The Family Care Contract: Childcare, Long-Term Care, and Intergenerational Insurance

Preliminary and Incomplete: Please Do Not Circulate

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Abstract

Parents who provide informal childcare to their grandchildren are significantly more likely to receive informal long-term care from their adult children in return. Within families, children who received informal childcare from a parent are 13.5 percentage points more likely to later provide that parent with long-term care. While residential proximity is likely partly endogenous to care arrangements, controlling for it yields a statistically significant estimate of 5.7 percentage points, suggesting the relationship reflects more than just geographic feasibility. We also document significant heterogeneity in these informal care arrangements. Grandparent care provision is most common among high-income families, while reciprocity is strongest among low-income families. These patterns suggest that policies affecting the availability of formal childcare may have spillover effects on informal long-term care provision, and vice versa. To understand the mechanisms behind these patterns, we develop a general equilibrium limited commitment model of intergenerational caregiving.

Keywords: long-term care, childcare, elderly, limited commitment.

JEL Classification Numbers: E21, H31, J13, J14, J22.

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1 Introduction

Families are an important source of insurance over the life cycle, especially when care needs are time-intensive and difficult to insure in formal markets. In the United States, this role is particularly salient in long-term care, much of which is delivered informally by spouses and adult children.[1] The same families also exchange childcare earlier in the life cycle, with grandparents often helping adult children when they are raising young children. This paper studies the link between these two margins. We show that parents who provide childcare to a given adult child are significantly more likely to receive informal long-term care from that same child later in life. We interpret this pattern as evidence that intergenerational care arrangements operate as a form of self-enforcing family insurance. To understand the aggregate and distributional implications of these arrangements, we develop an overlapping-generations general equilibrium model of intergenerational caregiving with limited commitment.

Our empirical analysis uses the Health and Retirement Study (HRS) to construct parent–child histories of childcare and later-life care. A central challenge is that families with stronger latent ties may be more likely both to exchange childcare and to provide long-term care later on. We address this concern using parent fixed effects and an instrumental-variables strategy. The instrument is the average number of children of the adult child's siblings, which shifts the likelihood that a parent provides childcare to a particular child through time constraints generated by other grandchildren, but is unlikely to directly affect that child's later long-term care provision to the parent. The estimates imply substantial reciprocity within families: earlier childcare provision significantly increases the probability of later informal care, and the relationship remains statistically significant even after controlling for residential proximity.

The data also reveal important heterogeneity across households. Grandparent-provided childcare is more common among higher-income families, but the reciprocity linking early childcare and later long-term care is strongest among lower-income families. These patterns suggest that intergenerational caregiving is not only a source of time transfers, but also an important margin of informal insurance for households with limited private resources. The strength of family-based insurance varies across the income distribution, implying that policies that affect one margin of care can have unequal effects on care arrangements and welfare across households.

To interpret these findings and evaluate policy, we build a stationary overlapping-generations general equilibrium model in which adult children and older parents choose whether to sustain an intergenerational care relationship. Cooperation in the first stage allows grandparents to provide childcare and relax younger households' time constraints. Cooperation in the second stage allows

[1] Barczyk and Kredler (2018) show that, conditional on experiencing functional limitations that require care, approximately 73 percent of the elderly receive informal care, primarily from spouses and adult children. Moreover, when care is provided by children, the majority of the caregiving burden is typically borne by a single child.

adult children to provide informal long-term care when parents experience care needs in old age. These arrangements are self-enforcing rather than contractible: because commitment is limited, the gains from cooperation must be high enough for both sides at each stage, and past childcare provision affects future long-term care through a state-dependent reciprocity motive. The model features heterogeneous productivity, endogenous use of formal and informal care, and an autarky outside option. We discipline the model using the empirical relationship between childcare and later long-term care, along with key moments on care arrangements and formal care use.

We use the model to study childcare subsidies. In a standard framework, subsidizing formal childcare relaxes resource constraints for young households. In our environment, however, childcare policy also changes the value of family-based insurance. Subsidized formal childcare crowds out grandparental childcare, weakens the intergenerational arrangement that supports later-life informal care, and can raise future demand for formal long-term care. These spillovers are largest for households lower in the income distribution, for whom family-provided care is a more important substitute for market insurance. The results highlight that policies targeted at one stage of the life cycle can reshape informal insurance at another, with implications for welfare, inequality, and the composition of care demand.

