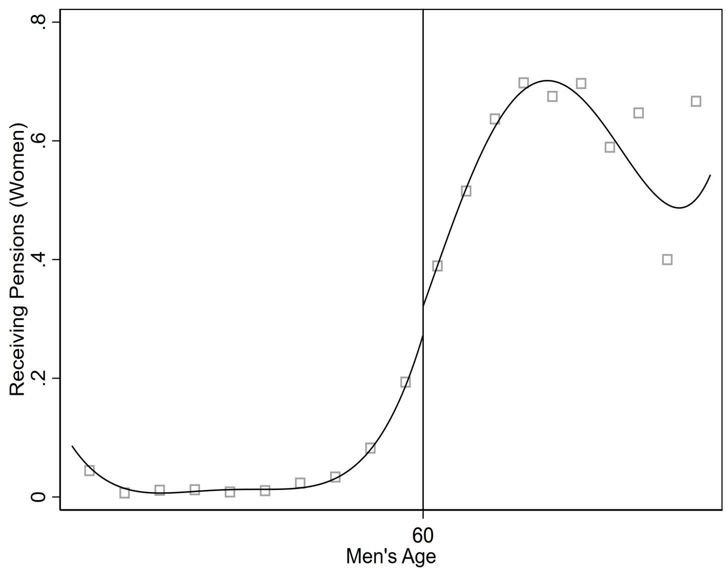

Figure 10: **Women's Pension Status by Men's Age.** This graph depicts the discontinuity on the wife's pension status after the husband reaches the minimum retirement age and retires. A vertical line marks the cutoff point at 60 years old. Sample restricted to married women living in rural areas who reported working in the past year (N = 25,546).

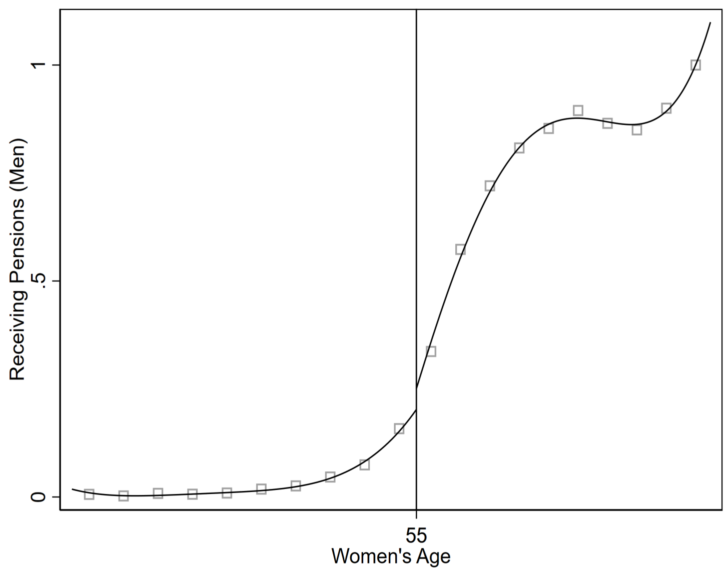

Figure 11: **Men's Pension Status by Women's Age.** This graph depicts the discontinuity on the husband's pension status after the wife reaches the minimum retirement age and retires. A vertical line marks the cutoff point at 55 years old. Sample restricted to married men living in rural areas who reported working in the past year (N = 49,186).

In this context, we assume that the traditional hypotheses in the literature that studies within couple retirement spillovers, such as complementarity in leisure preferences (Gustman and Steinmeier, 2004; Maestas, 2001) and a joint budget constraint (Blau and Gilleskie, 2006), may not be applicable, since obtaining a permanent pension does not impose any conditions on work activity. Thus, retirees can either continue working to assist the still-active spouse or adjust his or her labor supply to offset financial shocks related to the retirement of a family member. Therefore, we posit that coordination of access to retirement pensions in rural Brazil might be primarily attributed to informational spillovers after the spouse's requests retirement, which can occur in a complex social security normative system that establishes a dependence relationship between retirement rights within the family.

We seek to tackle this issue by conducting RDDs stratified by individuals with low and high levels of education. In this exercise, education acts as an imperfect proxy for the level of information, allowing us to distinguish between people with higher and lower access to information. We should consider that, since the level of education is correlated with various other observable and unobservable characteristics, and without individualized data on knowledge of pension rules, the exercise proposed is not effective at creating comparable treatment and control groups and as such cannot delineate the true desired causal effect. Our intention is just to explore this phenomena contributing with evidence to the debate on the importance of information dynamics for the phenomenon of joint retirement.

However, as we expect education to significantly influence the size of the set of employment opportunities individuals face, both in rural and urban environments, we understand that couples with a higher level of education are less likely to retire according to rural retirement rules. Thus, stratifying the original sample by the level of education may confound the impact of a higher level of information with the influence of diverse pension rules leading to different retirement claiming behavior. Table 7 reports the results of the second stage of the regression discontinuity similar to the one we are applying in this section but with different cohorts based on completion of elementary school level education.

Table 7: **Second stage regression results: heterogeneity by education level**

	Men - Elementary School			**Women - Elementary School**		
	All	Incomplete	Complete	All	Incomplete	Complete
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.241***	0.205***	0.470	0.215**	0.295***	-0.0281
	(0.0398)	(0.0424)	(0.239)	(0.0653)	(0.0719)	(0.142)
Observations	49,186	34,939	14,247	25,546	13,668	11,878
$P > \|Z\|$ (Conventional)	1.35e-09	1.31e-06	0.0494	0.000961	4.05e-05	0.843
$P > \|Z\|$ (Robust)	0.000295	0.00403	0.155	0.0244	0.00209	0.477
Bandwidth	13.08	11.72	11.46	9.238	9.548	9.089
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported working in the previous year. Columns stratify the sample based on having attained elementary school level education. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The results found in Table 7 show a significant divergence regarding the estimated impact of spouse's pension status conditional on the individual having completed at least elementary school. In columns (2) and (3), we observe that while the point estimate of the impact of the wife's access to benefits is higher for individuals who finished elementary school, this increase is more than offset by a rise in the standard deviation of the estimator, rendering it statistically insignificant. For women, the results follow more closely the hypothesis outlined earlier. In column (5), it is highlighted that the effect of the husband's pension status is higher in the sample of women with incomplete elementary education. Meanwhile, in column (6), which reports the result for the stratum of women with education equal to or higher than elementary school, we note that the husband's access to benefits is associated with a marginally significant decrease in the probability of receiving retirement benefits for women.

