Fertility Effects of Parental Early Retirement

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Abstract

This study exploits the eligibility age for early retirement in a regression discontinuity design to investigate the impacts of parental early retirement on the fertility of their adult children. Utilizing data from the Health and Retirement Study, it reveals a rise in the likelihood of daughters having childbirth upon their parents' early retirement. This increase is mainly driven by extensive margins, as the effects are especially strong among those expecting their first child. These effects are short-term, lasting up to two years after parental retirement. By exploring time and money transfers between parents and their children, the rise in childbirth can be attributed to increased time transfers from retired parents to their adult children in informal childcare, rather than monetary transfers. Moreover, the increase in childbirth after early parental retirement is more salient among areas with a higher cost for formal childcare.

JEL Codes: J13, J14, J26

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1 Introduction

Many countries are facing declining birth rates. As illustrated in Figure 1a, the average fertility rates in OECD countries have dropped to 1.6 over the past fifty years, which is below the replacement level.[1] In response, governments have implemented pronatalist policies, such as subsidized childcare, paid parental leave, child allowance and tax credits. Despite these efforts, the United Nations reports that the number of countries aiming to increase fertility rose from 19 to 55 between 1986 and 2015, yet these measures have not significantly increased long-term fertility rates(Sobotka et al., 2019; Kearney et al., 2022). Why does fertility seem so gloomy despite these pro-fertility policies?

Meanwhile, population aging also presents a formidable challenge for many countries, straining their social security systems. As Figure 1a shows, the old dependency ratio, defined as the proportion of individuals aged 65 and above to those between 20 and 64, has exceeded 30% in 2020. Accordingly, numerous countries have phased in reforms to their social security programs, primarily aiming to delay the normal retirement age. However, the cross-country evidence in Figure 1b interestingly suggests a potential negative correlation between the normal retirement age and fertility rates. Although most individuals in their 60s do not directly contribute to fertility, they can still influence the reproductive choice of their prime-age offsprings. This leads to a critical question: What are the fertility effects of retirement policies?

To address these questions above, I examine the impacts of parental retirement on the fertility of their adult children, by exploiting the eligibility age for early retirement in a regression discontinuity design. The analysis uses data from the Health and Retirement Study, linking parents with their biological adult children. I capitalize on the discontinuous increases in retirement probability at the early retirement age threshold of 62, to identify the influence of early retirees on their subsequent generation's fertility. Results indicate a significant increase in the likelihood of their daughters' childbirth. Furthermore, such positive impacts are mostly extensive margins, as they are much stronger for those daughters expecting their first child. The dynamic profile suggests that the impacts are immediate within 2 years, and the children may shift their childbearing to these two years right after their parental retirement. Exploiting intergenerational transfers as outcomes, I document the suggestive evidence that then main mechanism is time transfers from retired parents to kids rather than monetary transfers. Besides, I find suggestive evidence that such an increase in birth upon parent's retirement is more pronounced in areas where the formal childcare is more expensive. Aligning with existing research, this evidence from the U.S. attributes the increased fertility to the released time constraint of retirees, allowing them to offer informal childcare for their descendants. Different from the findings under other institutional contexts, this paper documents increased fertility of parental early retirement only occurred to daughters, not sons; neither

[1] A replacement fertility rate is 2.1.

the difference between paternal and maternal retirement is observed in the U.S. context.

The rest of this paper proceeds as follows. Section 2 reviews the related literature. A conceptual framework is presented in Section 3. Section 4 and Section 5 introduce the data and empirical strategies. Section 6 displays the results, and Section 7 concludes.

2 Literature Review

This paper interacts with two strands of literature. The first concerns the impacts of retirement or retirement policies. Extensive research has delineated its influence on consumption (Kolsrud et al., 2024), savings (Attanasio and Brugiavini, 2003), wealth (Bottazzi et al., 2006), investment (Bottazzi et al., 2011), labor supply of prospective retirees (Liebman et al., 2009), labor supply of their spouse (Moghadam et al., 2023), intra-generational fertility (Billari and Galasso, 2009), and even health outcomes (Nielsen, 2019; Caroli et al., 2022; Ebeid and Oguzoglu, 2023). Although the majority of these studies concentrate on the retiring generation, a growing body of research investigates its intergenerational effects, on subsequent generations. Aparicio Fenoll (2020) highlights that women's retirement leads to an increase in their daughters' employment. Similarly, Bratti et al. (2018) noted an 11% increase in labor force participation among Italian females whose mothers are eligible for retirement compared to those whose mothers are ineligible.

The second literature examines fertility determinants. Traditional labor economics outlines a trade-off between female labor force participation and fertility (e.g., Angrist and Evans (1998)). However, recent research has explored solutions to this dilemma, particularly the access to grandparent-provided childcare. This form of informal childcare has been acknowledged as a significant enabler of both higher fertility rates and greater female employment performance. Notably, research by Okun and Stecklov (2021) demonstrates that grandparent mortality in Israel leads to reduced fertility. Marcos (2023) uses the timing of grandmother's death as exogenous shock to establish a causality between a lack of grandmother support and lower fertility and reduced maternal labor participation. Further evidence by Compton and Pollak (2014) demonstrates that that living close to mothers or mothers-in-law substantially boosts labor participation among married women with young children in the U.S. Additionally, evidence from Sweden, suggests that proximity to paternal grandparents enhances fertility rates and maternal survival (Willführ et al., 2022).

This study offers a two-fold contribution. First, it supplements evidence from the United States, and draw conclusions aligning with three recent studies from Europe. Eibich and Siedler (2020) show parental early retirement at age 60 in Germany increases the fertility of their adult children. Ilciukas (2023) observes that a decline in fertility among the next generation in the Netherlands when parental retirement is delayed, where both female labor force participation and

formal childcare usage exceed the OECD average. Battistin et al. (2015) also document the adverse effects of delayed parental retirement on fertility in Italy, where female labor participation is below the OECD average and grandmothers frequently serve as the primary childcare providers. In the U.S., with female labor participation rates intermediate to these countries,[2] I find similar patterns among parents and their daughters.

My second contribution is to verify the roles of time transfers and exclude the alternative explanation from monetary transfers, as well as offering suggestive evidence on the substitution between formal and informal childcare within families. All these three most related papers above, suggesting that parental retirement positively influences adult children's fertility, have an underlying presumption that the retired parents might invest time to provide informal childcare for prospective grandkids. However, these studies have predominantly focused on the fertility benefits of parental retirement in the presence of time transfers, and overlooked the significance of monetary support as well as upward transfers from adult children to their retired parents. With intergenerational transfer data from HRS, I analyze both upward and downward transfers in time and money, and exclude the channels that haven't been considered in prior work. This distinction between monetary and time transfers is crucial for understanding the interactions of retirement and fertility policies, and thus offers crucial insights to policymakers.

3 Conceptual Framework

An extended family typically consists of two generations: the Senior (s) and the Junior(j), The junior generation makes their fertility decision. The senior generation, who are in their retirement phase, offers two types of support to their children (i.e., the junior generation): monetary transfer m and time transfer t.[3] The price of consumption is normalized as 1.

The junior generation accepts monetary transfer m and time transfer t from their parents, and they value their consumption c_j, leisure l_j, and total time devoted to prospective childcare $z = b_j$. This z is highly correlated with fertility behavior: if fertility f is a discrete choice (e.g., $f = \{0, 1\}$), they would have a baby only if z approaches some threshold; if it is a continuous choice (e.g., $f = [0, 1]$ is the probability to have a baby), then $f'(z) > 0$ must hold, i.e., the chance to have a baby increases with the prospective childcare time. Their utility is represented by a continuous, twice differentiable and quasi-concave function ν. To obtain closed form solutions, I make it as a Cobb-Douglas form $c_j^{\alpha} l_j^{\beta} (b_j)^{\gamma}$, where $\alpha, \beta, \gamma \in (0, 1)$ and $\alpha+\beta+\gamma = 1$. They are constrained by time $h_j+l_j+b_j = 1+t$, where the time endowment 1 is distributed to labor h_j, leisure l_j, and prospective childcare b_j. The budget constraint is $c = w_j h_j + y_j + m$,

[2]According to the World Bank, the female labor force participation rates in 2020 for the Netherlands, Germany, the U.S., and Italy were 59.9%, 56.2%, 55.3%. 39.8%, respectively.