Our paper contributes to several strands of literature. First, it contributes to the literature on limited commitment and intra-family risk sharing by showing how self-enforcing family arrangements can sustain intergenerational time transfers over the life cycle (Mazzocco, 2007; Mazzocco et al., 2014; Mommaerts, 2015; Voena, 2015; Shephard, 2019). Second, it speaks to a broader macro literature emphasizing that family structure, private insurance, and public redistribution jointly shape inequality and aggregate outcomes (Fernández, 2003; Fernandez et al., 2005; Hess, 2004). Third, it contributes to work on long-term care and intergenerational transfers by documenting that adult children's later-life care responds to earlier childcare received from parents (Braun et al., 2017; Barczyk et al., 2022; Ko, 2016; Cardia and Ng, 2003; Dynan et al., 2002; Abbott et al., 2019; Guryan et al., 2008). Finally, it contributes to the literature on childcare policy by showing that policies that expand formal childcare can generate spillovers to informal long-term care and have unequal effects across households (Ho and Pavoni, 2020; Bastani et al., 2020; Chaparro et al., 2020).

The paper is organized as follows. In Section 2, we describe our data, empirical strategy and key results. In Section 3, we overview the theoretical model while Section **??** discusses its estimation. We present the results of our counterfactual policy experiments in Section 5. Section 6 concludes.

2 Empirical Motivation

Informal care provision from family members play a crucial role in meeting the long-term care needs of the elderly in the United States. In this section, we use data from the Health and Retirement Study (HRS) to explore the relationship between grand-children care provided by parents and their likelihood of receiving informal long-term care support from their kid in old-age. We start by examining where individuals with long-term care (LTC) needs typically receive care from as well as the distribution of child-care in the US. We then delve into the connections between the two time-transfers.

2.1 Data

We use data from all available waves of the Health and Retirement Study (HRS). The HRS is a longitudinal panel study surveying individuals in the U.S. over the age of fifty and their spouses on a biennial basis. The study consists of seven primary birth cohorts—the early HRS cohort (born 1931-1936), late HRS cohort (born 1937-1941), AHEAD cohort (born before 1924), Children of Depression (born 1924-1930), War Babies (born 1942-1947), early Baby Boomers (born 1948-1953), and mid-Baby Boomers (born 1954-1959). The core survey was conducted for the early and late HRS cohorts every other year starting from 1992 with the other cohorts added periodically over subsequent waves of the survey.

We use the RAND HRS data file, available through the HRS website, to obtain data on informal long-term care provision, grand-child care provision, parent and kid characteristics, living distance and so on. We then use the RAND HRS Family Data file (v1) to obtain information about the type and the extent of informal care provision by children to their parents. Together the two files provide comprehensive knowledge of time transfers provided and received by HRS respondents.

2.2 Distribution of Informal Care

In the HRS (Health and Retirement Study) helper file, respondents are asked if they have difficulties with Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), or money management. If they report any difficulties, they are asked whether they receive assistance with tasks related to these activities. If they do receive help, respondents are asked to identify their helpers and describe their relationship to them. The respondents are first asked about the person who helps them most frequently, the nature of their relationship with that helper, the frequency of the assistance they receive, whether the helper is paid, and whether insurance helps cover long-term care costs. We define this primary helper as the ”main caregiver.” Respondents are also asked to provide information about all their helpers (entering a loop to list each one). A special situation

involves respondents who live in nursing homes. They are also asked about their helpers, but it's often assumed that the primary source of help for these residents is formal or non-family care. We explore both scenarios: one where helpers are identified according to the Health and Retirement Study (HRS) responses, and another where nursing home residents are presumed to receive formal care by default.

To understand the distribution of family (spouse, children, other relatives) and non-family care (formal care), we categorize helpers into four groups: 1) spouses, 2) children, their spouses, or grandchildren, 3) other family members, and 4) non-family/formal helpers. We use information from all HRS respondents between 1998 and 2020. We exclude respondents under age 65 and those who are not partially or fully retired. Helper relationships are classified separately for ADL, IADL, and money management. To maximize the information from the helper files, we restructure the data in each wave so that each type of assistance (ADL, IADL, money management) corresponds to one row per respondent per wave. In total, we have information about helper relationships for 8,721 respondents and 17,253 respondent-wave observations.

Table 1 displays the proportion of respondents with various care arrangements. Panel A shows the shares as directly reported by respondents. The most common source of long-term care (LTC), representing 38% of the sample, is from children, their spouses, or grandchildren. Approximately one-third (33%) of respondents primarily rely on their spouse for care. Non-family members and institutions provide care for 24% of respondents. Only 4% of main caregivers are other family members, excluding spouses or children. When care is provided by non-family members, approximately 85% of the main caregivers are paid professionals.

The remaining Panels B–G in Table 1 show the distribution of primary caregiver types for various samples, depending on whether the respondent is in a nursing home. Panel B replaces the primary caregiver information for respondents who were in a nursing home at the time of the interview with non-family care as the main source, increasing the share of non-family care to about 31%. This change reduces the share of family care by 5 percentage points, from 38% to 33%, while the proportion of paid care rises to approximately 91%.