Additionally, another way to provide evidence for the informational spillovers hypothesis is to examine whether individual's benefiting from other social programs, who are expected to be relatively more skilled in dealing with state bureaucracy and more likely to be aware of eligibility (Chareyron & Domingues, 2018; Heckman & Smith, 2004), exhibit a reduced correlation between partner's pension status. In Table 8 we stratify the sample based on access to *Bolsa Família*, a program that can affect intrahousehold pension status spillovers through the reduction of the amount of new information gained when requesting retirement benefits. The results outlined are coherent with the theoretical expectations, as they display a notable divergence of couple's pension status indirect effects conditional on living in a family that receives cash transfers from the *Bolsa Família* program. This is observed even though beneficiaries face no legal restrictions on work or in accessing rural retirement pensions. Furthermore, pension benefits are frequently up to five times greater [6] than the *Bolsa Família* cash transfers. As such, indifference between programs is not expected to be a factor barring *Bolsa Família* beneficiaries to seek pensions provided they are eligible.

[6] To illustrate this point, in 2019, the mean value per family of the *Bolsa Família* benefit was only 191 BRL, whereas the new rural retirement benefits awarded that year amounted to 998 BRL on average (Ministério do Desenvolvimento e Assistência Social, 2024; AEPS, 2015 to 2019).

Table 8: **Second stage regression results: heterogeneity by access to *bolsa família***

	Men - *Bolsa Família*		**Women - *Bolsa Família***	
	Receiving (1)	Not Receiving (2)	Receiving (3)	Not Receiving (4)
Spouse's Pension	0.0941	0.322***	0.0745	0.218**
	(0.0987)	(0.0439)	(0.149)	(0.0718)
Observations	17,878	31,295	8,263	17,273
$P > \|Z\|$ (Conventional)	0.340	0	0.618	0.00236
$P > \|Z\|$ (Robust)	0.393	0	0.467	0.0476
Bandwidth	5.257	15.54	8.025	9.780
Controls	No	No	No	No
Polynomial Order	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported working in the previous year. Columns stratify the sample based on household receiving *bolsa família* benefits. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We identify a significant challenge to our empirical strategy related to the potential simultaneity of retirement requests when the couple reaches the minimum age at the same time, with the man being five years older than his wife. In this group, we assess that it is not possible to recover the causal effect we aim to estimate, as we may be potentially confounding the effect of the spouse's pension status with the effect of reaching the access age in one's own access to benefits. To tackle this challenge, we implemented regressions stratifying our sample according to the age difference between the man and the woman. We consider the age difference in the couple to be a pivotal factor in either amplifying or attenuating the indirect impact on the spouse. Thus, filtering the sample according to this criterion allows us to distinguish heterogeneities in the individual's sensitivity to the partner's information based solely on the capacity for the individual to legally retire.

Table 9 shows the coefficients obtained in the second stage of the regression discontinuity for individuals residing in rural areas, grouped by age differences within the couple. In columns (1) and (6), we report the impact of the spouse's receiving social security benefits on individuals unable to obtain the right to retire because they are below the minimum age criterion. For both men and women in these groups, it is not possible to identify a statistically significant impact according to the robust p-value criterion. Also in Table 9, columns (2) and (5) provide the coefficient obtained from the regression using the sample in which the age difference in the couple implies that both reach the minimum age simultaneously. In this case, as discussed earlier, it is not possible to distinguish the direct and indirect effects of the discontinuity generated by the access age. Thus, we observe results that are considerably magnified compared to the others. For men, we find that the impact associated with the wife's pension status is estimated to be an increase of 102.8 percentage points, and for women, it represents an even larger increase of 131.1 percentage points.

On the other hand, columns (2) and (4) report the impact of the spouse's access to retirement benefits on individuals who could already retire based on the age criterion. Crucially for our empirical strategy, we manage to estimate a positive and significant impact. For men whose wife is currently receiving retirement benefits we document a jump of 65.6 percentage points in the probability of him also having access to retirement rights, and for women, the husband's pension status represents a similar increase of 39.9 percentage points.

Table 9: **Main results: heterogeneity by age differences within the couple**

Age Difference	**Men**			**Women**		
	1 to 4 Years	5 Years	6 to 10 Years	1 to 4 Years	5 Years	6 to 10 Years
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.100	1.028***	0.656***	0.399**	1.311***	0.0649
	(0.0556)	(0.142)	(0.0969)	(0.111)	(0.351)	(0.0788)
Observations	15,755	3,833	11,472	8,255	1,991	5,940
$P > \|Z\|$ (Conventional)	0.0718	0	0	0.000324	0.000192	0.411
$P > \|Z\|$ (Robust)	0.827	2.25e-10	2.08e-06	0.0438	0.000849	0.792
Bandwidth	11.33	10.57	11.13	12.35	7.612	8.195
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: `https://bit.ly/microdadospnad`
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported working in the previous year. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age . The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The results outlined in Table 9 are not overly reliant on this particular choice of age difference interval. As shown in columns (4) and (5) of Table 10, where we conduct a similar exercise but with smaller age bands, husbands can miss up to three years receiving retirement benefits after becoming eligible based on the minimum age criterion. Women, on the other hand, as seen in column (3), are only late on receiving retirement benefits by no more than one year.

