When Grandmothers Step In: Intergenerational Childcare and Labor Supply Dynamics

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Abstract

This paper examines the intergenerational labor supply effects of grandchild care, focusing on how the arrival of a grandchild influences the labor market outcomes of grandmothers and mothers. Using data from the Health and Retirement Study (HRS), I document a grandchild penalty for grandmothers, characterized by reduced earnings, labor force participation, and hours worked, particularly among those who provide grandchild care. Moreover, I find that grandmother-provided childcare attenuates the child penalty for mothers, facilitating maternal labor force participation. The magnitude of these effects varies by grandmothers' characteristics, such as income, wealth, and care provider status. I further explore these mechanisms through a structural life-cycle model, which reveals that changes in retirement policies could have spillover effects on mothers' labor supply. These findings highlight the critical role of intergenerational support in shaping labor market outcomes and have important implications for policies related to retirement, childcare, and female labor force participation.

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1 Introduction

Aging populations and rising retirement ages are reshaping labor markets, with grandparents increasingly playing a critical role in providing informal childcare. This paper examines how the arrival of a grandchild affects the labor supply of grandmothers and mothers, focusing on the interactions between grandchild care provision and labor market outcomes. Using data from the Health and Retirement Study (HRS), I establish stylized facts about the grandchild penalty (the reduction in grandmothers' labor supply upon the arrival of a grandchild) and the child penalty (the reduction in mothers' labor supply upon the birth of a child). The key findings are twofold. First, grandmothers experience a significant reduction in earnings, labor force participation, and hours worked upon the arrival of a grandchild, particularly if they provide childcare. This grandchild penalty varies by grandmother's characteristics: wealthier grandmothers reduce their hours of work, leading to lower earnings, while high-income grandmothers are more likely to be employed. Second, mothers who live near the grandmothers experience a smaller child penalty, suggesting that grandmother-provided childcare mitigates the negative labor supply effects of childbearing. These findings have important implications for policies related to retirement, childcare, and female labor force participation, particularly as families increasingly rely on intergenerational support.

This paper contributes to two key strands of literature. First, it extends the literature on the child penalty by examining how grandmother-provided childcare attenuates the negative labor supply effects of childbearing for mothers. Consistent with Compton and Pollak (2014), I find that mothers who live near their mothers experience a smaller reduction in labor supply, highlighting the role of proximity in facilitating maternal labor force participation. Second, it complements the growing body of research on the effects of grandparenthood on labor supply. While prior studies have documented a reduction in labor supply for grandmothers upon the arrival of a grandchild (Backhaus and Barslund (2021), Frimmel et al. (2022)), this paper provides new insights by directly measuring grandchild care provision and examining heterogeneity by income, wealth, and care provider status. Motivated by the stylized facts, I estimate a structural life-cycle model to understand the mechanisms underlying these effects and explore the spillover effects of retirement policies on intergenerational labor supply.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature and outlines my contributions. Section 3 describes the data and provides summary statistics. Section 4 presents descriptive evidence on the grandchild and child penalties, highlighting the role of grandchild care provision and proximity. Section 5 develops a structural life cycle model to explore the intergenerational dynamics of labor

supply and childcare. Section Section 6 presents the estimation results. Section 7 uses policies scenarios to provide counterfacutal analysis. Section 8 concludes.

2 Existing Literature and Contributions

This paper is linked to three key literature. First is the child penalty on motherhood. A large literature documents the child penalty, or the reduction in mothers' labor supply upon the birth of a child, finding that having a child decreases mother's earnings and labor supply (Kleven, Landais and Søgaard (2019)). My work confirms the child penalty on mother's generation and extends this literature by examining how grandmother-provided childcare attenuates the child penalty. Consistent with Compton and Pollak (2014), I find that mothers who live near the grandmothers experience a smaller reduction in labor supply, suggesting that proximity to grandmothers facilitates maternal labor force participation.

The second strand of the literature this paper connects to is the effect of grandparenthood on labor supply. Prior research has examined the causal effect of grandparenthood on grandparents' labor supply, often using the arrival of a first grandchild as an exogenous shock and find that grandparenthood is associated with a decrease in labor supply, particularly for grandmothers (Backhaus and Barslund (2021), Frimmel et al. (2022), Kridahl (2017), Rupert and Zanella (2018), Malisa (2024)). However, the results vary by context and sample. For example, Rupert and Zanella (2018) find a significant reduction in labor supply on the intensive margin (hours worked) but no effect on the extensive margin (employment), while Backhaus and Barslund (2021) find the opposite. My work complements these studies by focusing on older grandmothers (average age 64) using the HRS, which captures individuals closer to retirement age. I find that grandmothers are more likely to exit the labor force entirely upon the arrival of a grandchild, consistent with Backhaus and Barslund (2021), who also find a significant drop in employment rates for women aged 55–64.

There are two empirical approaches to examine the effect of grandparenthood on labor supply. First is the event-study approach, which the arrival of grandchild is assumed to be exogenous (Karademir, Laliberté and Staubli (2024), Gørtz, Sander and Sevilla (2025)). The second approach is to use instrumental variable such as the gender of the first adult child of the grandparent's (Rupert and Zanella (2018), Backhaus and Barslund (2021)). I follow the event-study approach to examine the effect of grandparenthood. Few literature uses the direct measure on childcare provided by the grandparents. This is because the information is not observed in most survey. Using

the Health and Retirement Study (HRS), I am able to observe whether grandparents provided any care to their grandchildren. Therefore, I can divide up the grandmothers by their care provision status to examine the grandparenthood effect.

Another strand of the literature examines the effect of various policies that aim to reduce childcare burden of the parent's generation on grandmother's labor supply (Abramowitz and Dillender (2024), Gørtz, Sander and Sevilla (2025), Karademir, Laliberté and Staubli (2024)). My work is closely related to Gørtz, Sander and Sevilla (2025) and Karademir, Laliberté and Staubli (2024). Gørtz, Sander and Sevilla (2025) examines the impact of the arrival of the first grandchild on the labor market outcomes of grandparent using Danish register data. They find that the effect of grandparenthood various by gender. Grandmothers experience a significant and persistent drop in labor market outcomes, while grandfathers see no change. They also find that grandchild penalty is attenuated for grandmothers who live in less generous family policies eras. Karademir, Laliberté and Staubli (2024) studies the public provision of formal childcare in Quebec on both mother's and grandmother's labor supply. They find that a universal childcare program increases both mother's and grandmother's employment in different magnitudes. I adopt a similar approach, an event-study framework, to examine the effect of grandparenthood. Since I have direct measure of grandchild care provision in the HRS, I can observe grandmothers who are care providers, and examine whether the grandchild penalty differs by care provision status. In addition, I estimate a structural model to examine the intergenerational time allocation of childcare, and investigate how changes in retirement policy on the grandmother's generation can have a ripple effect on the mother's labor supply, through grandchild care provision.

This paper complements the existing literature and broadens the understanding of how becoming a grandparent affects the intergenerational labor supply. In addition, it sheds light on how retirement policy could have spill-over effect on the parent's generation. Families increasingly rely on intergenerational support, both time transfer and monetary transfer. This paper incorporates the intergenerational dynamics by highlighting how decisions in one generation ripple to another. In addition, retirement age reforms are debated globally with an intention to increase retirement age eligibility. If grandmothers react to increased eligibility by delaying retirement, it would reduce grandmothers' availability for childcare. This could unintentionally constrain mothers' labor supply.