Panel C follows the same approach but uses the nursing home status of respondents from the previous 12 months. Here, 60% of the care is provided by family, with nearly equal shares for spouses and children (28% each), while 40% is non-family care. Notably, 94% of non-family care is paid. In Panels D and E, we also replace the primary caregiver information with non-family care for nursing home residents as in Panels B and C, but additionally include respondents who are in a nursing home but lack information about their primary caregiver. This adjustment leads to the highest proportion of non-family care, reaching 39% in Panel D and 55% in Panel E. As a result, the share of respondents who primarily rely on family drops to 40% in Panel E.

Table 1: Distribution of Informal Care in the US

	Share (%)	Cumulative (%)	N
A.Baseline			
Spouse	33.46	33.46	9,988
Children	38.72	72.17	11,558
Other family	4.17	76.34	1,245
Non-family	23.66	100.00	7,063
Total	100.00		29,854
% non-family paid	85.11		6,320
B. Nursing home residents (time interview): main caregiver always non-family			
Spouse	32.39	32.39	9,669
Children	33.09	65.48	9,880
Other family	3.40	68.88	1,014
Non-family	31.12	100.00	9,291
Total	100.00		29,854
% non-family paid	90.52		9,144
C. Nursing home residents (prv. 12 months): main caregiver always non-family			
Spouse	28.78	28.78	8,591
Children	28.51	57.29	8,511
Other family	2.83	60.12	845
Non-family	39.88	100.00	11,907
Total	100.00		29,854
% non-family paid	93.87		11,762
D. Nursing home residents (time interview): main caregiver is non-family by default, incl. missing			
Spouse	28.54	28.54	9,669
Children	29.17	57.71	9,880
Other family	2.99	60.70	1,014
Non-family	39.30	100.00	13,313
Total	100.00		33,876
% non-family paid	93.41		13,166
E. Nursing home residents (prv. 12 months): main caregiver is non-family default, incl. missing			
Spouse	21.28	21.28	8,591
Children	21.09	42.37	8,511
Other family	2.09	44.46	845
Non-family	55.54	100.00	22,418
Total	100.00		40,365
% non-family paid	96.76		22,273

Share helper types for ADL, IADL, money management from HRS 1998–2020. Respondents are aged 65 or above, partially or fully retired, and receive help with ADL, IADL, or money management. The % non-family paid row reports the percent of main caregivers who are paid among all non-family caregivers.

2.3 Distribution of unmet LTC care needs

In the Health and Retirement Study (HRS), respondents are asked whether they have difficulties with several activities of daily living. Further, they ask about issues with walking, eating, dressing, bathing, getting in or out of bed, or using the toilet. Instrumental Activities of Daily Living (IADL) include difficulties with making phone calls, managing finances, taking medication,

grocery shopping, or preparing meals. If a respondent reports difficulties with any activity, they are asked whether they receive help and from whom. We use this information—the number of difficulties and the extent of help received—to measure unmet long-term care (LTC) needs.

We create three distinct measures of unmet care needs. The first measure is zero for respondents who have ADL/IADL difficulties and receive help (for at least one difficulty). It ranges from -1 to -11 for those who report having between one and eleven difficulties (six ADL and five IADL, including managing finances) but do not receive any assistance. Panel (a) of figure 1 shows the distribution of this measure of unmet long-term care (LTC) needs. The majority of respondents (about 66%) do not have any unmet care needs. Approximately 23% do not receive any help for one ADL/IADL difficulty, and about 6% for two ADL/IADL difficulties. The share of respondents with unmet care needs for three or more difficulties is about 4%. This indicates that only a small number of respondents with more than two difficulties receive no assistance.