Table 10: **Second stage regression results: by age differences within the couple**

Age Difference	**Women**			**Men**		
	0 to 1 Years (1)	2 to 3 Years (2)	4 Years (3)	6 Years (4)	7 to 8 Years (5)	9 to 10 Years (6)
Spouse's Pension	-0.761**	-0.205	0.959***	1.003***	0.736***	-0.0410
	(0.459)	(0.229)	(0.177)	(0.111)	(0.179)	(0.185)
Observations	1,893	4,280	2,082	3,295	4,923	3,254
$P > \|Z\|$ (Conventional)	0.0972	0.370	5.74e-08	0	3.83e-05	0.825
$P > \|Z\|$ (Robust)	0.0407	0.109	1.38e-06	0	0.00501	0.0913
Bandwidth	7.159	7.495	14.64	15.05	10.74	11.34
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: `https://bit.ly/microdadospnad`
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported working in the previous year. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age . The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Building on the previous analysis, we now explore the interaction between age difference and schooling. In Table 11 we report the coefficients of the second stage fuzzy RDD for men living in rural areas grouped by education attainment and age difference within the couple. We observe, that the effect disappears as we raise the education level of the sample. Crucially, when comparing results in columns (2) and (5), we infer even couples where both spouses reach the retirement age simultaneously do not tend to request retirement together if the man has completed elementary school. Similarly, in columns (3) and (6), we find that only men with lower educations level respond to the partner's retirement benefits years after reaching their own retirement age.

Table 12 shows similar results for women in our sample. As we observe in columns (1) and (4), we find no statistically significant results of pension status for individuals older than the minimum age independent of education attainment. Conversely, in columns (2) and (5), we can conclude that only women who did not finish elementary school request retirement benefits along with their husband when reaching retirement age at the same time. Finally, as expected, we find no statistically significant increase in the probability of receiving retirement benefits for women who did not yet possess the right to claim pension benefits according to the age criteria.

Table 11: **Second stage regression results: by age differences within the couple and education level**

Elementary School	**Incomplete**			**Complete**		
	1 to 4 Years (1)	5 Years (2)	6 to 10 Years (3)	1 to 4 Years (4)	5 Years (5)	6 to 10 Years (6)
Spouse's Pension	0.0812	1.069***	0.535***	0.300	-3.296	0.165
	(0.0510)	(0.150)	(0.124)	(0.524)	(18.16)	(0.682)
Observations	10,844	2,712	8,346	4,911	1,121	3,126
$P > \|Z\|$ (Conventional)	0.111	0	1.48e-05	0.567	0.856	0.808
$P > \|Z\|$ (Robust)	0.660	5.24e-10	0.00287	0.629	0.986	0.821
Bandwidth	11.09	11.33	7.091	8.750	3.631	8.949
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of wife's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas who reported working in the previous year. Columns stratify the sample based on education attainment and age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 12: **Second stage regression results: by age differences within the couple and education level**

Elementary School	**Incomplete**			**Complete**		
	1 to 4 Years (1)	5 Years (2)	6 to 10 Years (3)	1 to 4 Years (4)	5 Years (5)	6 to 10 Years (6)
Spouse's Pension	0.248	1.339***	0.0705	-0.120	0.348	0.113
	(0.182)	(0.360)	(0.0630)	(0.252)	(0.778)	(0.218)
Observations	4,342	1,082	3,325	3,913	909	2,615
$P > \|Z\|$ (Conventional)	0.173	0.000199	0.264	0.633	0.654	0.605
$P > \|Z\|$ (Robust)	0.821	0.00160	0.794	0.186	0.770	0.747
Bandwidth	8.891	6.792	8.750	11.16	3.699	8.660
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of husband's age on individual's pension status described by Equation 2. Sample is restricted to married women living in rural areas who reported working in the previous year. Columns stratify the sample based on education attainment and age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.3 Other functional forms

In this exercise, we seek to assert the stability of the coefficients in the model under different specifications, such as the addition of age controls and higher-order polynomials.Table 13 provides the coefficients of the second stage of the regression discontinuity with male individuals living in rural areas. We observe that the estimates for this cohort proves to be quite robust. As we can see in columns (1) and (2), the different specifications do not impact the effect of the wife's pension status on individuals younger than the minimum age, as the point estimate remains insignificant.

Also in Table 13, we do not observe a significant change in different specifications on the result for individuals reaching the access age simultaneously, which can be verified in tables (3) and (4). Finally, columns (5) and (6) show that the effect of the wife's retirement benefits on the individual remains significant—although, in column (6), only marginally, according to the robust p-value.

Table 13: **Second stage regression results: by age differences within the couple**

Age Differences	**1 to 4 Years**		**5 Years**		**6 to 10 Years**	
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.0244	-0.0118	0.984***	1.019***	0.557***	0.386*
	(0.0547)	(0.0938)	(0.119)	(0.176)	(0.104)	(0.152)
Observations	15,755	15,755	3,833	3,833	11,472	11,472
$P > \|Z\|$ (Conventional)	0.656	0.900	0	7.49e-09	8.44e-08	0.0113
$P > \|Z\|$ (Robust)	0.529	0.897	0	9.41e-08	0.00106	0.0678
Bandwidth	10.64	9.277	11.68	15.59	9.119	12.11
Controls	age, age^2	No	age, age^2	No	age, age^2	No
Polynomial Order	1	2	1	2	1	2

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of wife's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas who reported working in the previous year. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age−Wife's Age. The dependent variable is the individual's pension status and the running variable is the partner's age. When included, variables age and age^2 control for a second degree polynomial of individual's own age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 14 replicates the same exercise for women, and we observe that, in this case, the results appear to be relatively less stable. Columns (1) and (2) provide results for women who, at the time of their husband's claim of retirement benefits, could already retire according to the minimum age criterion. We note that the results are sensitive to changes in the econometric model specification, as the introduction of controls and estimation with higher-order polynomials eliminates the significance of the estimator. On the other hand, the results remains quite substantial and significant for couples whose age difference implies simultaneous compliance with the access age rule. This can be observed in columns (3) and (4). Lastly, the effect remains insignificant in columns (5) and (6), representing coefficients obtained from the regression with women younger than the minimum age.