[3]Either of them can be positive or negative.

where h_j is their working hours. w_j is their wage rate. y_j is non-labor income, and m is the monetary transfer they receive from their parents. The optimization problem can be described as below.

$$\max_{c_j,l_j,b_j} \quad \nu(c_j, l_j, b_j + t) = c_j^{\alpha} l_j^{\beta} b_j^{\gamma}$$

s.t.

$$h_j + l_j + b_j = 1 + t, c_j = w_j h_j + y_j + m$$

By solving the first-order conditions, the consumption, leisure time, labor, and prospective childcare can be expressed as functions of financial and time transfer they receive.

$$c_j = \alpha(w_j + y_j + m + w_j t)$$

$$l_j = \frac{\beta(w_j + y_j + m + w_j t)}{w_j}$$

$$b_j = \frac{\gamma(w_j + y_j + m + w_j t)}{w_j}$$

Especially, the prospective childcare time is $z = b_j = \frac{\gamma(w_j+y_j+m+w_j t)}{w_j}$. It is obvious that the transfers from parents to their adult children may boost fertility, no matter in what forms, as

$$\frac{\partial f(z)}{\partial m} = f'(z)\frac{\partial z}{\partial m} > 0$$

$$\frac{\partial f(z)}{\partial t} = f'(z)\frac{\partial z}{\partial t} > 0$$

Hence, the fertility outcome depends on how these intergenerational transfers change upon parental retirement.[4] I propose the following hypotheses.[5]

Hypothesis 1: If the monetary transfers from the senior to the junior go up (down) upon the senior's retirement, the likelihood of the junior's childbirth will increase (decrease).

[4]In this theory, although only downward transfers from parents to children are literally discussed, they can actually turn to be negative as upward transfers from children to parents. In Tables 4 and 5 I discussed how those transfers from children to parents change right after parental retirement, and find no evidence for upward direction upon retirement.

[5]The optimization at the Senior generation level can also be added into this framework, where the parents will decide how much of time transfers and monetary transfers to the Junior upon their retirement. The conclusion depends on the senior's wage relative to the junior's. Specifically, if The senior's relative wage is higher, they would choose not to retire and give monetary transfers; otherwise they will give the junior time transfers. I omit the optimization for the senior because HRS doesn't provide wage rate of the linked adult children, and thus I am unable to map the model into my empirical work in later sections. The current simplified model wouldn't hinder the discussion on heart idea of this paper, and points out the clear direction of the later empirical work.

Hypothesis 2: If the time transfers from the senior to the junior go up (down) upon the senior's retirement, the likelihood of the junior's childbirth will increase (decrease).

4 Data

This paper uses 15 waves of data from the Health and Retirement Study (HRS)[6], from 1992 to 2022. The HRS, since 1992, has consistently generated a representative sample of the American population over the age of 50 through its biennial surveys. This dataset is particularly apt for my study due to its comprehensive socio-economic information on older adults and their family members. Additionally, I utilize the longitudinal individual-level data file and family file cleaned and prepared by RAND.[7] These files are instrumental in tracking the employment status of respondents, and identifying their family members.

After merging these longitudinal records, I restrict the sample to respondents aged between 50 and 75.[8] Based on the family member files provided by HRS, I link these respondents with their living biological children aged 20 to 50.[9] Furthermore, I exclude respondents: (1) those who live in a nursing home, with disabilities that hinder work; (2) those whose longest working history is less than 10 years; (3)those whose health insurance is provided by their employer. For such respondents have been consistently outside the labor force, and are unlikely to experience significant changes due to retirement, or their retirement decision would be affected by more than other factors and thus hinder the power of first regressions. By keeping those all key variables without missing, the final dataset has 218,098 observations, consisted of 19,511 respondents and 65,695 linked adult children from 13,202 extended families. Detail summary statistics are reported in Table 1.

5 Empirical Strategy

My empirical strategy is a fuzzy regression discontinuity (FRD) design with age as a running variable. The main goal of this paper is to learn about the treatment effects of parental early retirement on fertility of their next generation. If the treatment randomization is available, it is easier to estimate causal effects. The retirement treatment, however, is more endogenous due to reverse causality

[6]The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan.

[7]RAND HRS Longitudinal File 2020 (V1), produced by the RAND Center for the Study of Aging, with funding from the National Institute on Aging and the Social Security Administration. Santa Monica, CA (March 2023).

[8]According to American Community Survey(ACS) 2020, for those to become grandparents in the last year, over 73% of them are in this age range.

[9]Also based on results from American Community Survey(ACS) 2020, over 98% (96%) of mothers (fathers) with newborns, are aged between 20 and 50.

that parents may choose to retire around the arrival of newborn grandkids. Hence, I turn to utilize an age discontinuity in the benefit structure of the social security program.[10] Specifically, individuals are eligible to retire and begin receiving retirement benefits as early as age 62, and this produces an abrupt shift in eligibility of retirement. The discontinuity in the probability of retirement allows researchers to explore its causal effects for interest. [11] Figure 2 plots the rate of retirement by age, showing a big break from 40% to 60% around age 62 for both the female and the male. Throughout this paper, the retirement is defined as the employment status of "fully retired", directly reported by respondents themselves. It happens that people can enter the labor market after they have viewed themselves as retired. For those people with more than one self-reported retirement event records, I will regard the most recent date as their timing of retirement. It is worth to note that claiming Social Security retirement benefits are contingent upon surpassing the age of 62, although individuals are allowed to leave the labor force earlier and later than their 62. As expected, the transition in retirement probability at age 62 is not absolute but varies between zero and one, estimated in Figure 5. This "lack of compliance" is precisely why a Fuzzy RD design is utilized.

In this design, the estimand is the ratio of the jump in the regression of the fertility outcome on age to the jump in the regression of the treatment indicator on age, as a local average causal effect of the retirement treatment (Imbens and Lemieux, 2008). Formally, it is

$$\tau_{FRD} = \frac{\lim_{a=62^+} E\left[y|\text{age}_{it}=a\right] - \lim_{a=62^-} E\left[y|\text{age}_{it}=a\right]}{\lim_{a=62^+} E\left[\text{retirement}_{it}|\text{age}_{it}=a\right] - \lim_{a=62^-} E\left[\text{retirement}_{it}|\text{age}_{it}=a\right]} \tag{1}$$

This can be interpreted as how retirement impacts outcomes for compilers, those individuals who choose to retire (claim their social security benefits) as early as age 62.

5.1 Specification

I focus on the local average treatment effects of early retirement. Following Lee and Lemieux (2010), the estimation for my Fuzzy RD specification can be described by a two-equation system below:

$$Retirement_{ijt} = \alpha_1 + \pi_1 \mathbb{1}(Age_{it} \geq 62) + f_1(Age_{it} - 62, ChildAge_{ijt}) + \gamma_w + \zeta_i + \epsilon_{ijt} \tag{2}$$

$$Y_{ijt} = \alpha_2 + \pi_2 \mathbb{1}(Age_{it} \geq 62) + f_2(Age_{it} - 62, ChildAge_{ijt}) + \gamma_w + \zeta_i + \sigma_{ijt} \tag{3}$$

[10] Social Security, also known as Old Age, Survivors, and Disability Insurance (OASDI), is the largest social insurance program in the United States.