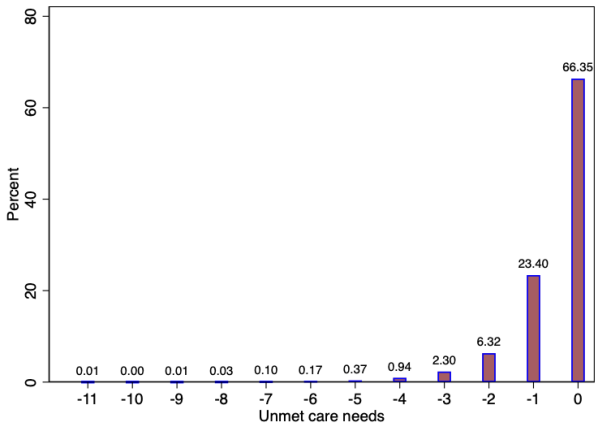
The second measure is similar to the first but considers help for each specific difficulty. For example, a respondent with one difficulty may need assistance only for that one issue to meet their long-term care (LTC) needs, while someone with five difficulties would require help for all five. This measure takes the value zero for respondents who receive assistance for all reported difficulties. It takes the value -1 for those who receive help for all but one difficulty, -2 for those who receive help for all but two, and so on. This approach has the advantage of quantifying unmet LTC needs by counting the difficulties for which no help is received. This implies that someone with five difficulties can have the same unmet LTC needs as someone with two difficulties. Figure 1(b) displays the distribution of this second measure. According to this measure, 36% of respondents receive the help they need for their ADL/IADL difficulties or more. About 40% of respondents experience very light unmet care needs because they lack help for one specific difficulty. A small percentage of respondents with numerous difficulties do not receive the necessary help, as indicated by Figure 1(a). This suggests that respondents with many difficulties are likely to receive the care they need.

Finally, the third measure calculates the proportion of difficulties for which help is received. This measure has an advantage over the previous ones, as it gauges unmet long-term care (LTC) needs largely independent of the total number of ADL/IADL difficulties. The measure is calculated by counting the number of ADL/IADL difficulties and the instances where help is received. We then divide the total help received by the total number of difficulties. Thus, respondents who receive help for all difficulties are assigned a value of one, indicating that 100% of their care needs are met. Conversely, those who receive no help for any difficulty get a value of zero. Those who receive help for some, but not all, difficulties are assigned a proportion based on the share of help received. For example, if a respondent reports five ADL/IADL difficulties but receives help for three, their score is 3/5 or 0.6. Similarly, a respondent with 10 difficulties who receives help for

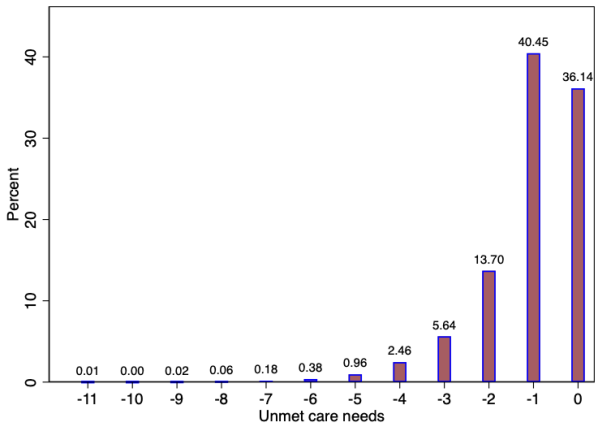
six has the same score of 0.6. In both cases, the unmet care needs, relative to the total number of difficulties, are 40%. Figure 1(c) illustrates the distribution of this measure of unmet care needs. The majority of respondents (about 36%) have no unmet LTC needs, while about 34% have 100% unmet LTC needs (regardless of the total number of difficulties). The remaining 30% have varying levels of unmet needs, ranging from 10% (a score of 0.9) to 90% (a score of 0.1).

Figure 1: Distribution of unmet LTC needs.

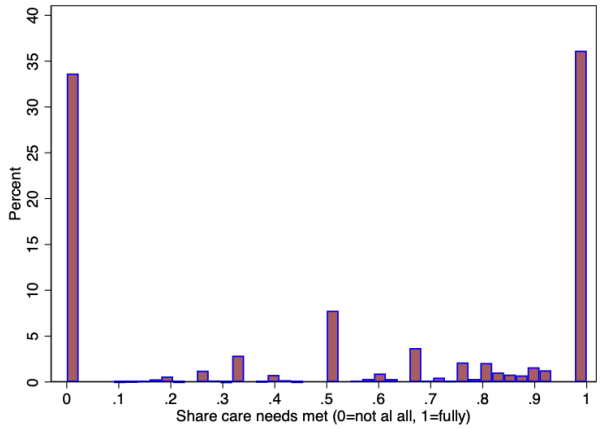
(a) ADL distribution when no help is received



(b) ADL distribution for which no help is received



(c) Share of care needs met



2.4 Dual Time Transfers

We combine the Rand Health and Retirement Study (HRS) family file with the Rand HRS data to explore the connection between providing childcare for grandchildren and the likelihood of receiving long-term care (LTC) from those same children later in life. The family file contains information on childcare and LTC for each respondent's child from 1992 to 2018. By adding data

from the HRS helper file, we can identify the relationship of the main caregiver for respondents who receive LTC assistance.

intergenerational transfers like providing childcare for grandchildren and receiving LTC typically don't happen at the same stage of life. Generally, grandparental childcare is provided at much younger ages compared to when long-term care is needed and received. This pattern is evident in the data: the average age at which parents (respondents) take care of their grandchildren is 64, while the average age for receiving LTC from children is 76 (with 81 for those who are partially or fully retired). To take this into account, we define two non-overlapping age periods for these types of intergenerational transfers. In both periods, we only consider respondents with biological children, adoptive children, or children with an unclear relationship status.