Table 14: **Second stage regression results: by age differences within the couple**

Age Differences	**1 to 4 Years**		**5 Years**		**6 to 10 Years**	
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.240	-0.443**	1.321***	1.418***	0.0139	-0.0194
	(0.111)	(0.289)	(0.332)	(0.503)	(0.0762)	(0.117)
Observations	8,255	8,255	1,991	1,991	5,940	5,940
$P > \|Z\|$ (Conventional)	0.0307	0.125	6.78e-05	0.00487	0.855	0.869
$P > \|Z\|$ (Robust)	0.492	0.0436	0.000420	0.00834	0.786	0.793
Bandwidth	11.23	10.81	7.674	11.28	8.467	9.339
Controls	age, age^2	No	age, age^2	No	age, age^2	No
Polynomial Order	1	2	1	2	1	2

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of husband's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas who reported working in the previous year. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age. The dependent variable is the individual's pension status and the running variable is the partner's age. When included, variables age and age^2 control for a second degree polynomial of individual's own age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.4 Testing the joint leisure mechanism

Having shown the existence and robustness of spillover effects within the couple's pension status, we're left with the task of examining the underlying mechanism driving this phenomenon. In section 5.2, we provided evidence supporting the information sharing hypothesis by showing that spillover effects are more prevalent among less educated couples. We suggest this pattern may be attributed to a lower level of knowledge about the intricacies of the rural social security system, resulting in increased uncertainty regarding eligibility for retirement at any given moment.

In this section we argue that the mechanism of complementarities in the taste for leisure (Blau, 1998; Gustman & Steinmeier, 2000; Maestas, 2001) cannot account for retirement benefits association within our sample. The main reason for that is, in the Brazilian retirement system which, unlike systems in other countries, does not terminate or reduce pensions when individuals continue working after starting to receive retirement benefits. As a result, labor market activity is not necessarily correlated with pension status beyond wealth effects. Importantly, if the partner's employment status remains unaffected by retirement, there is no corresponding shift in the taste for leisure that would provide incentives for the individual to cease working.

Table 15, displays the results of the second stage fuzzy regression discontinuity design, illustrating the estimated impact of an individual's reaching access age and requesting retirement benefits on their own labor market participation. We observe in column (1) that this event, for men, significantly lowers the probability of being active in the labor market by 17.3 p.p.. In the other hand, for women, as seen in column (2), we are not able to discern any significant statistical change in labor market participation. Given the absence of any noteworthy change in women's participation rates after retirement, we can argue that the observed spillover effects on men's pension status, as shown in section 5.2, cannot be solely attributed to joint leisure.

Table 15: **Second stage regression results: Effect on labor market participation**

	Men (1)	**Women (2)**
Pension Status	-0.173***	0.00804
	(0.0522)	(0.0887)
Observations	49,186	25,546
$P > \|Z\|$ (Conventional)	0.000953	0.928
$P > \|Z\|$ (Robust)	0.00146	0.778
Bandwidth	8.235	8.410
Controls	No	No
Polynomial Order	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of one's age on his/her labor market participation . Sample is restricted to married individuals living in rural areas who reported working in the previous year. The dependent variable is the individual's labor market participation status and the running variable is age. The coefficients represent the impact of receiving pension benefits on individual's labor market outcomes.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In table 16, we report the results of a fuzzy RDD representing the spillovers effects of the partner's pension status on individual's working status. Columns (1) and (2) reveal no statistically significant effects on the labor market participation of both men and women.

Table 16: **Second stage regression results: Effect on labor market participation**

	Men (1)	**Women (2)**
Spouse's Pension	-0.0291	-0.0457
	(0.0485)	(0.0736)
Observations	49,186	25,546
$P > \|Z\|$ (Conventional)	0.549	0.534
$P > \|Z\|$ (Robust)	0.725	0.617
Bandwidth	8.152	9.943
Controls	No	No
Polynomial Order	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's labor market participation . Sample is restricted to married individuals living in rural areas who reported working in the previous year. The dependent variable is the individual's labor market participation status and the running variable is spouse's age. The coefficients represent the impact of spouse's pension on individual's labor market outcomes.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

6 Conclusion

In this article, we investigated the spillover effect of one spouse's receiving retirement benefits on the partner. Leveraging data from the Continuous National Household Sample Survey (PNADC) spanning the years 2015 and 2019, we employed a regression discontinuity design to estimate the influence between the pension status of married individuals living in rural areas in Brazil. Particularly, our findings reveal that following one spouse's request for retirement benefits, facilitated by reaching the required age for pension eligibility, there's an increase in the other individual access to social security benefits.

Through a two-stage fuzzy regression discontinuity analysis, we estimated that, for women, when the husband receives retirement benefits that is associated with a 21.5 percentage point increase in her probability of her also receiving. Similarly, changes in the wife's pension status results in a 24.1 percentage point increase in the husband's receiving retirement pension probability.

Additionally, we argued that the normative framework for rural pension beneficiaries does not provide incentives for couples to delay retirement request after becoming eligible for benefits. In this context, our results are inconsistent with the hypothesis that this group acts rationally and well-informed. We posit that the lack of independence in pension status among couples may be attributed to imperfect information regarding the intricate legal regulations for pension eligibility, particularly exacerbated by the lower educational levels prevalent in our sample population. We estimate that this uncertainty decreases after the spouse interacts with the National Social Security Institute (INSS) during the pension granting process, constituting an information shock for the partner, as we expect couples to share relevant information.