[11] E.g., Zhang et al. (2018), Nielsen (2019), and Ebeid and Oguzoglu (2023), investigate the effects of retirement on health with similar identification strategies.

where the subscripts i, j, t refer to the respondent, their child, and surveyed year, respectively. $Retirement_{ijt}$ takes the value of one if the respondent i report themselves as retired, and zero otherwise. As I take the latest records as their timing of retirement, the retirement is an absorbing status. Y_{ijt} is the outcome variable reported to the pair consisted of parent i and child j in year t. For what I interest most, Y_{ijt} is a dummy variable equaling one if a new grandkid is born to this parent-child pair in the following two years, as conception and birth may take a while. $f_m(\cdot), m = 1, 2$ is a spline function of parent age relative to 62 and the child age. $\mathbb{1}(Age_i \geq 62)$ is an indicator for whether the parent age is 62 and beyond. γ_w is survey wave fixed effects, and ζ_i is parent effects. $\epsilon_{ijt}, \sigma_{ijt}$ are both error terms.

The equation 2 is the first stage, and the equation 3 is the reduced form. Provided that the same bandwidth for the both equations is applied, and the same order of polynomial is used for $f_m(\cdot), m = 1, 2$, a two-stage least square (2SLS) estimate τ is numerically identical to the ratio $\frac{\pi_2}{\pi_1}$, capturing the local average treatment effect (LATE) for respondents retire around age 62. The second stage of 2SLS specification is:

$$Y_{ijt} = \alpha_3 + \tau \hat{Retirement}_{it} + f_3(Age_{it} - 62, ChildAge_{ijt}) + \gamma_w + \zeta_i + \mu_{it} \quad (4)$$

where $\hat{Retirement}_{it}$ is the first-stage estimate. $f_3(\cdot)$ is also a spline function based on parent centered age, and child age, with the same polynomial order as $f_m(\cdot), m = 1, 2$. μ_{ijt} is the error term.

To overcome the challenge of finding an appropriate estimator for $f_m(\cdot), m = 1, 2, 3$, I specify a flexible parametric function for them to take the form as:

$$\begin{aligned} f_m(\cdot) = [1 - \mathbb{1}(Age_{it} \geq 62)] \sum_{p=1}^{P} \kappa_{0p}(Age_{it} - 62)^p + \mathbb{1}(Age_{it} \geq 62)) \sum_{p=1}^{P} \kappa_{1p}(Age_{it} - 62)^p \\ + \sum_{p=1}^{P} \xi_p ChildAge_{ijt}^p \end{aligned} \quad (5)$$

where P is the highest order of polynomials. $\kappa_{nj}, n = 0, 1$ are coefficients of each polynomial term interacted with the age eligibility indicator, allowing the estimated shape to be different on either side of the age cutoff 62. As suggested by Gelman and Imbens (2019), I will keep the polynomial order up to two.[12] The main results of this paper use uniform kernel weight[13], and the

[12]Gelman and Imbens (2019) recommend to use polynomials up to the second degree (i.e., quadratic). Based on Pei et al. (2022)'s proposed procedure to minimize asymptotic mean squared error (AMSE), the estimated AMSE for estimator is smallest when the polynomial order is 1 in this paper.

[13]Uniform kernel function, is also known as rectangular kernel function, where all observations have the same weight. For robustness checks, I also use a triangular kernel function, where the weight is maximized at the cutoff point, and decline symmetrically and linearly as going farther from the cutoff. The baseline results with triangular kernel weights are reported in A.2

data-driven bandwidth selector recommended by Calonico et al. (2014, 2020) (CCT, hereafter). The optimal bandwidth based on mean square error (MSE) ranges between 3.68 and 4.75 (years) when using the linear spline, while 4.15-5.72 (years) for quadratic spline, so I fix the bandwidth for most analysis in this paper at 4 years when using linear spline while 5 years using quadratic method, for ease of comparison between different specifications and samples.[14] Family-level clustered standard errors are applied throughout the main analysis, to account for household-level heteroskedastcity and autocorrelation.

5.2 Validity of Assumptions

Two important assumptions must hold for regression discontinuity design. The first one is individual characteristics are smoothly distributed according to age to make sure individuals around the age of 62 are comparable. Figure 3 plots estimated coefficient for some parent and child characteristics against centered age at 62, using either linear or quadratic spline relative to the centered age. Those covariates are age, marital status, education, employment, income level of kids, and education, gender, race, and income level of parents. All these statistically insignificant estimates support the assumption that the observations on either side of the cutoff are similar.

The second assumption is no manipulation around the age cutoff. It is unlikely that manipulation would be an issue here, as people cannot respond to the policies by altering their age. Figure 4 contains the distribution of age for all observations. Also, formally using a local-polynomial density test suggested by Cattaneo et al. (2018), the p-values above 0.59 don't reject the null hypothesis of no manipulation.

6 Results

6.1 Baseline Results

Table 2's column (3)-(4) reports the effects of parental retirement on daughter's fertility as my baseline results. The Panel A displays the OLS results across different specifications, with all coefficients showing modestly negative values. However, due to the endogeneity concerns, these results are considered unreliable. That is the reason I turn to my RD strategy. Figure 5 and Panel B of Table 2 demonstrate a noticeable increase in the likelihood of retirement for individuals just over 62 compared to those slightly younger—specifically, a 7 percentage point increase with 99% statistical significance. This supports the use of the age 62 threshold as a robust instrument for assessing the impact of parental retirement.

[14] Another optimal bandwidth, suggested by Imbens and Kalyanaraman (2012)'s procedure (IK, hereafter) ranges between 3.6 to 5.4 years.

Further, the detail results for reduced form and 2SLS regressions are reported in the Figure 6 and Panel C and D of Table 2, where the estimated effects become positive. The odd columns of Table 2 explore a linear trend of respondents' centered age and child age, while the even columns apply a quadratic trend. As columns (3)-(4) shown, if the linear spline is employed, the results suggest that early parental retirement increases the likelihood of grandchildren by 14 percentage points at a 95% significance level; with a quadratic spline, the increase in fertility likelihood is 20 percentage points at a 90% significance level. The quadratic spline regressions tend to yield more conservative results but a bit larger in magnitude.

The results for son's fertility, and from mother's or father's early retirement, are displayed in other columns of Table 2. The sign of coefficients varies across specifications and keeps statistically insignificant. Considering the statistical significance here, I would take the daughter sample as my baseline and conduct the rest of my analysis based on them.

6.2 Robustness Checks

In this subsection, I will do sensitivity and falsification tests concerning bandwidths and cutoffs. In Regression Discontinuity Design, selecting appropriate bandwidths is crucial. Adopting a data-driven bandwidth selection approach recommended by Calonico et al. (2014) and Caroli et al. (2022), I use a 4-year and 5-year bandwidth in my principal analysis. Additionally, I expand the analysis by progressively widening the bandwidth from 1.25 years to 10 years in the 2SLS results. For the linear spline estimates shown in Figure 7a, the estimated confidence intervals expand as the bandwidth shrinks, but the estimated points always remain positive until the bandwidth reaches 1.25. A similar pattern is also observed in the quadratic spline method, confirming that the positive outcomes are relatively stable across different bandwidth settings.

A series of falsification tests are employed to ensure that the results are not influenced by retirement and fertility decisions at the age cutoff nearby, specifically at ages 60, 65, and the full retirement age (FRA).[15] The tests reveal no significant effects at these ages, with the only noteworthy positive estimates occurring at age 62. This pattern holds no matter when using a linear spline or a quadratic spline method. The coefficients from these tests are visualized in Figure 8.

Taken together, through the sensitivity test regarding bandwidths and falsification test on cutoffs, I find there exist robust effects of parental early retirement on fertility. It is clear that positive effects are detected on daughters' fertility,

[15] An individual who claims benefits at the full retirement age (FRA) receives 100 percent of their monthly primary insurance amount. For those retiring early (or delaying retirement) before (after) the FRA, the amount would be scaled down (up) by monthly early retirement reduction factors (delayed retirement credits) to account for the longer (shorter) period of benefit receipt. Currently, the FRA varies from 65 to 67 according to the birth year.

which aligns with the findings documented in other research studies.[16].