For the childcare provision period, we select respondents who meet the following criteria: (a) are between 40 and 69 years old, (b) have no difficulties with Activities of Daily Living (ADL) or Instrumental Activities of Daily Living (IADL), (c) have children aged between 20 and 40, and (d) have at least one grandchild. For the LTC period, we consider respondents who (a) are at least 75 years old, (b) are partially or fully retired, and (c) have at least one ADL or IADL. Combining these two periods yields a sample with 5,966 observations from 2,400 parents with an average of 2.3 children during the childcare period.

Descriptive analysis

Table 2 presents the marginal distribution of childcare provision and LTC receipt for this sample, along with standard errors. Because childcare is typically given to the child's household (including the child and their partner), we consider LTC for ADL or IADL as coming from either the child or their partner. Panel A of Table 2 shows that among parents who have provided childcare to one of their children, about 22% receive LTC from that child. In contrast, among those who haven't provided childcare, only 15% receive LTC. This indicates that those who have provided childcare are 7 percentage points more likely to receive LTC from that same child.

To understand if these results are driven by children who live with their parents, we removed children who co-reside with parents in either transfer period from our analysis. As shown in Panel B of Table 2, this adjustment reduces the proportion of parents receiving long-term care (LTC) from a child to just under 13%. The difference in LTC rates based on whether childcare was provided is approximately 5 percentage points, suggesting that children living with parents are more likely to provide LTC but don't necessarily receive more childcare.

To further explore the role of proximity in intergenerational transfers, we focused on respondents whose children live more than 10 miles away during both transfer periods. Panel C of Table 2 indicates that distance does impact these transfers. First, the proportion of children providing LTC when they live more than 10 miles away drops to about 7% (see the "Total" row). Second,

the strength of this transfer mechanism seems limited: children who received childcare from their parents are only about 1.5 percentage points more likely to provide LTC than children who did not receive childcare.

Finally, we limited the analysis to parents who do not live in a nursing home during the LTC period (see Panel D of Table 2). The share of parents receiving LTC from children decreased slightly to about 15%, suggesting that children still assist their parents even when formal LTC is available. Despite this, children who received childcare are 7 percentage points more likely to provide LTC to their parents compared to children who did not receive childcare.[2]

Table 2: Marginal distribution of childcare provision and LTC receipt for parents and children

Whether childcare provided	Share received LTC		
	Mean	Standard error	N
A.all parents and children			
No	0.149	0.006	3,415
Yes	0.219	0.009	2,140
Total	0.176	0.005	5,555
B. excludes co-residing children			
No	0.126	0.006	3,075
Yes	0.175	0.009	1,745
Total	0.143	0.005	4,820
C. excludes children living within 10 miles			
No	0.065	0.006	1,667
Yes	0.080	0.011	566
Total	0.069	0.005	2,233
D. excludes parents residing in nursing home at time of interview			
No	0.125	0.006	3,026
Yes	0.198	0.009	1,972
Total	0.154	0.005	4,998

[2]It is worth noting that the sample of nursing home residents is quite small (546 respondent-child observations), but the transfer mechanism still appears significant. Among nursing home residents, 46% of parents who provided childcare to a child received LTC from that child, compared to only 33% for those who did not provide childcare.

Heterogeneity by parental characteristics

Next, we explore whether intergenerational care transfers are influenced by certain subgroups of parents and children. We begin by examining parental education, using a variable with five categories (less than high school, GED, high school, some college, and college or higher). This variable takes the value of one if a parent has at least some college education and zero otherwise. Table 3 indicates that parental education has a minor impact on receiving long-term care (LTC) from children if no childcare was provided. About 15% of parents, regardless of education, receive LTC from their children. However, parents with a college degree are 3 percentage points less likely to receive LTC from their children (when child-care was provided) compared to those without a college degree. Overall, LTC receipt is about 1 percentage point lower for parents with a college degree compared to those without.