3 Data

I use data from the Health and Retirement Study (HRS), a nationally representative panel survey of Americans aged over 50. Respondents are surveyed biennially since 1992 with approximately 20,000 respondents and their spouses. Each six years a new cohort is added. The HRS offers comprehensive data on labor supply, retirement, and grandchild care, as well as details on adult children's characteristics and employment status, making it particularly well-suited for this analysis. Additionally, approximately two-thirds of the respondents can be linked to Social Security Administration data, which provides complete earnings histories for those who are wage and salary workers.

I use twelve waves of the HRS (1996-2018) because that was when the grandchild care provision question was asked. To eliminate counfounding effects due to COVID, I stop in 2018. To explore the effect of grandchild care provision (arrival of a child) on grandparents' (parents') labor market outcomes, I restrict my sample to HRS respondents who are aged between 50 and 80, and born after 1930. For the child penalty analysis, I restrict adult children aged between 20 and 45.

3.1 Variable Descriptions

The HRS provides a direct a measure of grandchild care provision by asking respondents who are grandparents whether they or their spouse spent 100 or more hours in total taking care of grandchildren over the past wave. They were further asked how many hours they spent individually on taking care the of grandchildren if they answer yes to the first question. If the respondents cannot provide an exact number, they are asked to provide a range. I take the average of the range and assign the grandchild care hours for these respondents. Since the first question asks for a combined effort, I create another binary variable for repsondents and their sposues. Instead of having an indicator for 100 or more hours combined, I use the individual hours of care to construct another binary indicator for whether an individual spent 100 or more hours on grandchild caring. With this new binary variable, I can examine the grandchild care effort by gender, i.e., grandmothers versus grandfathers.

One of the limitations of the HRS is that it does not have information on the year of birth of a grandchild. The best I can do to overcome this limitation is to take the number of grandchildren variable, and construct for whether a first or new grandchild arrived over the past wave. For those who had zero grandchild last wave and a positive number of grandchild in the current wave, I take the year of the current wave and assign it as the year of first grandchild. However, some respondents entered the HRS with a

positive number of grandchild already (due to the fact that HRS samples who are over 50). For these respondents, I use the same procedure but to calculate the year of birth of an additional grandchild. As a result, the arrival of a grandchild in my analysis will be a combination of the first grandchild and a new grandchild.

The outcomes I examine are: (1) annual earnings from the SSA data; (2) employment status from the SSA; (3) hours of work from the HRS; (4) probability of providing grandchild care from the HRS; (5) retirement indicator from the HRS; (6) claiming indicator from the HRS. The HRS asks respondents whether they give permission to be linked to the SSA. About two-thirds of the respondents consented. Hence their earning histories from the SSA can be obtained. Using the restricted HRS-SSA product, I can observe a respondent's earnings change upon an arrival of a grandchild. Moreover, using the earnings information, I construct a binary variable for employment status: if respondents do not have a positive earning, I consider them as not working. Since the SSA does not provide information on hours of work, I use the HRS for this labor supply measure. The probability of providing grandchild care is calculated using the binary indicator for whether an individual spent 100 or more hours taking care of the grandchildren. The retirement indicator is an absorbing variable generated from information on age of retired in the HRS. The claiming indicator come from the SSA's Benefit File. The Benefit File has information on respondents who have claimed for social security benefit and the date of claiming. Using this variable I can construct a binary variable for a respondent on whether they have claimed for social security in a given year. Since the HRS is biennial, I assume that the current year has the same information as the previous year for the hours of work and grandchild care provision.

3.2 Summary Statistics

Table 1 presents the summary statistics by grandmothers' care provider status by highlighting significant differences between grandmothers who provide grandchild care and those who do not, particularly in terms of age, marital status, proximity to grandchildren, and labor market engagement. About 35% of women provides grandchild care. Furthermore, there are heterogeneity by grandmother's characteristics. On average, Providers are younger (mean age = 61.91) compared to Non-Providers (mean age = 64.16). The age at which they became grandparents is slightly lower for Providers (mean = 58.58) than for Non-Providers (mean = 59.25). A higher proportion of Providers are married (69%) compared to Non-Providers (61%). Educational attainment varies between the two groups. Compared to Non-Providers, Providers are less likely to have less than a lower level of education, more likely to be higher-educated compared to

Non-Providers. Providers have slightly fewer children and grandchildren compared to Non-Providers. A significant difference is observed in the proximity to grandchildren, with 40% of Providers living within 10 miles of their grandchildren, compared to only 25% of Non-Providers.

In terms of labor market outcomes, Providers are more likely to be working (47%) compared to Non-Providers (41%). However, Providers work fewer hours at their main job (mean = 16.38 hours) than Non-Providers (mean = 14.11 hours) when considering unconditional hours. Conditional on working, the hours are similar between the two groups. Providers also have higher earnings (mean = $13,439.93) compared to Non-Providers (mean = $11,591.87). Retirement status shows that 62% of Providers are retired, compared to 68% of Non-Providers. Providers are more likely to transfer money to their children (46%) and transfer larger amounts (mean = $5,799.90) compared to Non-Providers (33% and mean = $3,599.15).

Table 2 presents the summary statistics of adult daughters by whether they receive grandchild care (GCC). On average, daughters who receive GCC are slightly older (mean age = 34.77) compared to those who do not (mean age = 34.41). The age at which they became parents is significantly lower for those who receive GCC (mean = 30.56) than for those who do not (mean = 32.02). A higher proportion of daughters who receive GCC are married (83%) compared to those who do not (61%). Educational attainment also varies, with a lower percentage of daughters who receive GCC having less than a high school education (2%) compared to those who do not (6%). Conversely, a higher percentage of daughters who receive GCC have a college degree or above (53%) compared to those who do not (43%). Daughters who receive GCC have a higher likelihood of living nearby (81%) compared to those who do not (65%). In terms of family income, daughters who receive GCC are less likely to be in the lowest income bracket (10K or less) and more likely to be in higher income brackets (35-70K and 70K+). Daughters who receive GCC are slightly less likely to be working full-time (61%) compared to those who do not (66%).

4 Descriptive Evidence

In this section I present some stylized facts about the effect of having grandchild on grandmother's and mother's labor supply using the HRS. It is a panel dataset surveyed representative sample of Americans over the age of 50 since 1992. Using twelve waves of the HRS (1996-2018), I provide stylized facts that motivate the model in the next section.

To examine whether the arrival of a grandchild has an impact on grandmother's earnings and labor supply (employment, claiming, retired), I use an event-study framework that follows Kleven, Landais and Søgaard (2019) and Sun and Abraham (2021):

$$Y_{ist} = \alpha_i + \sum_{j \neq -1,-6} \beta_j \cdot \mathbb{1}[j = t] + \sum_k \beta_k \cdot \mathbb{1}[k = age_{is}] + \sum_y \gamma_y \cdot \mathbb{1}[y = s] + \epsilon_{ist} \quad (1)$$

where Y_{ist} is the one of the outcomes for person i in year s and event time t. The outcome variables for the grandchild penalty analysis include: earnings (2016 $), probability of working, hours of work, probability of providing grandchild care, retired and claimed for social security benefits, while for the child penalty analysis, it's the probability of working full-time. α_i is the individual fixed effect. $\sum_{j \neq -1,-6} \beta_j \cdot \mathbb{1}[j = t]$ includes a set of event time dummies from six years before the arrival of the grandchild to ten years after. Event time dummies $t = -1$ and $t = -6$ are omitted to avoid multi-collinearity. As a result, the coefficients measure the impact of grandchild arrival relative to these two periods, and estimate the outcome variables at a given t relative to the outcomes for the omitted categories. $\sum_k \beta_k \cdot \mathbb{1}[k = age_{is}]$ represents the age dummies, and $\sum_y \gamma_y \cdot \mathbb{1}[y = s]$ are the year dummies. The age and year fixed effects control nonparametrically for life-cycle trends, such as retirement age, gradual ageing over time etc., and time trends. This allows me to distinguish the effects of becoming a grandparent on retirement outcomes. I also assume that the only variation comes from the arrival of the grandchild, conditional on age and year. Therefore, any changes in the outcome variables is likely to be the result of the grandchild.