6.3 Marginal Effects: Birth Order

An interesting exploration beyond the general effects focuses on the marginal effects, specifically examining the birth order of grandchildren and the family size of adult children. I incorporated the interaction between the newborn grandchild's birth order and parental retirement into my 2SLS regressions. The findings, displayed in columns (1) and (2) of Table 3, reveal coefficients as -0.09, significant at the 99% level. This indicates that as the number of children increases for adult children, the beneficial impacts of parental retirement diminish. Additionally, I divide the sample based on the number of children adult children have in the previous period and applied the same analytical framework as described in equation 4. Results from columns (3) to (8) of Table 3 suggest that the positive effects of parental retirement predominantly benefit those adult children who are childless, as they are more likely to have their first child when their parents retire. Therefore, I can conclude that the positive effects of parental retirement are mostly driven by extensive margins.

6.4 Dynamic Effects: Timing of Birth

An additional aspect of interest to policymakers is the dynamic profile of fertility effects associated with parental retirement: are these effects immediate? Or do they manifest over time?

To answer this question, I start from this equation

$$Y_{ijt} = \alpha_4 + \sum_{\tau=-5}^{\tau=5} \rho_\tau \mathbb{1}(Age_{it} - 62 = \tau) + f_4(Age_{it} - 62, ChildAge_{ijt}) + \gamma_w + \zeta_f + \mu_{it} \tag{6}$$

In this equation, $f_4(\cdot)$ is a spline function in terms of parent centered age, and child age, with the same polynomial order as before. $\mathbb{1}(Age_{it} - 62 = \tau)$ represents a series of dummy variables that measure the years relative to the prospective retirement age of 62, with a set of coefficients ρ_τ capturing the dynamic effects. By excluding the year $\tau = -1$, the approach resembles an event study design where the prospective retirement is the treatment. Results, depicted in Figure 9, indicate that regardless of using a linear spline or quadratic spline model, the positive effects on fertility are witnessed only in the first and second years after retirement. Besides, we observe negative coefficients for years prior to 62. This reveals that adult children may shift their fertility from those periods to later as they can anticipate their parental retirement.

Moreover, I investigate the dynamic effects by replacing equation 4 with the

[16]If the triangular kernel function is employed to weight, the conclusion stays. Details are displayed in Table A.2

following

$$Y_{ijz} = \alpha_5 + \rho \hat{Retirement}_{it} + f_5(Age_{it} - 62, ChildAge_{ijt}) + \gamma_w + \zeta_f + \mu_{it} \quad (7)$$

Still, $f_5(\cdot)$ is a spline function of ages. The subscripts $z = -3, -2, -1, 0, 1, 2, 3$, indicating the distance (in years) relative to the predicted parental retirement. Given HRS is conducted every two years, it generates bi-year windows around prospective retirement year as $[-6, -4], [-4, -2], [-2, 0], [0, 2], [2, 4], [4, 6], [6, 8]$. Figure 10 displays the impact of parental retirement on the likelihood of childbirth among adult daughters, accompanied by a 95 percent confidence interval. It also shows that the fertility effects are immediate, manifesting solely within the two years following parental retirement. Coefficients in the window $[-2, 0]$ are marginally negative, also indicating the fertility shifts from $relativeyears\,[-2, 0]$ to $[0, 2]$ to parental retirement.

6.5 Mechanism: Intergenerational Transfers

Intergenerational transfers between retired parents and their adult children may explain increased grandchild births upon parental retirement. I investigate this by using four transfers as outcome variables in Equation 4. Results of time transfers from children to parents are reported in Table 4. In the first two columns, the outcome is whether the linked child is in the helper files, indicating whether they spend time helping their old parents with daily activities or instrumenting daily activities. In columns (3) and (4) the outcome is the number of hours per week they spent on taking care of their linked parents. As shown, no statistically effects are detected. As for money transfers from children to parents in Table 5, the estimates are still insignificant.

I replace the outcome variables with time and money transfers from parents to kids, and reported their 2SLS estimated in Table 7 and Table 6, respectively. Effects from money transfers from parents to kids are not detected, no matter if it takes the forms of extensive margins or intensive margins, as shown in Table 7. However, if taking the intensive margins (i.e., number of hours per week helping children with childcare) of hours parents spent to help their adult children, the results in columns (3)-(4) of Table 6 imply that retired parents tend to spend 7 more or 14 more hours per week to help their children. Compared to the extensive margins in the first columns, it indicates that grandparents' deep involvement in informal child care helps the appearance of their grandkids.

Aside, I report the results with other two definitions for retirement in Table A.1, and consistent results with the baseline is documented as well. The first one defines retirement as claiming their social security retirement benefits; the other is to define retirement as working less than 1000 hours during the last two years. It is easy to tell that the first measure here is based on money access, while the second focuses on more flexibility on time. Consistent with the fact that time transfers matter more than money transfers, the magnitude and significance of 2SLS estimates are pretty close to what is in the previous baseline results.

6.6 Early Retired Parents Substitute Formal Child Care

Table 8 presents suggestive evidence that early retirees act as "grand nannies" substituting for costly formal childcare. To examine this, I link the weekly center-based childcare price for infants aged 0–23 months—scaled by local median family income and weighted by the county's total population—from the National Dataset of Childcare Prices to respondents' locations. I then divide the sample based on the ranking of local formal childcare costs. The three most expensive census divisions are the Pacific, New England, and East North Central divisions, while the least expensive are the East South Central, West South Central, and West North Central divisions. The results, presented in Table 8, columns (1)–(2), suggest that in areas with high childcare costs, the regression coefficients on retirement and fertility remain positive but are not statistically significant due to a smaller sample size. In contrast, in areas where childcare is more affordable (columns (3)–(4)), the coefficients become negative. This suggests that retired parents may support fertility by substituting for costly formal childcare.

7 Conclusion

Utilizing Health and Retirement Study (HRS) data to connect parents with their biological children, this paper investigates the impact of early retirement eligibility on the fertility of adult children in the U.S. It finds that the positive effects on childbirth probabilities are exclusive to daughters, not among sons or other groups. Notably, the impacts are most significant for daughters on the verge of having their first child. The dynamic profile suggests it is immediate and pronounced within two years following parental retirement. Moreover, the study explores the mechanisms behind these effects, revealing that time transfers from parents to adult children are more influential than transfers in other forms and directions. Early retirement policies may support fertility through retired parents acting as informal childcare providers for their prospective grandkids.

This research carries important implications for social security reforms. The rising statutory retirement age in many countries raises concerns about its potential to depress fertility rates. The findings suggest that the interplay between delayed retirement and fertility goals may require careful balance. Making formal childcare more affordable could mitigate these concerns.

Here are also some limitations of this study. Firstly, it focuses exclusively on the timing of fertility around parents' early retirement age, rather than overall effects on lifetime fertility. It is possible that individuals merely adjust the timing of childbirth in response to parental retirement, but the total number of offspring remains unchanged. Secondly, the study does not account for alternative mechanisms, such as health-related influences on fertility decisions, or labor substitutability between young and old labor. The health effects of retirement are not conclusively understood in the literature. For instance, Ebeid and

Oguzoglu (2023) suggests retirement may lead to a decrease in cognitive health, while Nielsen (2019) associates it with reduced hospitalizations. These varying health outcomes may affect the fertility decisions of the next generation. Future research may expand on these areas to shed light on how parental retirement affects children's fertility through health conditions.