Table 3: Marginal distribution of childcare provision and LTC receipt by parental education

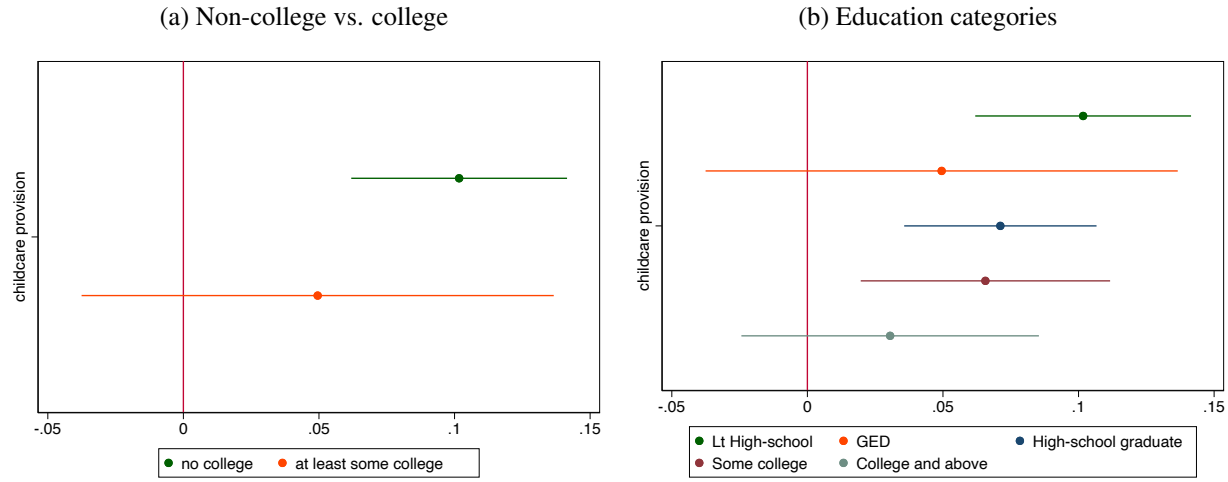
Whether childcare was provided	Share received LTC					
	Non-college			College		
	Mean	S.E.	N	Mean	S.E.	N
No	0.150	0.007	2,397	0.147	0.011	1,018
Yes	0.230	0.011	1,376	0.199	0.015	764
Total	0.179	0.006	3,773	0.169	0.009	1,782

Panel (a) of Figure 2 shows the estimated correlations between childcare provision and LTC receipt derived from bivariate OLS regressions based on parental education. The correlation for highly educated parents is about 0.05, roughly 3 percentage points lower than for less-educated parents. These differences are not statistically significant at conventional levels. Figure 2(b) plots the estimated OLS coefficients across various levels of parental education. The pattern suggests that the estimated link between childcare provision and LTC receipt declines with higher parental education. The coefficient is 0.10 for parents without high school diplomas, but it drops to just 0.03 for parents with a college degree or higher.

We also examine whether the correlation between providing childcare and receiving long-term care (LTC) varies with parental wealth. We measure parental wealth at age 65 and categorize parents into wealth groups based on the 25^{th}, 50^{th}, and 75^{th} percentiles of the wealth distribution, creating four wealth categories.[3] Table 4 reveals that the overall share of parents receiving LTC decreases as wealth increases. In the lowest 25% of the wealth distribution, about 21% receive

[3]Since not all parents were interviewed at age 65, we extended the age range to 60-70, using the wealth measures closest to age 65.

Figure 2: Estimated correlation between childcare provision and LTC receipt by parental education



LTC from a child, while in the top 25% of the distribution, only about 15% receive LTC. The difference in LTC receipt based on childcare provision also varies with parental wealth. In the bottom wealth quartile, about 17% of parents who don't provide childcare receive LTC from their children, but among those who do provide childcare, over 29% receive LTC–a nearly 13 percentage point increase. In contrast, among parents in the highest wealth quartile, 12% receive LTC if they don't provide childcare, while 17% receive LTC if they do–a difference of only 5 percentage points.

Table 4: Marginal distribution of childcare provision and LTC receipt by parental wealth