We tested this hypothesis by stratifying our sample by the individuals' education levels. In these regressions, we identified that in individuals we deemed well-informed, the linkage between couples pension status is nonexistent. Conversely, in the group exhibiting lower educational indicators, where we anticipate a more pronounced influence of the information-sharing channel, we successfully estimated a notably significant impact of the spouse's retirement benefits.

We believe our study contributes to understanding how family dynamics influence individuals' decision-making, in particular social programs participation, by diluting transaction costs in the form of bureaucratic hassle and information gathering. In particular, by the expressiveness and consistency of our results, we highlight the importance of accounting for the behavior and information levels of partners in any theoretical models and simulations dealing with access to social security, as well considering partner effects in social programs coverage expansion initiatives.

As the institutional design of rural retirement homogenizes the decision of when to ask for retirement benefits regardless of individuals' work characteristics and preferences, the correlation between partners pensions must occur through a process of information sharing between spouses regarding entitlement to retirement benefits or a coincidence of eligibility requirements of both members of the couple. The information shared by the partner is likely highly important to individuals' ability to successfully apply for pensions due to the economic characteristics of the Brazilian agricultural setting, wherein a substantial number of spouses share the same occupation and, consequently, adhere to identical pension rules. In this environment of uncertainty about pension entitlements and requirements, we posit that one spouse's retirement process generates an information shock, leading to an increase, *ceteris paribus*, in the probability of the other partner's accessing the same rights. Such an outcome is prejudicial to the individual's welfare because acquiring the right to retirement pensions in the rural context represents permanent a inflow of cash in significant amounts.

Furthermore, we acknowledge that our results have important policy implication. In particular, we understand that the existence of within pension status association phenomena can inform policymakers to enhance the political calculation involved in choosing the minimum retirement age. In this context, we emphasize that the interaction between complex systems and individuals with low information can influence economic behavior in ways that do not always maximize well-being. Additionally, the importance of studying information shocks, household spillovers, and their effects on social policy outcomes. These considerations are particularly relevant at a time when demographic, economic and political trends require universalizing social security coverage in order to better protect vulnerable individuals who risk falling into a poverty trap when old age settles and labor strength dwindles.

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.

Appendix A. More descriptive statistics

Table 17: **Sample statistics: Women, Ages 45 to 60**

Elementary School:	*Incomplete*		*Complete*	
	Mean	SD	Mean	SD
Demographic Characteristics				
Age (*years*)	52	4	51	4
Education (*years*)	4	2	12	3
Contribution (%)	28	45	65	48
White (%)	44	50	51	50
Agriculture (%)	60	49	25	43
Income				
Household p.c. income (*R*$)	857	1062	1598	2286
Household p.c. income minus pensions (*R*$)	679	1020	1384	2181
Individual income * (*R*$)	938	1075	2058	2459
Individual income minus pensions ** (*R*$)	344	989	867	1653
Pensions ** (*R*$)	1051	144	1955	2610
Social Transfers ** (*R*$)	246	432	282	364
Working Status				
Pension (%)	17	38	10	31
In labor market (%)	70	46	84	36
Work week (*hours*)	33	14	36	13
Other Characteristics				
Literate (%)	82	38	100	0
Internet Access (%)	38	49	66	47
Sindicalization (%)	32	46	30	46

Notes: This table shows the sample means and standard-deviation of each variable. Sample is restricted to married women living in rural areas who reported working in the previous year.
* Restricted to individuals who reported income from work or other sources in the current year (76% of women aged 45 to 60).
** Restricted to individuals who reported receiving pensions/social transfers in the current year.

Table 18: **Sample statistics: Men, Ages 50 to 65**

Elementary School:	*Incomplete*		*Complete*	
	Mean	SD	Mean	SD
Demographic Characteristics				
Age (*years*)	56	4	56	4
Education (*years*)	4	2	10	3
Contribution (%)	39	49	67	47
White (%)	39	49	59	49
Agriculture (%)	75	43	49	50
Income				
Household p.c. income (*R*$)	814	973	1805	2613
Household p.c. income minus pensions (*R*$)	612	906	1562	2503
Individual income * (*R*$)	1495	2075	3378	5473
Individual income minus pensions ** (*R*$)	947	2026	2881	4956
Pensions ** (*R*$)	1119	354	1987	1871
Social Transfers ** (*R*$)	501	493	631	668
Working Status				
Pension (%)	20	40	16	36
In labor market (%)	84	37	93	25
Work week (*hours*)	41	13	44	13
Other Characteristics				
Literate (%)	73	44	100	0
Internet Access (%)	36	48	65	48
Sindicalization (%)	33	47	31	46

Notes: This table shows the sample means and standard-deviation of each variable. Sample is restricted to married men living in rural areas who reported working in the previous year.
* Restricted to individuals who reported income from work or other sources in the current year (91% of men aged 50 to 65).
** Restricted to individuals who reported receiving pensions/social transfers in the current year.