4.1 The Grandchild Penalty

To evaluate how grandparents respond to the arrival of a grandchild, I examine the change in grandparents' earnings, probability of working, and hours of work. Figure 1 shows the effect on these outcomes for grandmother and grandfather. The x-axis shows the outcome variable, and the y-axis shows the years since the event.

Panel 1a shows the effect on earnings in level from the Social Security Administration data, adjusted to 2016's dollar value. Although both grandmothers and grandfathers experience a decrease in earnings, grandmothers see a decrease in earnings upon the arrival of the grandchild, while grandfathers do not experience a reduction until year three. The timing may have an implication on how grandparents divide grandchild caring differently: grandmothers are more likely to handle the daily activities of grandchild, while grandfathers are more involved in educational development. At the beginning of

the grandchild's existence, there's less demand to spend time with grandchild for educational activities, but requires more intensive house-work. Therefore, grandfathers are less likely to step in immediately. In addition, grandmother' earnings recover gradually as the grandchild approaches six years old, the age when grandkids can attend school, thus requires less time involved from grandmothers. Panel 1b shows the effect on the extensive margins of labor supply. Grandmothers are less likely to work upon the arrival of the grandchild, while grandfathers are more likely to work. The opposite direction may be due to the fact that the loss of income from grandmother's reduced labor supply needs to be smoothed by the grandfather. It also has implications on traditional gender norms on household productions: women are more likely to take up care provider roles than men. Panel 1c is an analogous exercise but on the probability of working full quarters. Since the SSA data does not have hours of work, it is difficult to examine how attached the grandparents are. Working full quarters might be a complementary picture to the exercise done on probability of working. One can be categorized as working full quarter if he or she has worked a few hours a day but consistently during the quarter. This is not a proxy for full-time or part-time work since one could be working the entire quarter but cutting back on hours. It is a measure on whether one takes leave for more than a quarter, which may be necessary if a grandmother needs to relocate to provide grandchild care. Panel 1d shows the effect on hours of work. It is not quite the intensive margins of labor supply because it is not conditional on being employed (i.e., those who do not work have hours equal to zero). I include people who are not working to get a sense of how grandparents adjust hours of work, either change in hours or not working at all, due to the arrival of a grandchild.

Panels 1e and 1f show the effects on the probability of retiring and claiming, respectively. To examine whether having grandchildren increases retirement and claiming behaviors, I constructed a variable for being retired from the HRS, using the self-reported year of retirement (either partial or fully retired) to calculate the age of retirement. I constructed the claiming variable from the SSA benefit file. Only those who have claimed for Social Security have a valid year of claiming. I then take the year of claiming to construct such a variable. Both retirement and claiming variables are treated as absorbing stages. Grandmothers are more likely to enter the retirement stage upon the arrival of the grandchild: probability of retiring increases one year after the grandchild was born, and it lasts for four years after birth. This is the time when grandchildren are able to attend pre-school, which literature has found that increased of school days increase mother's labor supply (Contreras and Sepúlveda (2017), Felfe, Lechner and Thiemann (2016)). This could be applied to grandmothers as well. The claiming behavior sees a similar result: grandmothers increase their probabilities of claiming one year after

the birth of the grandchild. This could be complementing the retirement timing: once retired, financial assistance is needed to smooth consumption, hence the need to claim for social security benefits increases. For the grandfathers, there's no response in terms of retirement upon the arrival of a grandchild. Grandfathers did not see a significant increase in claiming until year eight.

To summarize, grandmothers respond immediately to the grandchild's birth by adjusting their labor supply: reduced labor market attachment and hours of work, reduced earnings, increased probability of retiring and claiming. Given the fact that grandfathers do not immediately respond to grandparenthood as the grandmothers, I focus on the grandmothers for the rest of the paper.

4.2 Heterogeneity in Grandchild Penalty

There is a negative effect on grandmothers' labor supply due to the arrival of the grandchildren. I further explore the heterogeneity to identify the mechanisms underlying the labor supply adjustment observed.

4.2.1 The role of grandchild care provision on grandmother's labor supply

Most of the literature using the arrival of grandchild to examine grandmother's labor supply because it could serve as a proxy for free childcare. In the HRS, I can directly observe the hours spent caring for grandchild. Therefore, I can estimate the impact of grandchild care provision on grandmother's labor supply. It is worth noting that such an exercise is not causal due to revealed preference: grandchild care provision is a choice, and those grandmothers who are providers select into such activity. The HRS asks respondents with grandchildren if they or their spouse spent 100 or more hours in total taking care of their grandchildren in the past 2 years. If respondents answer yes, they are asked how many hours they spent taking care of grandchildren in the past 2 years and how many hours their spouse spent taking care of grandchildren in the past 2 years. Using these variables, I construct a binary indicator for whether each individual has provided at least 100 hours of childcare.

Figure 2 shows the effect by grandchild care provision status. r_gcc_raw=1 indicates the grandmother provides at least 100 hours of care over the past two years, and 0 otherwise. The arrival of a grandchild is associated with a decrease in earnings and employment, and this is driven by those who provide grandchild care. However, there's no difference in hours of work, retirement and claiming behaviors.

4.2.2 The role of grandmother's earnings on grandmother's labor supply

The labor supply of the grandmother depends on the opportunity cost of providing care. If a grandmother is a high-earner, the time she spends on grandchild care is more costly than a lower-earning grandmother. To examine the heterogeneity in grandmother's earnings, I divide grandmothers into two income groups - high and low - by using the median of the income distribution in a given year. Figure 3 shows the results. I do not find major differences between these two groups of grandmothers in terms of changes in earnings when a grandchild arrives (figure 3a). However, differences are observed in labor supply, as shown in figures 3b and 3d. High-income grandmothers are more likely to work upon the arrival of a grandchild, while low-income grandmothers are less likely to work. Moreover, they work fewer hours. This is consistent with the opportunity cost story: the opportunity cost of providing grandchild care is higher for higher-income grandmothers. It might make more sense for them to continue working and make financial transfers to their adult children instead of time transfers.

4.2.3 The role of grandparent's wealth on grandmother's labor supply

Household wealth can serve as an insurance against shocks. Therefore, those who have higher wealth are able to fall back on their savings when there is a change in labor supply and earnings. I examine the grandchild penalty for wealthier and less-wealthy grandmothers. Grandmothers are categorized as wealthy if their household wealth is above the median in a given year. Figure 4 shows the results. Grandmothers with higher household wealth see a significant decrease in earnings relative to grandmothers with below-median household wealth upon the arrival of a grandchild (figure 4a). This implies that wealthier grandmothers can cope with loss in earnings because they can rely on savings. Figures 4b and 4d show there is no change in employment, but a significant decrease in hours of work. Wealthier grandmothers are also more likely to retire, though not significant. Less-wealthy grandmothers are more likely to claim with a grandchild.

4.3 Child Penalty

One of the questions is how the grandmother and mother interact upon the arrival of a grandchild. In this section, I focus on the effect of grandmother's behaviors on the adult daughter. I restrict the sample to the grandmothers' adult daughters (mothers). A senior woman can have multiple daughters, hence the sample of adult daughters include those who were not in the grandchild penalty analysis. The HRS has information on the adult children's generation for each respondent. Therefore, I can observe the employment

status of each adult child the grandmother has. In addition, I can construct the year of birth for the first child of these adult children, and examine the child penalty for the mothers. Most importantly, I can investigate whether having a grandmother around can attenuate child penalty.