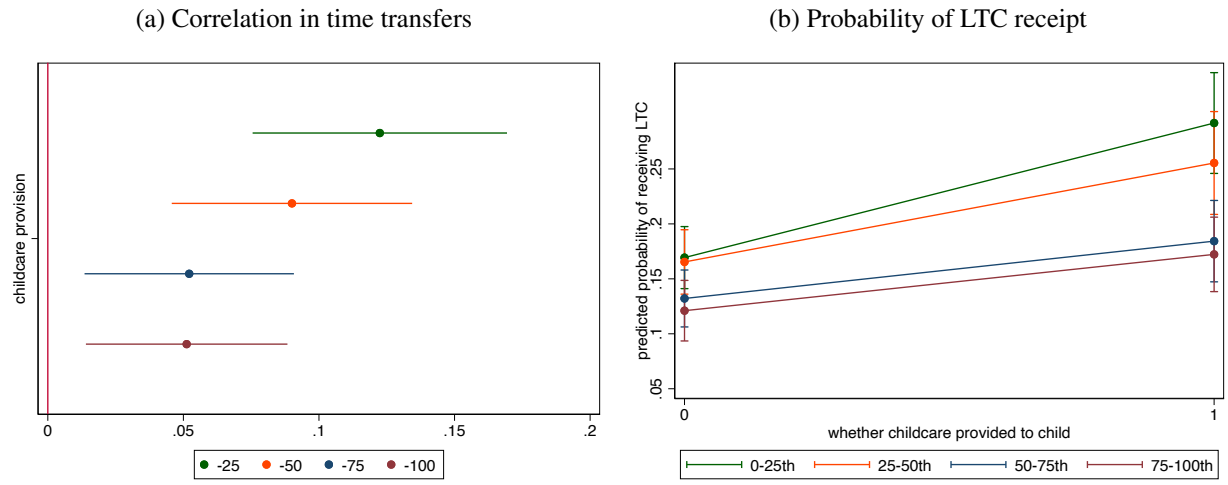
Whether childcare was provided	Share LTC received					
	Bottom quantile			Second quantile		
	Mean	S.E.	N	Mean	S.E.	N
No	0.169	0.011	939	0.165	0.012	901
Yes	0.292	0.023	401	0.255	0.020	462
Total	0.206	0.011	1,340	0.196	0.011	1,363
	Third quantile			Fourth quantile		
	Mean	S.E.	N	Mean	S.E.	N
No	0.132	0.012	787	0.121	0.012	727
Yes	0.184	0.016	586	0.172	0.015	656
Total	0.154	0.010	1,373	0.145	0.010	1,383

Figure 3 illustrates the variability in the relationship between two types of intergenerational

time transfers—childcare provision and LTC receipt—across different parental wealth levels. The figure displays the estimated coefficients from OLS regressions that examine the correlation between receiving LTC and providing childcare for each wealth group. As depicted in Figure 3(a), the probability of receiving LTC is significantly associated with providing childcare across all wealth groups. The strength of this relationship is highest among parents in the lowest wealth quantile and weakest among those in the highest wealth quantile. Figure 3(b) shows the predicted probability of receiving LTC, derived from an OLS regression with interaction terms for childcare provision and wealth groups. Across all groups, the probability of receiving LTC is higher for those who provided childcare. However, the increase is notably stronger among the lower wealth groups, with the differences being statistically significant.

Overall, these findings suggest substantial variability in the correlation between childcare provision and LTC receipt. The association is more robust for parents who are less educated and less wealthy.

Figure 3: Estimated correlation between childcare provision and LTC receipt by parental wealth



Note: the first panel presents the estimated OLS coefficients for different wealth quantile groups and the second panel shows the predicted probability of receiving LTC by childcare provision for different wealth quantile groups.

Heterogeneity by child characteristics

We also explore whether the link between providing childcare and receiving long-term care (LTC) varies with different child characteristics. First, we consider the child's education. Just as with parents, a child's level of education might significantly influence the extent of intergenera-

tional transfers. The information on a child's education is provided in years of schooling. We split the sample into two groups: children with up to 12 years of education and those with 13 or more years.

Table 5: Marginal distribution of childcare provision and LTC receipt by child's education

Whether childcare was provided	Share LTC received					
	$\leq$ 12 years			13+ years		
	Mean	S.E.	N	Mean	S.E.	N
No	0.142	0.008	1,836	0.160	0.009	1,561
Yes	0.233	0.014	909	0.209	0.012	1,227
Total	0.172	0.007	2,745	0.182	0.007	2,788

Table 5 shows the marginal distribution of LTC receipt based on childcare provision across these two education groups.

Overall there is not much heterogeneity in LTC receipt by child's education. Parents of highly educated children are somewhat more likely to receive LTC without offering childcare, as opposed to parents of less educated children. Specifically, the proportion of low-educated children providing LTC to their parents (among those who received childcare) stands at 23%, slightly higher than the 21% among high-educated children. Overall, the variation in LTC receipt by child education level doesn't appear to be pronounced. Moreover, an OLS regression examining the association between childcare provision and LTC receipt, with childcare interacting with child education, suggests that highly educated children receiving childcare are 4 percentage points less likely to provide LTC compared to low-educated children not receiving childcare. However, these coefficients only show borderline significance. Consequently, it seems that child's education may not be an important driver of the intergenerational transfer of care.

Finally, we explore the impact of a child's household income on the relationship between childcare and long-term care (LTC). In the Health and Retirement Study (HRS), child income is reported in various categories that change across different survey waves. To maintain consistency, we consider only two categories: whether a child's household income is above 70,000 USD or not, as this information is consistently available across all waves.