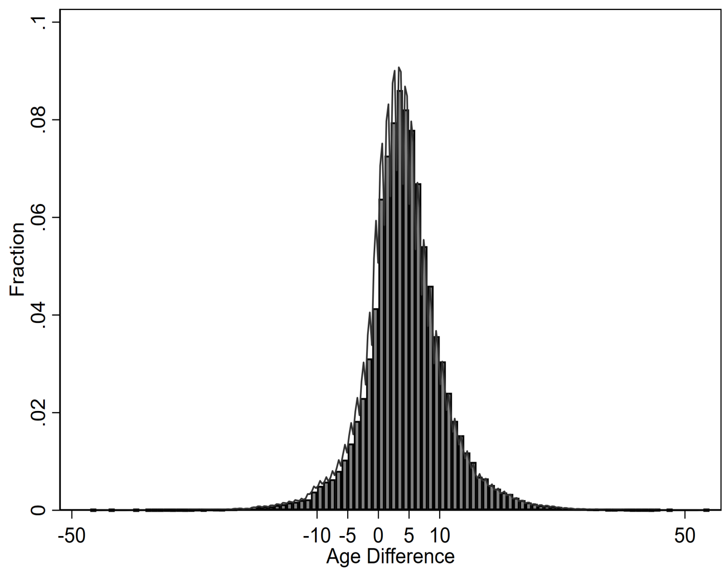

Figure 12: **Age difference distribution.** This figure displays a fraction histogram of the age differences between men and women in our sample of men living in rural areas (N = 49,186). The age difference is obtained according to the following equation: Age Difference = Husband's Age − Wife's Age

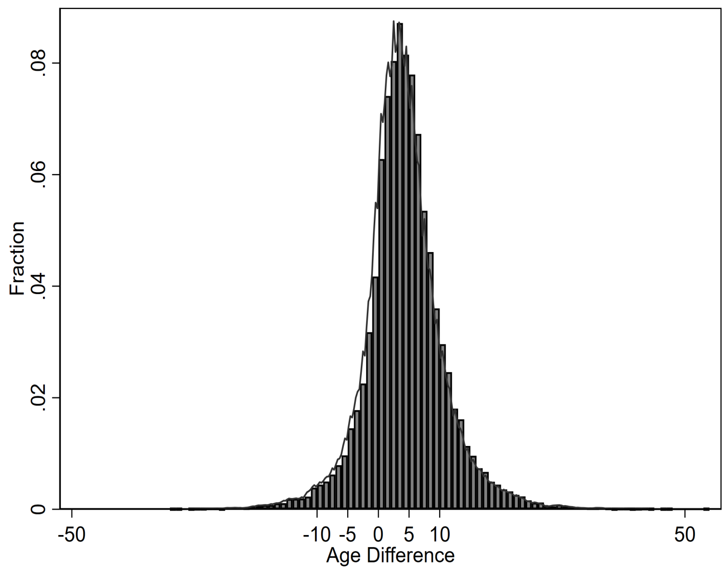

Figure 13: **Age difference distribution.** This figure displays a fraction histogram of the age differences between men and women in our sample of women living in rural areas (N = 25,546). The age difference is obtained according to the following equation: Age Difference = Husband's Age − Wife's Age

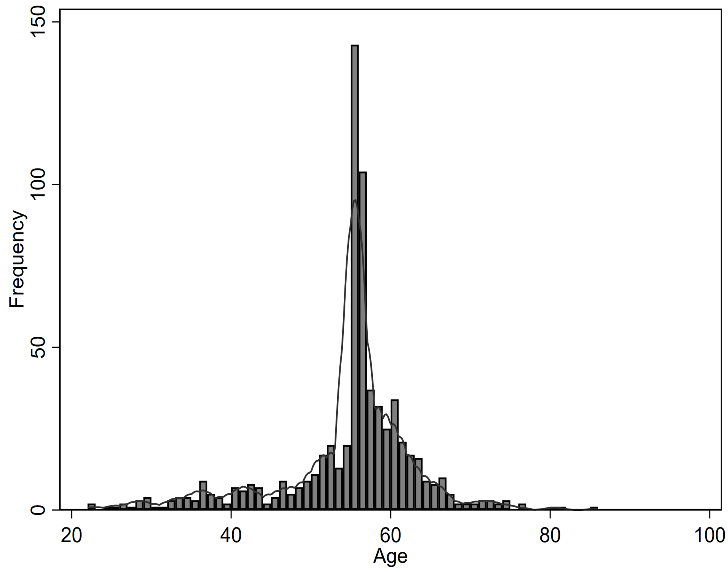

Figure 14: **Age when women receives pensions for the first time.** This figure shows the frequency with respects to age when women first report receiving pension benefits in our sample. (N = 25,546).

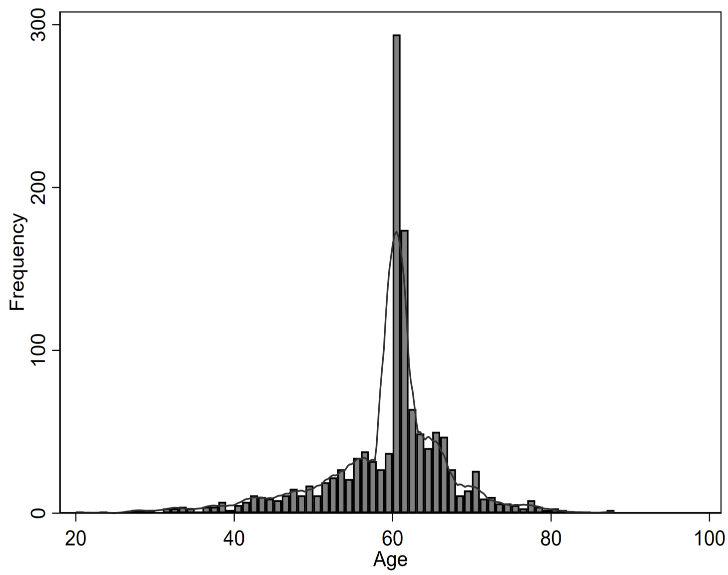

Figure 15: **Age when men receives pensions for the first time.** This figure shows the frequency with respects to age when men first report receiving pension benefits in our sample. (N = 49,186).