4.3.1 Child Penalty by Gender

I focus on adult daughter because in the literature, there's a gap in child penalty by gender: women experience a decrease in labor supply while men do not. I first plot the child penalty by gender for the adult children observed in my sample of grandmothers. Figure 5 shows the consistent finding of the existing literature. Adult daughters reduce their employment upon the birth of the first child, while adult sons are not affected at all. For this reason, I focus on adult daughters instead of adult sons for the rest of this section.

4.3.2 The role of grandmother's proximity on mother's labor supply

Research found that married women with young children see a smaller child penalty in labor supply when grandmothers live nearby (Compton and Pollak (2014)). The potential mechanism is through free grandparental childcare. I divide adult daughters by whether they live in the same or adjacent counties to the grandmothers to investigate this mechanism. Consistent with the literature, figure 6 shows that adult daughters who live close to the grandmothers see a smaller child penalty: having a grandmother around attenuates the reduction in labor supply.

4.4 Discussion

This paper provides new evidence on the intergenerational labor supply effects of grandchild care. I show that grandmothers experience a significant reduction in labor supply upon the arrival of a grandchild, particularly if they provide childcare. At the same time, grandmother-provided childcare attenuates the child penalty for mothers, facilitating maternal labor force participation. The magnitude of the child penalty depends on the proximity to grandmothers: having grandmothers around attenuates the child penalty of the mothers. On the other hand, grandmothers experience different levels of grandchild penalty based on her characteristics: for those who provide grandchild care, grandmothers see a reduction in earnings and labor supply. Wealthier grandmothers see a reduction in earnings and hours of work. Higher-income grandmothers see an increase in employment. Combining the child penalty and the grandchild penalty, it seems like

there is an offsetting effect: grandmothers reduce their labor supply upon the arrival of a grandchild, while mothers see less negative impact on their labor market outcomes when grandmothers step in. These findings have important implications for policies related to retirement, childcare, and female labor force participation, particularly as families increasingly rely on intergenerational support. These stylized facts motivate the model in the next section to explore when grandmothers step in, and the consequences of grandmothers' responses on the mother.

I am still developing the model so I do not have any results to share yet for the rest of the paper. Below is a sketch of the model. No need to read the rest as it is still preliminary and incomplete.

5 Model

I develop a dynamic economic model of labor supply and childcare allocation between a grandmother and a mother over their respective life cycles. The grandmother, aged 50 to 80, makes decisions about work, retirement, and grandchild care, while the mother, aged 25 to 40, balances work and childcare, supplemented by formal care options. It incorporates stochastic wage processes, retirement benefits, and childcare demand triggered by a probabilistic grandchild arrival. This model explores how economic factors influence the labor supply and childcare decisions of a grandmother and a mother across their working lives. The grandmother faces a dynamic optimization problem, solved via value function iteration, while the mother optimizes period-by-period, choosing between full-time, part-time, or no work, with explicit own-care contributions. The model captures key life-cycle events, such as retirement and grandchild birth, and their impact on time allocation. I simulate the model to analyze time allocation patterns, focusing on how economic incentives shape intergenerational support.

The grandmother moves first by choosing a discrete choice vector $d_t^G = (GCC_t^G, H_t^G)$ comprising informal care provision and labor supply. The informal care provision decision is continuous, $GCC_t^G \in \mathbb{R}$ and hours of work. The mother reacts based on grandmother's decisions. She chooses a discrete choice vector $d_t^M = (H_t^M, M_t^M, F_t^M)$ comprising employment, hours of care, and formal childcare usage. The formal care usage is binary, $F_t^M \in 0, 1$ I assume the childcare need be summed up by grandmother's informal care, mother's care, and formal care. If grandmother does not provide care and mother does not use formal care, mother has to provide care herself. The mother's employment $H_t^M \in \{0, 1, 2\}$ can take three values: not working ($H_t^M = 0$), work part-time ($H_t^M = 1$), and work full-time ($H_t^M = 2$).

Under the sequential game, I assume that grandmother has monitoring friction (no perfect information). The majority (XX%) of mother-grandmother do not live in the same household, so the grandmother has no way to monitor the time transfer to the mother. Therefore, I assume they take it as given, and react to a policy as it is.

5.1 Grandmother's Problem

5.1.1 Preference

Grandmother have non-homothetic utility functions following a Stone-Geary form. This functional form is chosen based on the descriptive evidence on heterogeneity effect of grandchild penalty on grandmothers by income and wealth distributions. Grandmother's per-period utility is:

$$U_t^G = \beta_C \ln(C_t^G - \bar{C}) - \beta_H (H_t^G)^2 + \beta_G \ln(G_t + \bar{G}), \tag{2}$$

where $C_t^G = 0.5(w_{G,t} H_t^G + S_t R_t)$ is consumption, H_t^G is labor supply, and G_t is hours of grandchild care provision. S_t is a retirement benefit, which is calculated as the replacement rate $\times$ wage $\times$ full-time hours. The replacement takes the value less than 1 if age between 62 (ERA) and 66 (FRA), and equals 1 if age over 66. where $H_t^G = T - L_t^G - G_t$ is labor supply, T is total time (e.g., 100 hours/week), $\bar{C}$ is subsistence consumption, $\bar{G}$ is subsistence care (e.g., 0 or small positive), and β_C is consumption weight, β_H is disutility to work, β_G is utility from care. This functional form allows preferences to shift with wealth and income, explaining why wealthier grandmothers reduce work while higher-income ones increase employment.

5.1.2 Wage Process

Wages follow a lognormal AR(1) process:

$$\ln(w_t^G) = \rho_G \ln(w_{t-1}^G) + \epsilon_t^G, \quad \epsilon_t^G \sim N(0, \sigma_G^2), \tag{3}$$

where ρ_G is wage persistence, and σ_G^2 is the standard deviation of grandmothers' wage shock.

5.1.3 Childcare Demand

Childcare need $N_t = 1$ arrives with probability N_{prob} and lasts 6 periods with demand $[40, 40, 30, 20, 10, 0]$. G_t, hours of care, is capped at this demand when active.

5.1.4 Time Constraint

$$T = H_t^G + L_t^G + G_t, \tag{4}$$

where $H_t^G = 0$ if $R_t = 1$, $G_t \geq 0$ (active only if $N_t > 0$), and $C_t^G > \bar{C}$.

5.1.5 Bellman Equation

The value function is:

$$V_t(R_{t-1}, w_{G,t}) = \max_{H_t, G_t, R_t} \{U_{G,t} + \beta E_t[V_{t+1}(R_t, w_{G,t+1})]\}, \tag{5}$$

with retirement irreversible post-A_{ss}.

5.2 Mother's Problem

5.2.1 Preference

Mother's per-period utility incorporates formal childcare:

$$U_t^M = \ln(w_t^M H_M - p_F F_t + constant) - \psi H_M^2 - \psi_M M_t^2 - \mathbb{1}_{FT=0} \cdot \phi(N_t - G_t - F_t)^2 \tag{6}$$

where $C_t^M = w_t^M H_t^M - p_F F_t$, w_t^M is the wage rate, p_F is the price of formal childcare, F_t is a binary variable indicating whether formal childcare is used, H_M is labor supply of the mother, M_t is hours of childcare provision, ψ is the disutility to work, ψ_M is the disutility to care, ϕ is disutility if care need is not met. This occurs when mother does not work full-time ($FT = 0$). $M_t = \max(0, N_t - G_t - F_t)$, and N_t follows the grandmother's t_{birth}.