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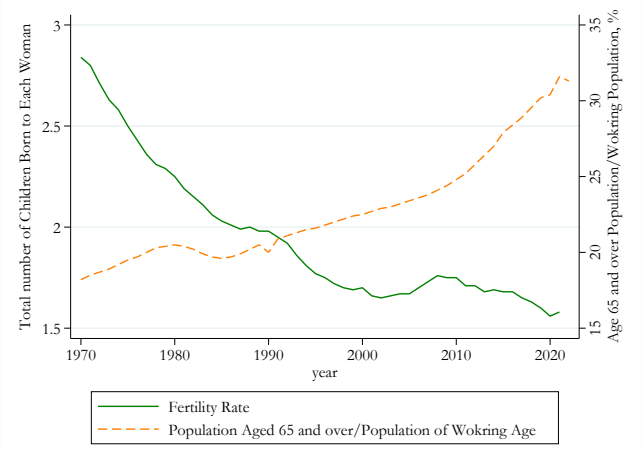
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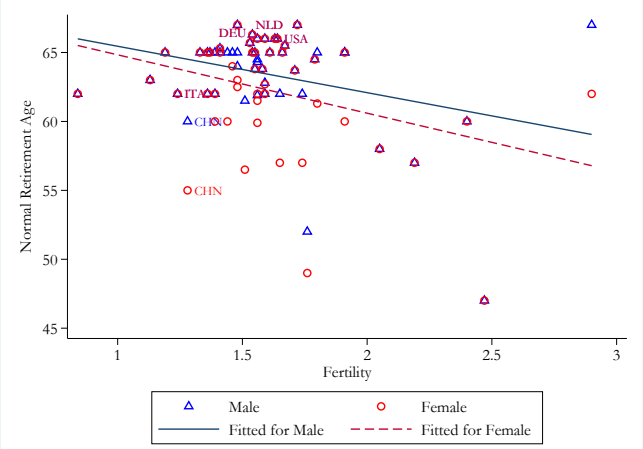
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Figure 1: Retirement and Fertility



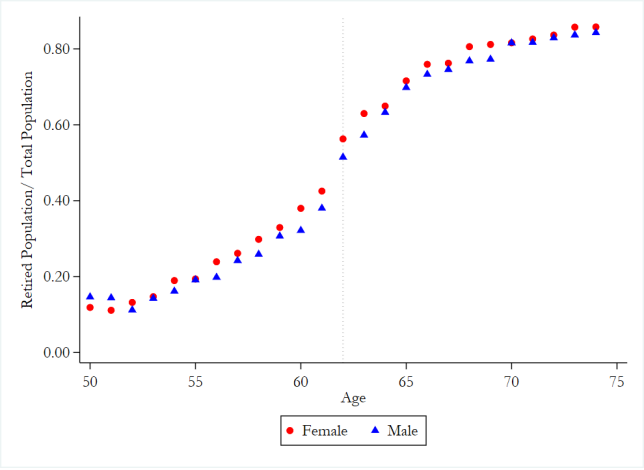
(a) OECD Average



(b) Cross Countries in 2020

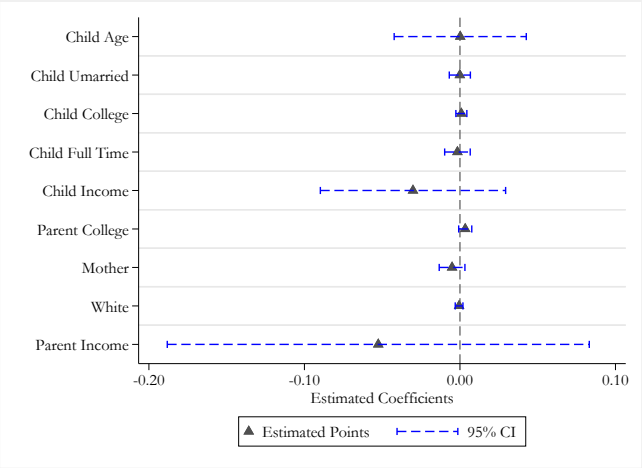
Notes: Working age is defined as age between 20 and 64. Fertility rate in a specific year is defined as the total number of children that would be born to each woman if she were to live to the end of her child-bearing years and give birth to children in alignment with the prevailing age-specific fertility rates. Source: OECD https://data.oecd.org

Figure 2: Retirement Rate by Age

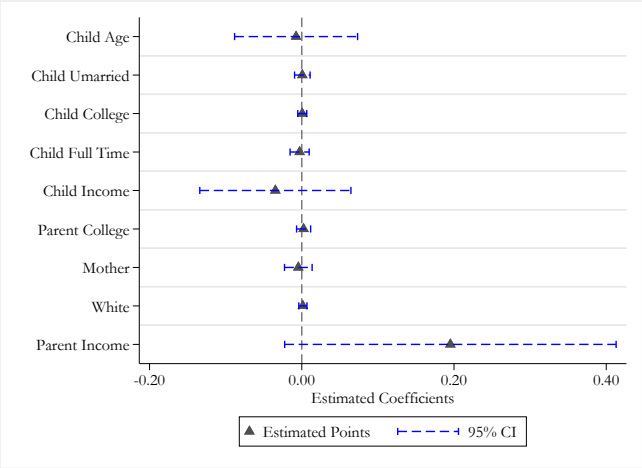


Notes: Retirement here is defined based on the respondent's self report.

Figure 3: Balance Test on Covariates



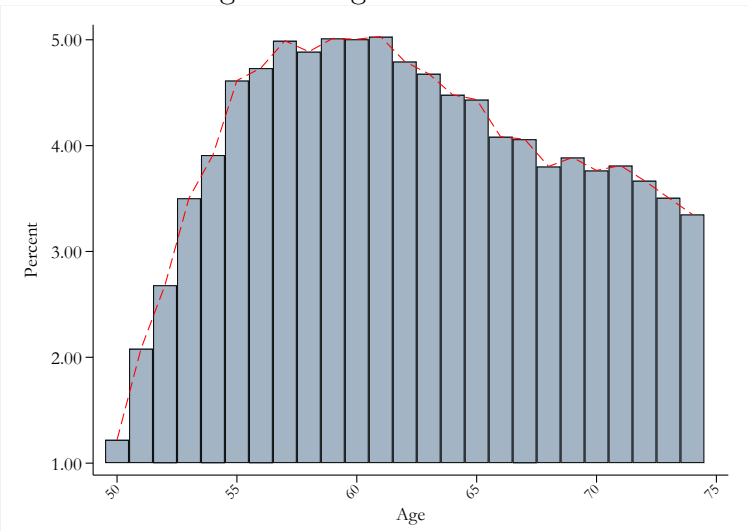
(a) Linear Spline



(b) Quadratic Spline

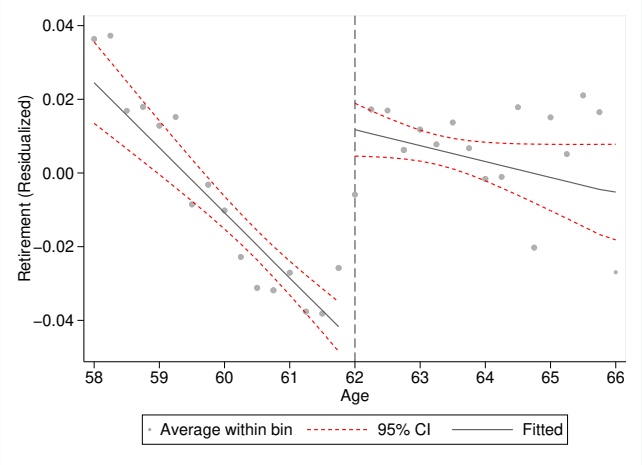
Notes: This reports estimated coefficients of covariates against centered age at 62 within a 5 year-bandwidth. The lines with caps show 95% confidence intervals. The left panel uses linear spline, while the right panel uses quadratic spline.