Appendix B. Other results

Table 19: **Second stage regression results: Agriculture workers who did not contribute by age differences within the couple**

Age Difference	**Men**			**Women**		
	1 to 4 Years (1)	5 Years (2)	6 to 10 Years (3)	1 to 4 Years (4)	5 Years (5)	6 to 10 Years (6)
Spouse's Pension	0.0409	1.103***	0.605***	0.167	1.241***	-0.0896
	(0.0615)	(0.135)	(0.129)	(0.155)	(0.206)	(0.0783)
Observations	6,319	1,567	4,928	2,952	744	2,267
$P > \|Z\|$ (Conventional)	0.506	0	2.70e-06	0.281	1.83e-09	0.252
$P > \|Z\|$ (Robust)	0.346	0	0.00836	0.239	2.79e-08	0.435
Bandwidth	9.680	14.03	8.596	7.600	11.83	6.354
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported both working on agriculture and not making contributions to a pension institute in the previous year. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age . The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 20: **First stage regression results: heterogeneity by age differences within the couple**

Age Difference	**Wives**			**Husbands**		
	1 to 4 Years (1)	5 Years (2)	6 to 10 Years (3)	1 to 4 Years (4)	5 Years (5)	6 to 10 Years (6)
Age $> c$	0.354***	0.422***	0.392***	0.381***	0.340***	0.392***
	(0.0232)	(0.0494)	(0.0338)	(0.0384)	(0.0964)	(0.0394)
Observations	15,755	3,833	11,472	8,255	1,991	5,940
$P > \|Z\|$ (Conventional)	0.000	0.000	0.000	0.000	0.000	0.000
$P > \|Z\|$ (Robust)	0.000	0.000	0.000	0.000	0.005	0.000
Bandwidth	11.33	10.57	11.13	12.35	7.612	8.195
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the first stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 1. Sample is restricted to married individuals living in rural areas who reported working in the previous year. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age . The dependent variable is the individual's pension status and the running variable is the partner's age. The coefficients represent the impact of the spouse's retirement age on his/her pension outcomes.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 21: **Second stage regression results: Individuals with different socioeconomic characteristics by age differences within the couple**

Age Difference: 1 to 10 years	**Men**			**Women**		
	Rural (1)	Agro (2)	No Cont. (3)	Rural (4)	Agro (5)	No Cont. (6)
Spouse's Pension	0.297***	0.0912	0.228*	0.148	0.253**	0.460**
	(0.0689)	(0.0713)	(0.105)	(0.0894)	(0.132)	(0.201)
Observations	31,060	6,044	3,417	16,186	2,657	1,987
$P > \|Z\|$ (Conventional)	1.60e-05	0.201	0.0307	0.0984	0.0559	0.0221
$P > \|Z\|$ (Robust)	0.00238	0.330	0.0662	0.453	0.0472	0.0265
Bandwidth	7.202	5.135	3.424	7.702	3.562	2.883
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of spouse's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas who reported working in the previous year whose age difference within the couple is between 1 and 10 years, as as described by the following equation: Age Difference = Husband's Age − Wife's Age. Columns stratify the sample based on socioeconomic characteristics. The dependent variable is the individual's pension status and the running variable is the partner's age. The coefficients represent the impact of the spouse's reaching retirement age on her pension outcomes.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendix C. No activity restriction

Table 22: **Second stage regression results**

	Men			**Women**		
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.162***	0.134**	0.0969*	0.173***	0.151***	0.105**
	(0.0428)	(0.0540)	(0.0506)	(0.0443)	(0.0430)	(0.0498)
Observations	91,676	91,676	91,676	91,676	91,676	91,676
$P > \|Z\|$ (Conventional)	0.000151	0.0131	0.0555	8.98e-05	0.000456	0.0350
$P > \|Z\|$ (Robust)	0.0456	0.0554	0.179	0.0416	0.0352	0.191
Bandwidth	7.777	4.628	13.51	8.064	6.910	15.28
Controls	No	age, age^2	No	No	age, age^2	No
Polynomial Order	1	1	2	1	1	2

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas. The dependent variable is the individual's pension status and the running variable is the partner's age. When included, variables age and age^2 control for a second degree polynomial of individual's own age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 23: **Second stage regression discontinuity: heterogeneity by education level**

	Men - Elementary School			Women - Elementary School		
	All	Incomplete	Complete	All	Incomplete	Complete
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.162***	0.194***	0.311**	0.173***	0.197***	0.0602
	(0.0428)	(0.0339)	(0.123)	(0.0443)	(0.0500)	(0.0934)
Observations	91,676	65,217	26,459	91,676	55,831	35,845
$P > \|Z\|$ (Conventional)	0.000151	9.91e-09	0.0115	8.98e-05	7.87e-05	0.519
$P > \|Z\|$ (Robust)	0.0456	0.00897	0.141	0.0416	0.0221	0.710
Bandwidth	7.777	10.83	11.84	8.064	7.548	10.72
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas. Columns stratify the sample based on having attained elementary school level education. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 24: **Second stage regression discontinuity: heterogeneity by age differences within the couple**

Age Difference	Men			Women		
	1 to 4 Years	5 Years	6 to 10 Years	1 to 4 Years	5 Years	6 to 10 Years
	(1)	(2)	(3)	(4)	(5)	(6)
Spouse's Pension	0.240***	0.939***	0.345***	0.0922	1.077***	0.136***
	(0.0400)	(0.0971)	(0.0767)	(0.0898)	(0.118)	(0.0509)
Observations	28,663	6,964	21,380	28,663	6,964	21,380
$P > \|Z\|$ (Conventional)	1.96e-09	0	6.94e-06	0.304	0	0.00747
$P > \|Z\|$ (Robust)	0.0758	0	0.00988	0.658	0	0.267
Bandwidth	12.58	12.41	7.863	6.685	11.50	9.180
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of partner's age on individual's pension status described by Equation 2. Sample is restricted to married individuals living in rural areas. Columns stratify the sample based on age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age . The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 25: **Second stage regression results: Heterogeneity by age differences within the couple and education level. Men**