5.2.2 Wage Process

Wages follow:

$$\ln(w_t^M) = \rho_M \ln(w_{t-1}^M) + \gamma + \epsilon_t^M, \quad \epsilon_t^M \sim N(0, \sigma_M^2), \tag{7}$$

where ρ_M is wage persistence parameter, γ is wage growth, and σ_M^2 is the standard deviation for wage shock.

5.2.3 Optimization

Mothers solve:

$$\{H_t^M, F_t\} = \arg\max_{H_t^M, F_t} U^M(C_t^M, H_t^M | G_t, F_t), \tag{8}$$

subject to $H_t^M \geq 0$, $F_t \geq 0$, and $w_t^M H_t^M - p_F F_t > 0$.

6 Estimation

6.1 Data and Sample

6.2 Parameters

Tables X and Y shows the list of parameter for grandmothers and mothers, respectively.

6.3 Model fit

6.4 Discussion

7 Counterfactuals

8 Conclusion

References

Abramowitz, Joelle, and Marcus Dillender. 2024. "Effects of California's paid family leave law on caregiving by older adults." *Journal of aging & social policy*, 36(4): 490–507.

Backhaus, Andreas, and Mikkel Barslund. 2021. "The effect of grandchildren on grandparental labor supply: Evidence from Europe." *European Economic Review*, 137: 103817.

Compton, Janice, and Robert A Pollak. 2014. "Family proximity, childcare, and women's labor force attachment." *Journal of Urban Economics*, 79: 72–90.

Contreras, Dante, and Paulina Sepúlveda. 2017. "Effect of lengthening the school day on mother's labor supply." *The World Bank Economic Review*, 31(3): 747–766.

Felfe, Christina, Michael Lechner, and Petra Thiemann. 2016. "After-school care and parents' labor supply." *Labour Economics*, 42: 64–75.

Frimmel, Wolfgang, Martin Halla, Bernhard Schmidpeter, and Rudolf Winter-Ebmer. 2022. "Grandmothers' labor supply." *Journal of Human Resources*, 57(5): 1645–1689.

Gørtz, Mette, Sarah Sander, and Almudena Sevilla. 2025. "Does the child penalty strike twice?" *European Economic Review*, 172: 104942.

Karademir, Sencer, Jean-William Laliberté, and Stefan Staubli. 2024. "The multi-generational impact of children and childcare policies."

Kleven, Henrik, Camille Landais, and Jakob Egholt Søgaard. 2019. "Children and gender inequality: Evidence from Denmark." *American Economic Journal: Applied Economics*, 11(4): 181–209.

Kridahl, Linda. 2017. "Retirement timing and grandparenthood in Sweden: Evidence from population-based register data." *Demographic Research*, 37: 957–994.

Malisa, Amedeus. 2024. "Grand-parenthood and Retirement." *Labour Economics*, 90: 102547.

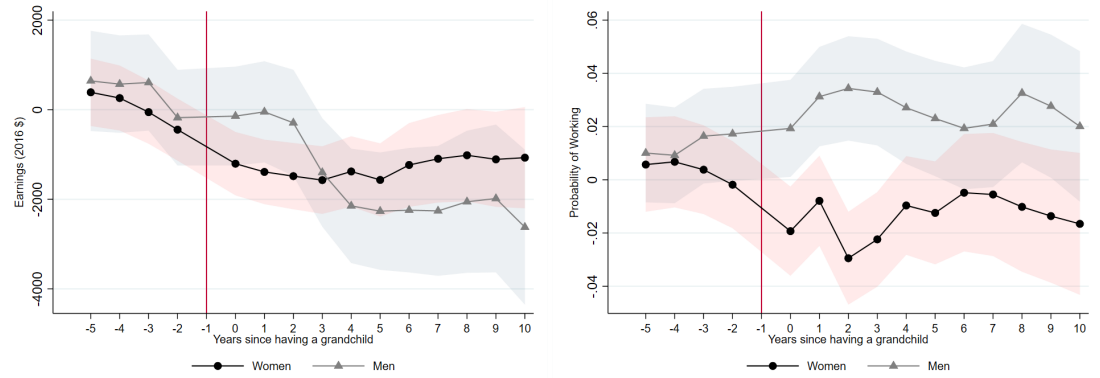
Rupert, Peter, and Giulio Zanella. 2018. "Grandchildren and their grandparents' labor supply." *Journal of Public Economics*, 159: 89–103.

Sun, Liyang, and Sarah Abraham. 2021. "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects." *Journal of econometrics*, 225(2): 175–199.