Figure 4: Age Distribution

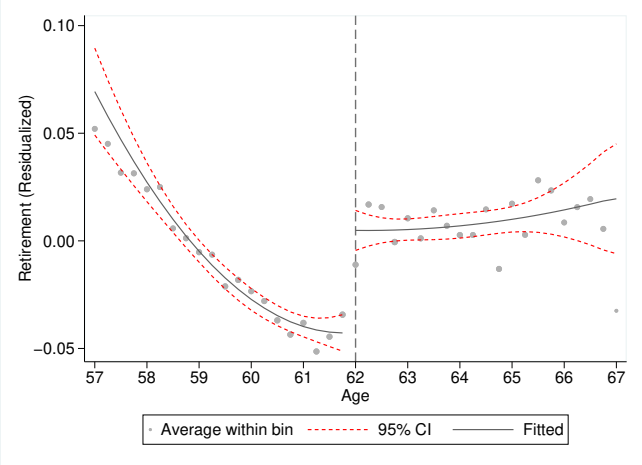


Notes: This is distribution of respondents' age at parent-child-wave level for full sample.

Figure 5: Predicted Retirement against Age



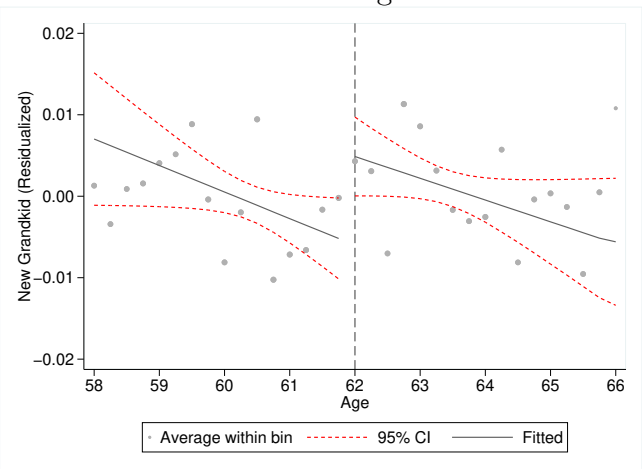
(a) Linear Spline



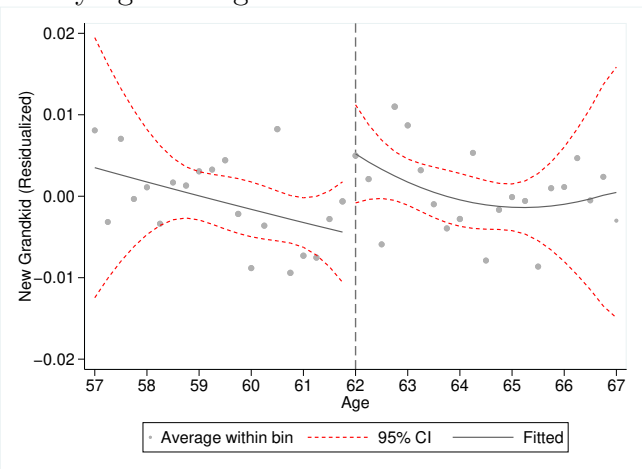
(b) Quadratic Spline

Notes: The dots denote averages, within a bin width of 3 months. Their size represents the number of observations. The left panel uses linear spline, while the right panel uses quadratic spline.

Figure 6: Predicted Fertility against Age



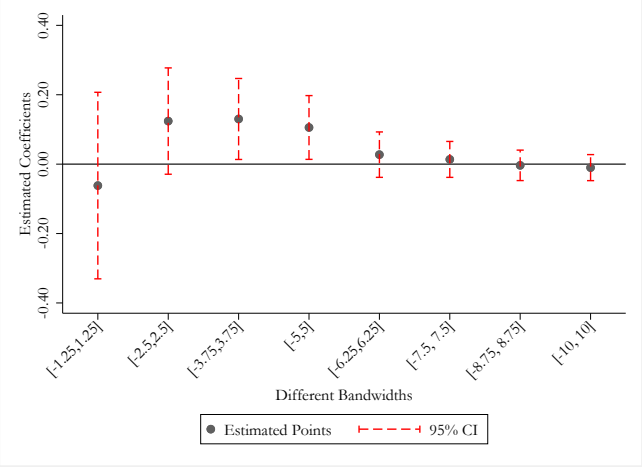
(a) Linear Spline



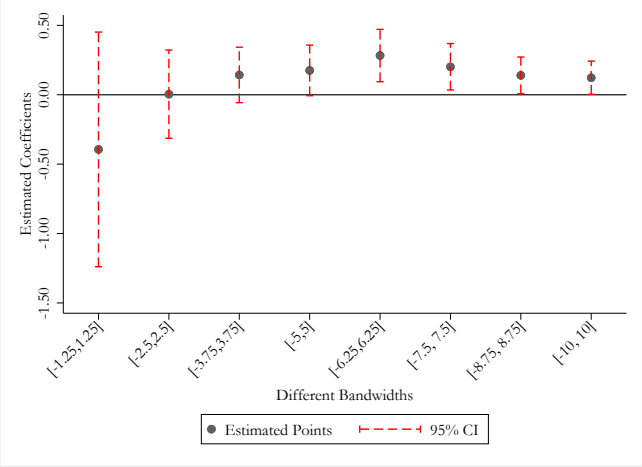
(b) Quadratic Spline

Notes: The dots denote averages, within a bin width of 3 months. Their size represents the number of observations. The left panel uses linear spline, while the right panel uses quadratic spline.

Figure 7: Sensitivity to Bandwidth



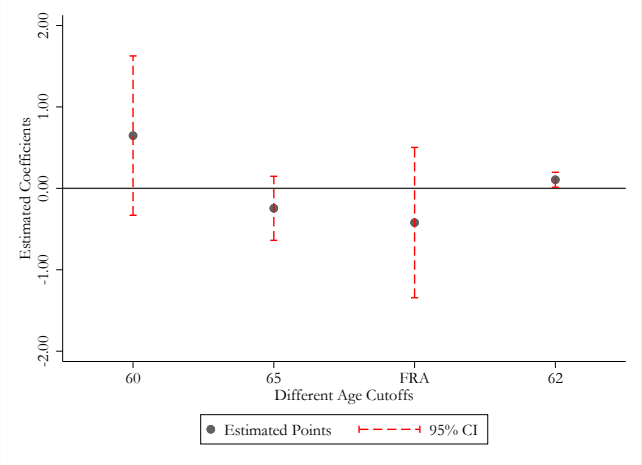
(a) Linear Spline



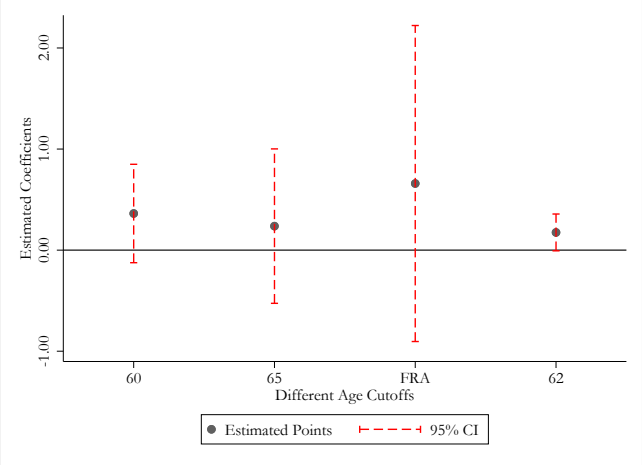
(b) Quadratic Spline

Notes: This reports estimated 2SLS coefficients of retirement on fertility across different bandwidths. The lines with caps show 95% confidence intervals. The left panel uses linear spline, while the right panel uses quadratic spline.