Elementary School	**Incomplete**			**Complete**		
	1 to 4 Years (1)	5 Years (2)	6 to 10 Years (3)	1 to 4 Years (4)	5 Years (5)	6 to 10 Years (6)
Spouse's Pension	0.124***	0.957***	0.444***	0.270	0.731*	0.739***
	(0.0442)	(0.102)	(0.0632)	(0.188)	(0.415)	(0.251)
Observations	20,016	4,911	15,637	8,647	2,053	5,743
$P > \|Z\|$ (Conventional)	0.00511	0	0	0.150	0.0781	0.00323
$P > \|Z\|$ (Robust)	0.838	0	2.93e-06	0.658	0.220	0.101
Bandwidth	9.915	11.50	9.970	12.08	12.93	15.22
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of wife's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas. Columns stratify the sample based on education attainment and age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 26: **Second stage regression results: Heterogeneity by age differences within the couple and education level. Women**

Elementary School	**Incomplete**			**Complete**		
	1 to 4 Years (1)	5 Years (2)	6 to 10 Years (3)	1 to 4 Years (4)	5 Years (5)	6 to 10 Years (6)
Spouse's Pension	0.111	1.105***	0.205***	0.446***	1.017***	0.0643
	(0.0959)	(0.142)	(0.0427)	(0.118)	(0.377)	(0.201)
Observations	17,385	4,256	13,196	11,278	2,708	8,184
$P > \|Z\|$ (Conventional)	0.247	0	1.51e-06	0.000161	0.00704	0.749
$P > \|Z\|$ (Robust)	0.559	0	0.00720	0.0336	0.0119	0.889
Bandwidth	6.715	9.795	10.63	16.31	12.67	6.774
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of husband's age on individual's pension status described by Equation 2. Sample is restricted to married women living in rural areas. Columns stratify the sample based on education attainment and age difference between husband and wife as described by the following equation: Age Difference = Husband's Age − Wife's Age. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendix D. Other robustness tests

Table 27: **Second stage regression results**

Optimal Bandwidth = 13.083	25% (1)	50% (2)	75% (3)	125% (4)	150% (5)	200% (6)
Spouse's Pension	0.208**	0.201**	0.208***	0.284***	0.322***	0.385***
	(0.0980)	(0.0616)	(0.0476)	(0.0348)	(0.0314)	(0.0272)
Observations	49,186	49,186	49,186	49,186	49,186	49,186
$P > \|Z\|$ (Conventional)	0.0340	0.00113	1.25e-05	0	0	0
$P > \|Z\|$ (Robust)	0.0434	0.0268	0.00565	0.000281	1.16e-05	1.06e-09
Bandwidth	3.271	6.542	9.812	16.35	19.62	26.17
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of wife's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas who reported working in the previous year. Columns show results of the same regression estimated with different percentages of the optimal bandwidth. The dependent variable is the individual's pension status and the running variable is the partner's age.
Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 28: **Second stage regression results**

Optimal Bandwidth = 9.328	25% (1)	50% (2)	75% (3)	125% (4)	150% (5)	200% (6)
Spouse's Pension	0.0133***	0.145	0.187	0.235*	0.259**	0.323***
	(0.206)	(0.109)	(0.0797)	(0.0561)	(0.0499)	(0.0414)
Observations	25,546	25,546	25,546	25,546	25,546	25,546
$P > \|Z\|$ (Conventional)	0.948	0.182	0.0188	2.75e-05	1.98e-07	0
$P > \|Z\|$ (Robust)	0	0.716	0.462	0.0526	0.0192	0.00144
Bandwidth	2.309	4.619	6.928	11.55	13.86	18.48
Controls	No	No	No	No	No	No
Polynomial Order	1	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of wife's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas who reported working in the previous year. Columns show results of the same regression estimated with different percentages of the optimal bandwidth. The dependent variable is the individual's pension status and the running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 29: **Second stage regression results**

Dependent Variable:	North (1)	Northeast (2)	Central-West (3)	Southeast (4)	South (5)
Spouse's Pension	0.0449	-0.0161	0.0351	0.0430	-0.0744*
	(0.0395)	(0.0622)	(0.0307)	(0.0596)	(0.0492)
Observations	49,186	49,186	49,186	49,186	49,186
$P > \|Z\|$ (Conventional)	0.256	0.796	0.254	0.471	0.130
$P > \|Z\|$ (Robust)	0.338	0.892	0.210	0.418	0.0763
Bandwidth	9.201	9.007	8.065	8.177	9.495
Controls	No	No	No	No	No
Polynomial Order	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of wife's age on individual's pension status described by Equation 2. Sample is restricted to married men living in rural areas who reported working in the previous year. Columns report the impact of spouse's pension status on different dependent variables. The running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 30: **Second stage regression results**

Dependent Variable:	North (1)	Northeast (2)	Central-West (3)	Southeast (4)	South (5)
Spouse's Pension	-0.0159	-0.0430	-0.00614	-0.0386	0.126*
	(0.0374)	(0.0684)	(0.0289)	(0.0654)	(0.0739)
Observations	25,546	25,546	25,546	25,546	25,546
$P > \|Z\|$ (Conventional)	0.671	0.530	0.832	0.555	0.0873
$P > \|Z\|$ (Robust)	0.461	0.646	0.834	0.449	0.0941
Bandwidth	13.45	11.45	11.72	9.908	8.007
Controls	No	No	No	No	No
Polynomial Order	1	1	1	1	1

Source: PNADC 2015-2019 Data. Available at: https://bit.ly/microdadospnad
Notes: This table shows the results from the second stage of a fuzzy regression discontinuity design of husband's age on individual's pension status described by Equation 2. Sample is restricted to married women living in rural areas who reported working in the previous year. Columns report the impact of spouse's pension status on different dependent variables. The running variable is the partner's age.
Regressions estimated with optimal bandwidth (Calonico et al., 2017). Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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