Figure 1: Grandchild Penalty

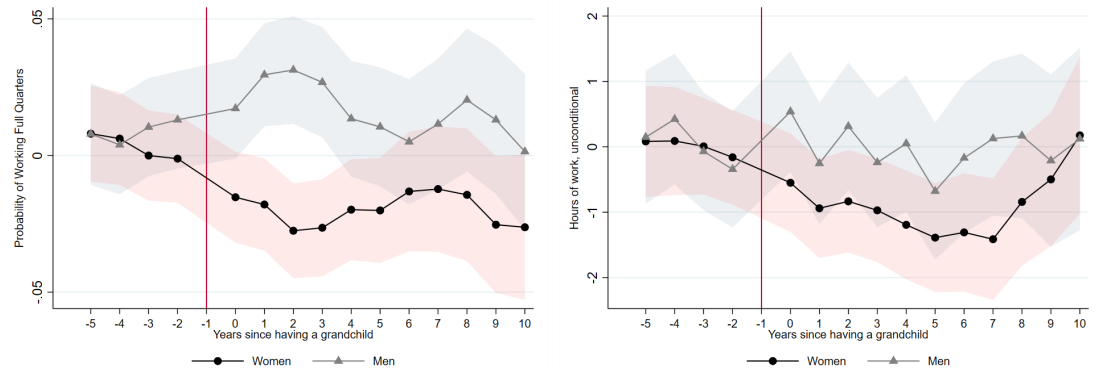
(a) Earnings

(b) Probability of Working



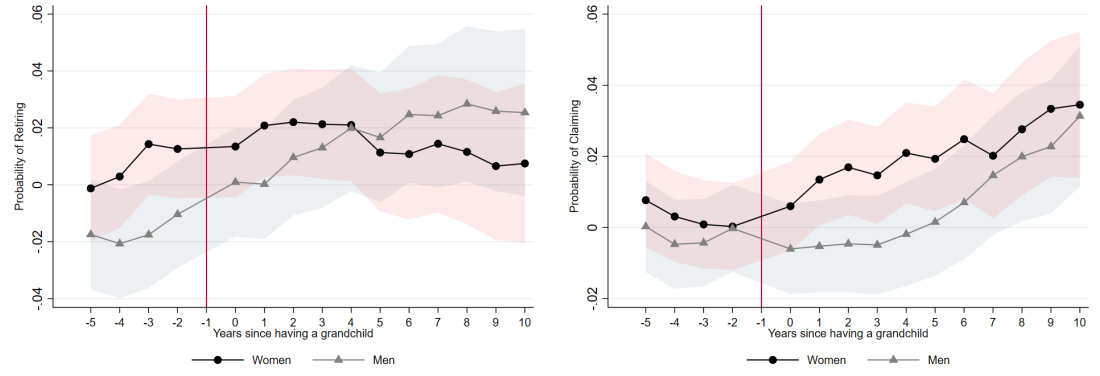
(c) Working Full Quarter

(d) Hours of Work



(e) Probability of Retiring

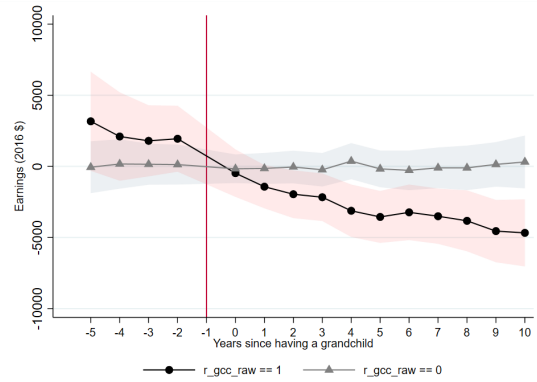
(f) Probability of Claiming



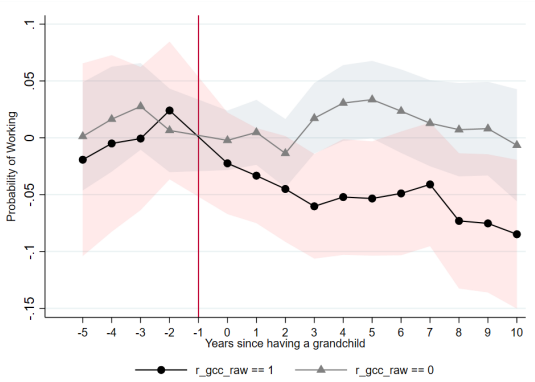
Note: Sample is restricted to individuals aged between 50 and 80. The event is year since having a grandchild. The regression includes individual, age, and year fixed effects. Event = -1 and -6 are omitted. HRS 1996-2018.

Figure 2: Grandchild Penalty, by Care Provision Status

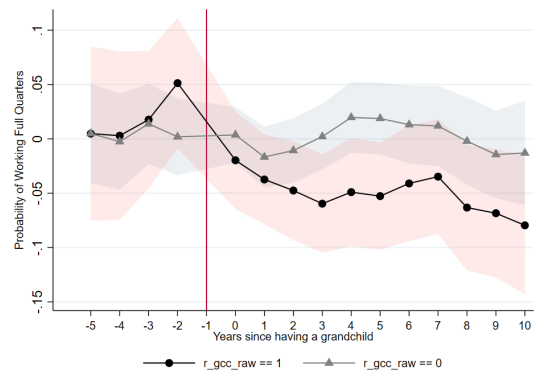
(a) Earnings



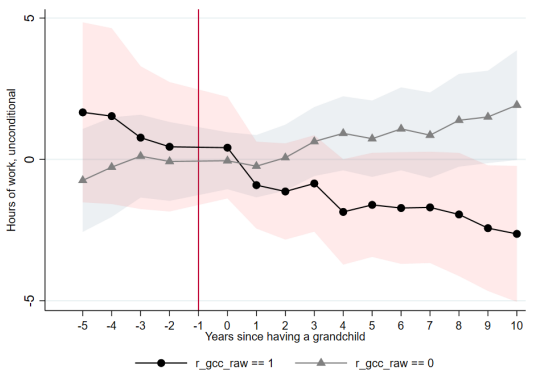
(b) Probability of Working



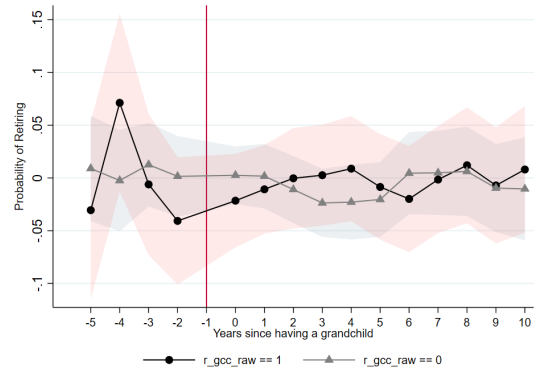
(c) Working Full Quarter



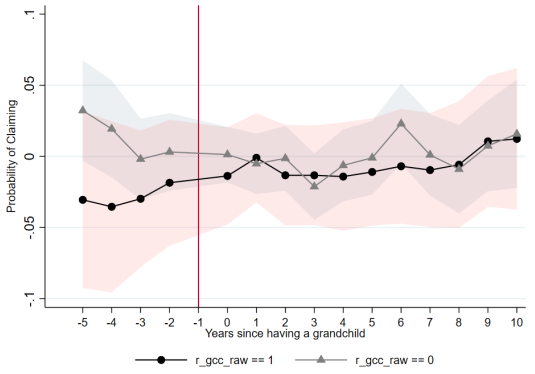
(d) Hours of Work



(e) Probability of Retiring



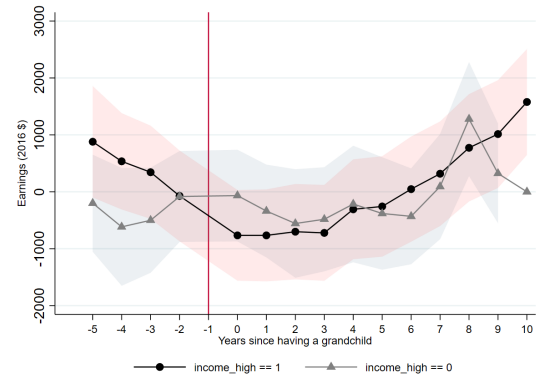
(f) Probability of Claiming



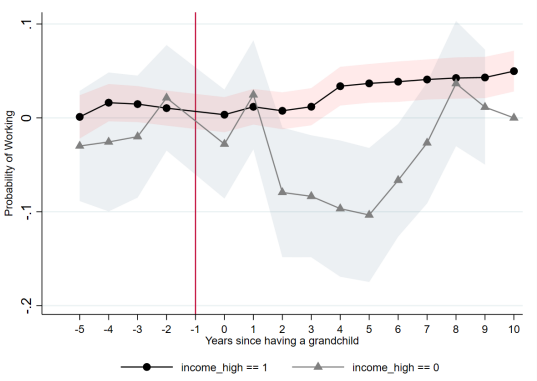
Note: Sample is restricted to women aged between 50 and 80. The event is year since having a grandchild. The regression includes individual, age, and year fixed effects. Event = -1 and -6 are omitted. HRS 1996-2018.