Figure 8: Falsification Test



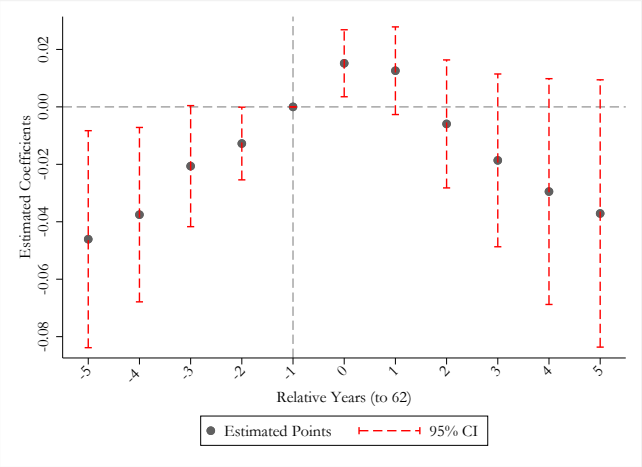
(a) Linear Spline



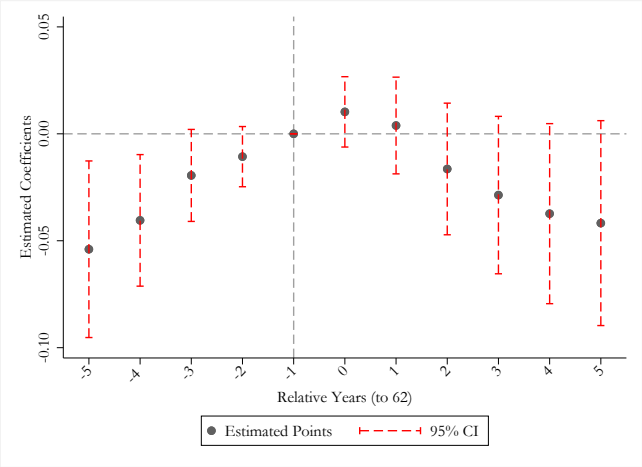
(b) Quadratic Spline

Notes: This reports estimated 2SLS coefficients of retirement on fertility across different age cutoffs. The lines with caps show 95% confidence intervals. The left panel uses linear spline, while the right panel uses quadratic spline. "FRA" represents the cutoff at full retirement age.

Figure 9: Timing of Fertility relative to Propsective Retirement



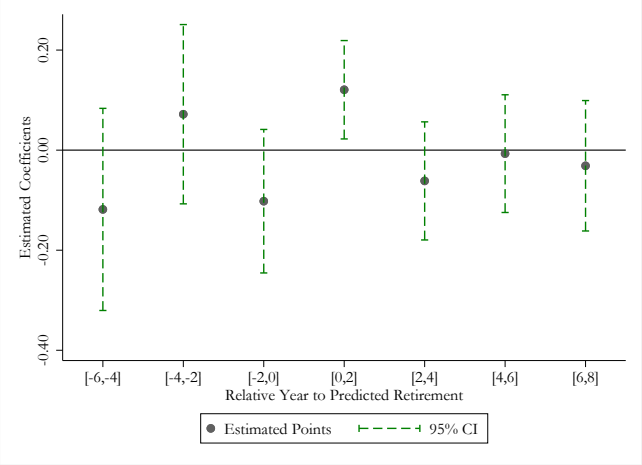
(a) Linear Spline



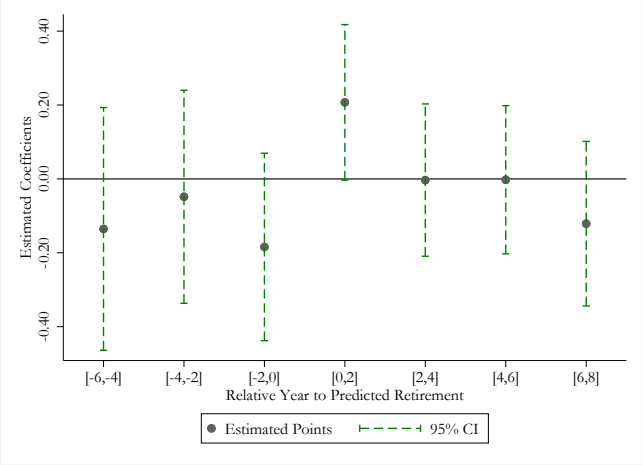
(b) Quadratic Spline

Notes: This reports estimated OLS coefficients of fertility on relative years to propsective retirement, i.e., 62. The lines with caps show 95% confidence intervals. The left panel uses linear spline, while the right panel uses quadratic spline.

Figure 10: Timing of Fertility relative to Propsective Retirement



(a) Linear Spline



(b) Quadratic Spline

Notes: This reports estimated 2SLS fertility results of relatives year windows with respect to predictive retirement. The lines with caps show 95% confidence intervals. The left panel uses linear spline, while the right panel uses quadratic spline.

Table 1: Summary Statistics within a 5-Year Bandwidth

A. Child-wave level	Obs.	Mean	Min	Median	Max	SD
New kid in the following 2 years	218,098	0.0843	0	0	1	0.278
Number of Kis	218,098	1.397	0	1	25	1.486
Age	218,098	34.74	20	35	50	6.253
Female	218,098	0.491	0	0	1	0.500
Unmarried	218,098	0.333	0	0	1	0.471
Years of Education	198,136	13.60	0	13	17	2.334
Work full time	218,098	0.333	0	0	1	0.471
Income Band	99,714	2.977	0	3	9	1.768
Number of Adult Children					65,695	
B. Respondent(Parent)-wave level	Obs.	Mean	Min	Median	Max	SD
Retired	70,382	0.410	0	0	1	0.492
Age	70,382	61.83	57	61.75	67	2.866
Years of education	70,382	61.83	57	61.75	67	2.866
Female	70,382	0.530	0	1	1	0.499
Married	70,382	0.530	0	1	1	0.499
White	70,382	0.530	0	1	1	0.499
Income	70,382	97,360	0	65,046	3.245e+07	190,664
Number of Respondents (Parents)					19,511	

Notes: The above table shows summary statistics of Health and Retirement Studies from wave 1992 to wave 2020, 15 waves in total. I keep respondents (i) who are between age 57 and 67; (ii) have reported themselves as retired after 50 and have adult children between age 20 and 50; (iii) are not disabled; (iv) have employment history more than 10 years; (iv) whose health insurance are unrelated to their employer. All prices are deflated by CPI based in 2020.

Table 2: Effects of Parental Early Retirement on Children's Fertility Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All		Daughter		Son		Mother		Father	
A. OLS					New Grandkid					
Retired										
	-0.0187	-0.0132	-0.0048	-0.0048	-0.0011	-0.0003	-0.0007	-0.0007	-0.0050	-0.0047
	(0.019)	(0.016)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
B. 1st Stage					Retired					
≥ 62										
	0.0894***	0.1124***	0.0705***	0.0555***	0.0723***	0.0559***	0.0594***	0.0450***	0.0847***	0.0676***
	(0.019)	(0.025)	(0.006)	(0.008)	(0.006)	(0.008)	(0.007)	(0.009)	(0.008)	(0.010)
C. Reduced form					New Grandkid					
≥ 62										
	-0.0217	-0.0202	0.0102**	0.0115**	-0.0047	-0.0062	0.0029	0.0067	0.0016	-0.0013
	(0.019)	(0.025)	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.006)	(0.005)	(0.006)
D. 2SLS					New Grandkid					
Retired										
	-0.2428	-0.1802	0.1447**	0.2072*	-0.0645	-0.1115	0.0495	0.1485	0.0194	-0.0191
	(0.217)	(0.223)	(0.052)	(0.114)	(0.061)	(0.106)	(0.074)	(0.133)	(0.054)	(0.090)
Mean	0.085	0.084	0.080	0.080	0.090	0.089	0.084	0.084	0.085	0.084
Bandwidth	4	5	4	5	4	5	4	5	4	5
Observations	19,577	24,207	85,860	105,814	89,176	109,744	92,012	113,277	85,035	104,400
Wave FE & Parent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Polynomial function	linear	quadratic	linear	quadratic	linear	quadratic	linear	quadratic	linear	quadratic

Notes: Variable "retired" is whether the respondent has been self reported as retired; varaiable "new grandkid" is a dummy variable indicting whether a new grandkid is born to this parent-child pair in the following two years. * p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01. Standard errors in parentheses are clustered at parent level.