Figure 3: Grandchild Penalty, by Income Distribution

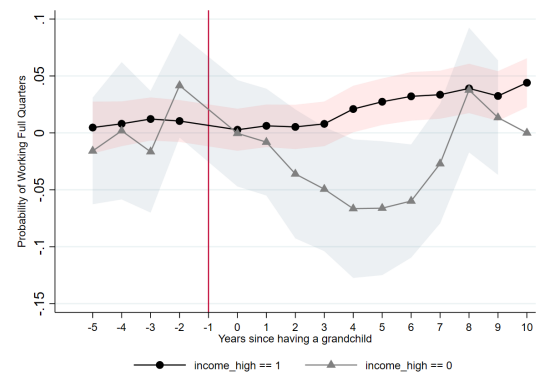
(a) Earnings



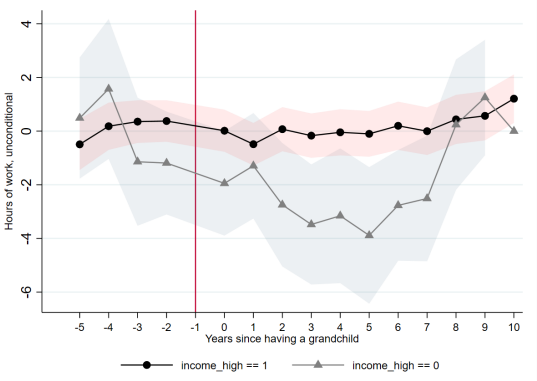
(b) Probability of Working



(c) Working Full Quarter



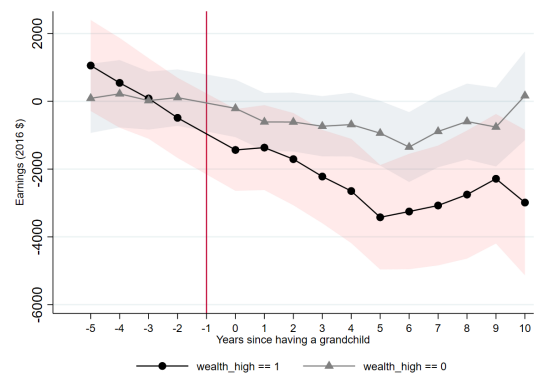
(d) Hours of Work



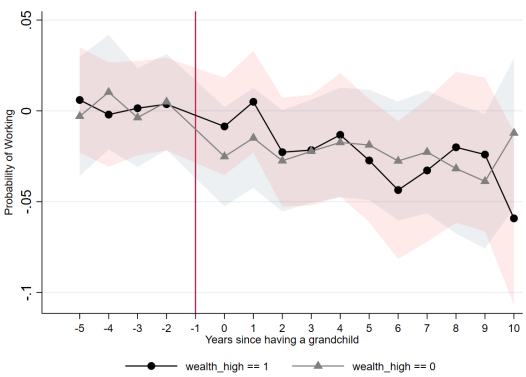
Note: Sample is restricted to women aged between 50 and 80. The event is year since having a grandchild. The regression includes individual, age, and year fixed effects. Event = -1 and -6 are omitted. HRS 1996-2018.

Figure 4: Grandchild Penalty, by Wealth Distribution

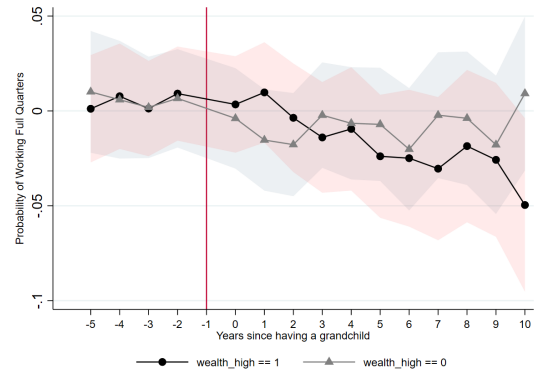
(a) Earnings



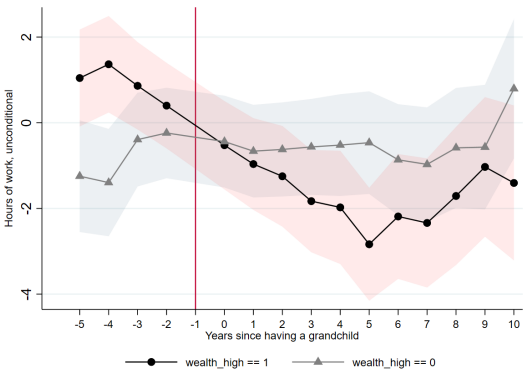
(b) Probability of Working



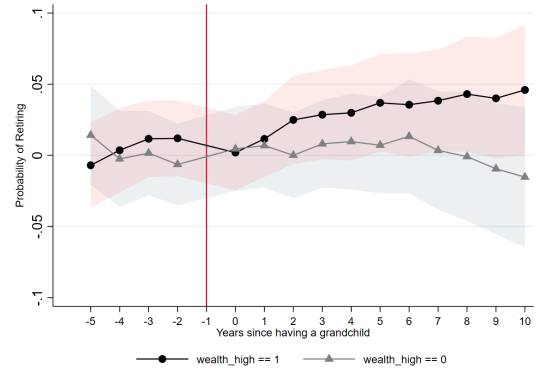
(c) Working Full Quarter



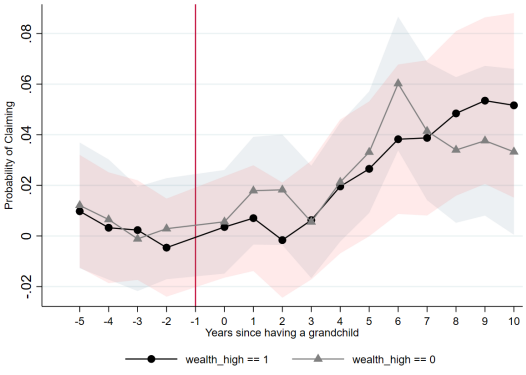
(d) Hours of Work



(e) Probability of Retiring

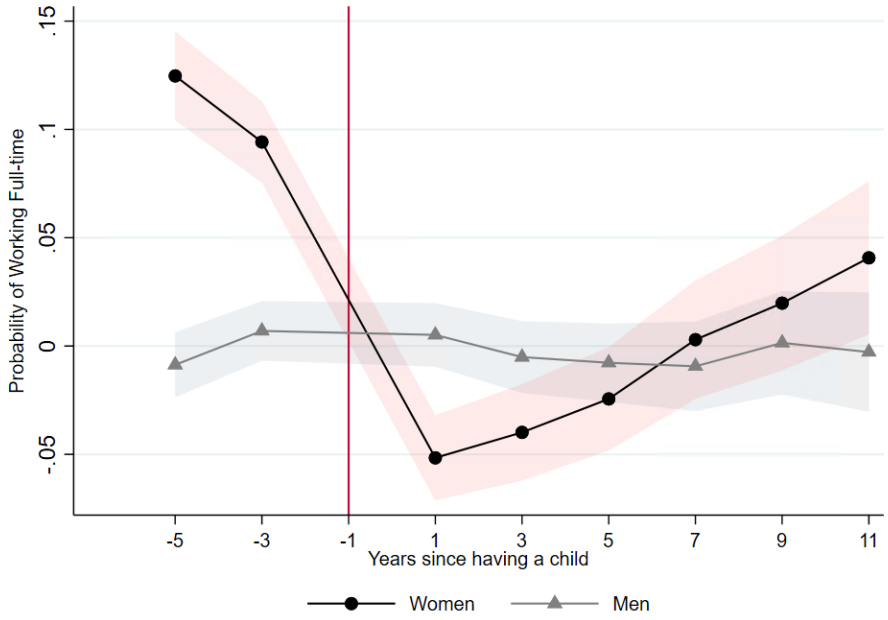


(f) Probability of Claiming



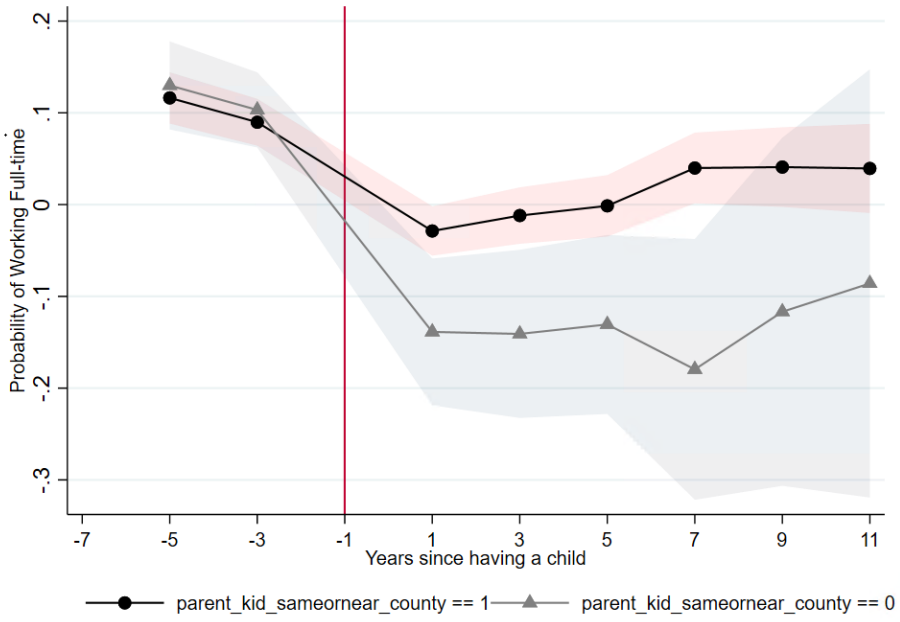
Note: Sample is restricted to women aged between 50 and 80. The event is year since having a grandchild. The regression includes individual, age, and year fixed effects. Event = -1 and -6 are omitted. HRS 1996-2018.

Figure 5: Child Penalty by Gender



Note: Sample is restricted to individuals aged between 20 and 45 and grandmothers appear in the grandchild penalty analysis. The event is year since having a child. The regression includes individual, age, and year fixed effects. Event = -1 and -6 are omitted. HRS 1996-2018.

Figure 6: Child Penalty by Proximity to Grandmother



Note: Sample is restricted to adult daughters aged between 20 and 45 and grandmothers appear in the grandchild penalty analysis. The event is year since having a child. The regression includes individual, age, and year fixed effects. Event = -1 and -6 are omitted. HRS 1996-2018.

Table 1: Summary Statistics of Grandmothers, by Care Provision

	(1) Women		(2) Providers		(3) NonProviders		(4) Diff	
	mean	sd	mean	sd	mean	sd	b	t
Demographics								
Age	63.38	7.10	61.91	6.21	64.16	7.42	2.25***	(39.00)
Age became gp	59.01	5.41	58.58	5.24	59.25	5.49	0.67***	(12.67)
Married	0.64	0.48	0.69	0.46	0.61	0.49	-0.08***	(-20.79)
LTHS	0.18	0.38	0.14	0.34	0.20	0.40	0.06***	(20.10)
High school	0.40	0.49	0.41	0.49	0.39	0.49	-0.02***	(-3.89)
Some college	0.26	0.44	0.28	0.45	0.25	0.43	-0.02***	(-6.78)
College or more	0.16	0.37	0.18	0.38	0.16	0.36	-0.02***	(-7.48)
# children	3.60	1.93	3.51	1.84	3.65	1.98	0.13***	(8.31)
# grandchildren	5.73	4.90	5.44	4.47	5.89	5.11	0.45***	(11.14)
Live within 10 miles	0.30	0.46	0.40	0.49	0.25	0.43	-0.15***	(-21.19)
Provided gcc	0.35	0.48	1.00	0.00	0.00	0.00	-1.00	(.)
Hours of grandchild care (conditional)	596.03	1260.37	596.03	1260.37	.	.		
Hours of grandchild care (unconditional)	169.94	726.06	488.98	1166.56	0.00	0.00	-488.98***	(-86.66)
Outcomes								
Working (SSA)	0.43	0.50	0.47	0.50	0.41	0.49	-0.06***	(-14.88)
Earnings (SSA)	12234.15	21739.93	13439.93	22354.22	11591.87	21378.04	-1848.07***	(-10.37)
Hours of work at main job (unconditional)	14.90	19.31	16.38	19.53	14.11	19.15	-2.27***	(-14.35)
Hours of work (conditional on working)	34.88	15.24	34.86	14.98	34.88	15.40	0.02	(0.11)
Whether claimed	0.39	0.49	0.34	0.47	0.42	0.49	0.08***	(19.90)
Whether retired	0.66	0.47	0.62	0.49	0.68	0.47	0.06***	(14.43)
Whether transferred money to kid	0.38	0.48	0.46	0.50	0.33	0.47	-0.13***	(-34.16)
Amt. transferred to kid	4362.05	29918.48	5799.90	42296.45	3599.15	20474.85	-2200.75***	(-6.38)

Table 2: Summary Statistics of Adult Daughters, by Care Recipients

	(1) All		(2) Receive GCC		(3) No GCC		(4) Diff	
	mean	sd	mean	sd	mean	sd	b	t
Demographics								
Age	34.47	6.25	34.77	5.37	34.41	6.41	-0.36***	(-3.33)
Age became parent	31.65	5.33	30.56	4.77	32.02	5.46	1.45***	(15.06)
Married	0.65	0.48	0.83	0.38	0.61	0.49	-0.22***	(-26.86)
LTHS	0.05	0.22	0.02	0.15	0.06	0.23	0.03***	(8.36)
High school	0.25	0.43	0.18	0.38	0.26	0.44	0.09***	(11.61)
Some college	0.25	0.43	0.27	0.44	0.25	0.43	-0.02**	(-3.04)
College or above	0.45	0.50	0.53	0.50	0.43	0.50	-0.10***	(-11.11)
# children	0.98	1.16	1.75	1.01	0.81	1.13	-0.95***	(-49.41)
Live nearby	0.68	0.46	0.81	0.39	0.65	0.48	-0.16***	(-18.84)
Family Income								
10K	0.17	0.38	0.09	0.29	0.19	0.39	0.09***	(10.12)
10-35K	0.23	0.42	0.20	0.40	0.24	0.43	0.05***	(4.31)
35-70K	0.41	0.49	0.48	0.50	0.39	0.49	-0.09***	(-7.39)
70K+	0.19	0.39	0.23	0.42	0.18	0.38	-0.05***	(-5.08)
Work								
Working full-time	0.65	0.48	0.61	0.49	0.66	0.47	0.05***	(6.36)
Spouse Working	0.94	0.23	0.95	0.21	0.94	0.24	-0.01**	(-3.04)
Observations	24557		4057		20500		24557	

Table 3: Grandmother's Parameters

Parameter	**Description**	**Value**
T	Number of periods (ages 50–80)	31
β	Discount factor	0.95
r	Interest rate	0.02
A_{ss}	Social Security eligibility age (62)	13
A_{FRA}	Full retirement age (66)	17
s_{base}	Base Social Security benefit	$0.6 \cdot 20 \cdot 40$
H_t	Work hours (weekly)	$\{0, 10, \ldots, 40\}$
G_t	Care hours (weekly)	$\{0, 10, \ldots, 40\}$
W_{init}	Initial wealth	10,000
N_{prob}	Probability of grandchild arrival	0.1
β_C	Consumption weight	1.0
β_H	Work disutility	0.07
β_G	Care utility	0.3
$\bar{C}$	Subsistence consumption	100
$\bar{G}$	Care utility shift	1
ρ_G	Wage persistence	0.9
σ_G	Wage shock standard deviation	0.3
w_G	Mean wage	20

Table 4: Mother's Model Parameters

Parameter	**Description**	**Value**
T_M	Number of periods (ages 25–40)	16
p_F	Formal care cost per hour	50
ψ	Work disutility	0.0005
ψ_M	Own care disutility	0.001
ϕ	Unmet care penalty	0.1
ρ_M	Wage persistence	0.9
σ_M	Wage shock standard deviation	0.1
γ	Wage growth	0.05
w_M	Mean wage	25
H_M	Work hours (weekly)	$\{0, 20, 40\}$
F_t	Formal care hours (weekly)	$[0, 40]$
N_t	Childcare need (weekly, 6 periods)	$[40, 40, 30, 20, 10, 5]$