Table 3: Marginal Effects of Parental Retirement on Fertility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			New Grandkid					
			$FamilySize_{t-1} = 0$		$FamilySize_{t-1} = 1$		$FamilySize_{t-1} >= 2$	
Retired	0.0375	0.0551	0.2423**	0.2344*	0.0272	0.0924	0.0397	-1.0531
	(0.030)	(0.052)	(0.101)	(0.127)	(0.116)	(0.152)	(0.070)	(0.715)
Retired × Birth Order	-0.0930***	-0.0901***						
	(0.027)	(0.022)						
Birth Order	0.3102***	0.3103***						
	(0.012)	(0.010)						
Bandwidth	4	5	4	5	4	5	4	5
Observations	85,860	105,814	29,444	36,309	15,630	19,263	42,009	51,529
Wave FE & Parent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Polynomial Order	1	2	1	2	1	2	1	2

Notes: Variable "retired" is whether the respondent has been self reported as retired; outcome varaiable "new grandkid" is a dummy variable indicting whether a new grandkid is born to this parent-child pair in the following two years; "Birth Order" is the order of the new born grandkid. "$FamilySize_{t-1}$" measures how many children the kid has reported in last survey. * p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01. Standard errors in parentheses are clustered at parent level.

Table 4: Time Transfers from Children to Parents

	(1)	(2)	(3)	(4)
	Helper		Hours	
Retired	0.0000	-0.0228	1.5061	-1.8699
	(0.019)	(0.037)	(6.701)	(6.868)
Bandwidth	4	5	4	5
Observations	85,860	105,814	437	599
Wave FE & Parent FE	Yes	Yes	Yes	Yes
Polynomial Order	1	2	1	2

Notes: Variable "retired" is whether the respondent has been self reported as retired; "Helper" capture whether the child is included in helper files reported by respondents. " Hours" denotes the number of hours per week the child help the parent * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at parent level.

Table 5: Money Transfers from Children to Parents

	(1)	(2)	(3)	(4)
	Money		$ Amount	
Retired	-0.0612	-0.0885	-89.3015	-142.6488
	(0.055)	(0.123)	(200.026)	(449.093)
Bandwidth	4	5	4	5
Observations	43,264	54,374	42,425	53,357
Wave FE & Parent FE	Yes	Yes	Yes	Yes
Polynomial Order	1	2	1	2

Notes: Variable "retired" is whether the respondent has been self reported as retired; "Money" captures whether this kids gave her parents over $500. "$ Amount" is the calculated average amount of monetary transfer parent recived from the child. This sample covers period 2002-2020, as HRS released answers to the related questions over these years. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at parent level.

Table 6: Time Transfers from Parents to Kids

	(1)	(2)	(3)	(4)
	Care		Hour	
Retired	0.0684	0.1613	7.4516***	14.7554**
	(0.129)	(0.283)	(2.503)	(6.859)
Bandwidth	4	5	4	5
Observations	43,264	54,374	43,264	54,374
Wave FE & Parent FE	Yes	Yes	Yes	Yes
Polynomial Order	1	2	1	2

Notes: Variable "retired" is whether the respondent has been self reported as retired; "Care" captures whether this respondent provide care for this child's children over 100 hours in the surveyed period. "Hour" is the calculated average amount of hours per week this parent providing childcare for this child's children. This sample covers period 2002-2020, as HRS released answers to the related questions over these years. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at parent level.

Table 7: Money Transfers from Parents to Kids

	(1)	(2)	(3)	(4)
	Money		$ Amount	
Retired	0.0729	0.2913	83.3759	1,136.1447
	(0.111)	(0.257)	(603.357)	(1,364.791)
Bandwidth	4	5	4	5
Observations	43,264	54,374	43,191	54,267
Wave FE & Parent FE	Yes	Yes	Yes	Yes
Polynomial Order	1	2	1	2

Notes: Variable "retired" is whether the respondent has been self reported as retired; "Money" captures whether this kids recived over $500 from her parents. "$ Amount" is the calculated average amount of monetary transfer children recived from their parents. This sample covers period 2002-2020, as HRS released answers to the related questions over these years. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at family level.

Table 8: Cost of Formal Childcare

	(1)	(2)	(3)	(4)
	More Expensive Divisions		Less Expensive Divisions	
Retired	0.1634	0.2051	-0.0888	-0.3237
	(0.215)	(0.485)	(0.156)	(0.294)
Bandwidth	4	5	4	5
Observations Observations	6,061	7,436	6,349	7,802
Wave FE & Parent FE	Yes	Yes	Yes	Yes
Polynomial Order	1	2	1	2

Notes: The outcome variable is a dummy variable indicting whether a new grandkid is born to this parent-child pair in the following two years. The formal care cost is calculated based on National Database of Childcare Prices 2008-2022: I used the weekly center price for infants, devided by local family income medium. The average of census division weighted by local population is applied. Expensive divisions are Pacific Division, New England Division, and East North Central Division; less expensive divisions are East South Central Division, West South Cnetral Division, and West North Central Division. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at parent level.

A Appendix: Additional Results and Discussion

Table A.1: Parental Access to Social Security vs. Parental Less Work on Daughter's Fertility Results

	(1)	(2)	(3)	(4)
A. OLS		New Grandkid		
Claim	-0.0042	-0.0039		
	(0.004)	(0.003)		
Less Work			-0.0038	-0.0037
				(0.004)
(0.004)				
B. 1st Stage	Claim		Less Work	
≥ 62	0.2517***	0.2283***		
	(0.007)	(0.009)		
			0.0506***	0.0478***
			(0.006)	(0.007)
C. Reduced form		New Grandkid		
≥ 62			0.0102**	0.0115**
			(0.004)	(0.006)
D. 2SLS		New Grandkid		
Claim	0.0405**	0.0504**		
	(0.017)	(0.025)		
Less Work			0.2014**	0.2410*
			(0.088)	(0.126)
Bandwidth	4	5	4	5
Observations	85,860	105,814	85,860	105,814
Wave FE & Parent FE	Yes	Yes	Yes	Yes
Polynomial function	linear	quadratic	linear	quadratic

Notes: This table reports only results for daughters' fertility. Variable "Claim" is whether the respondent has started claiming her social security benefits; "Less Work" is whether the respondent worked less than 1000 hours in the survey period (i.e., two years). "new grandkid" is a dummy variable indicting whether a new grandkid is born to this parent-child pair in the following two years. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at Parent level.

Table A.2: Effects of Parental Retirement on Daughter's Fertility Results with Triangular Kernel Weight

	(1)	(2)	(3)	(4)	(5)	(6)
A. OLS			New Grandkid			
Retired	-0.001	-0.005	-0.004	-0.001	-0.005	-0.004
	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)	(0.003)
B. 1st Stage			Retired			
≥ 62	0.080***	0.079***	0.081***	0.072***	0.061***	0.068***
	(0.008)	(0.006)	(0.006)	(0.013)	(0.009)	(0.010)
C. Reduced form			New Grandkid			
≥ 62	0.009**	0.012***	0.010***	0.006	0.014**	0.013**
	(0.004)	(0.004)	(0.004)	(0.006)	(0.007)	(0.006)
D. 2SLS			New Grandkid			
Retired	0.107**	0.152***	0.127***	0.081	0.228**	0.186**
	(0.049)	(0.054)	(0.047)	(0.080)	(0.112)	(0.089)
Bandwidth	5	5	5	5	5	5
Observations	106,382	95,558	105,653	106,382	95,558	105,653
Wave FE & Child-Parent FE	No	Yes	No	No	Yes	No
Wave FE & Family FE	No	No	Yes	No	No	Yes
Polynomial function	linear	linear	linear	quadratic	quadratic	quadratic

Notes: This table is comparable to Table 2 but using triangular kernel weight. Variable "retired" is whether the respondent has been self reported as retired; varaiable "new grandkid" is a dummy variable indicting whether a new grandkid is born to this parent-child pair in the following two years. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses are clustered at family level.