Table 6 shows the share of LTC receipt by whether childcare was provided and a child's household income. Although the overall share of LTC receipt is similar across income groups, there is significant variation based on childcare provision and income level. For parents who haven't provided childcare to a child with a household income below 70,000 USD, the share of LTC receipt is 15%. This share jumps to 24% among parents who have provided childcare, indicating a 9

percentage point difference. However, for children with higher household incomes, whether they provide childcare or not doesn't significantly affect LTC receipt.

Figure 4(a) demonstrates that the estimated effect of childcare provision on LTC receipt for high-income children is minimal and nearly zero, while for low-income children, the effect is around 10 percentage points and statistically significant. The 95% confidence intervals for these two groups do not overlap, suggesting that a child's household income plays a role in the relationship between childcare provision and LTC receipt. Figure 4(b) further supports this observation by displaying the predicted probability of LTC receipt from an OLS regression, where childcare provision is interacted with child household income. Without childcare provision, the predicted probabilities of LTC receipt across different income groups are similar. However, when childcare is provided, the probability of LTC receipt differs notably by household income.

Table 6: Marginal distribution of childcare provision and LTC receipt by child's household income

Whether childcare was provided	Share LTC received					
	household income $\leq$ 70k			household income $>$ 70k		
	Mean	S.E.	N	Mean	S.E.	N
No	0.152	0.008	2,080	0.175	0.014	705
Yes	0.242	0.012	1,288	0.180	0.016	618
Total	0.186	0.007	3,368	0.177	0.011	1,323

Identification strategy

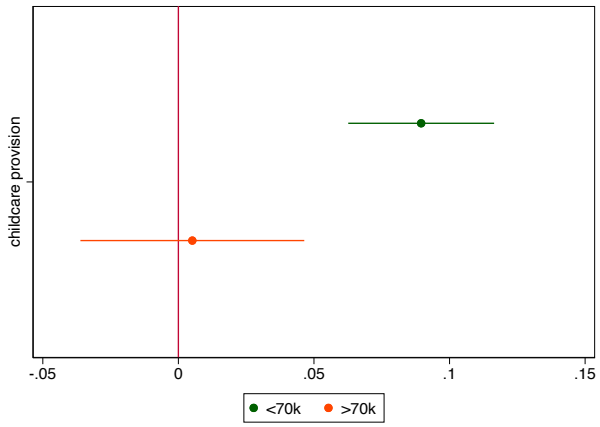
In the previous section, we demonstrated that parents who have provided childcare to their children are more likely to receive long-term care (LTC) from those children. Next, we delve deeper into these observed relationships to explore them further. Our aim is to establish whether there's a causal relationship between providing childcare and receiving LTC. To investigate this intergenerational transfer between parents and children, we link LTC outcomes of parent i received from child j to the parent's decision to provide childcare to that child j in the following equation:

$$y_{ij,old} = \beta_0 + \beta_1 cc_{ij,young} + \boldsymbol{\gamma}' \boldsymbol{x}_{ij} + \varepsilon_{ij,old}, \tag{1}$$

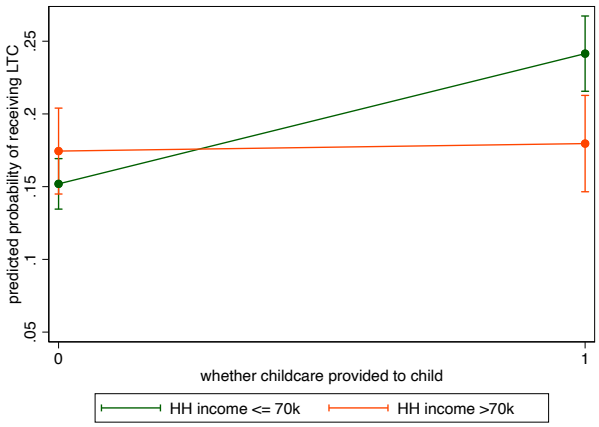
where $y_{ij,old}$ is a binary variable that takes the value 1 if parent i receives LTC for ADL, IADL, or both from child j and/or her spouse at age 75 or older (old), and is zero otherwise. The variable $cc_{ij,young}$ is a binary measure that takes the value 1 if parent i provides childcare to child j's chil-

Figure 4: Estimated correlation between childcare provision and LTC receipt by child's household income.

(a) Correlation in time transfers



(b) Probability of LTC receipt



Note: the first panel presents the estimated OLS coefficients for different child income groups and the second panel shows the predicted probability of receiving LTC by childcare provision for different child income groups.

dren at age 40-69 ($young$) and is zero otherwise.[4] The vector $\boldsymbol{x}_{ij}$ contains a set of covariates at the parents and the child level that is measured in both periods. The error term $\varepsilon_{ij,old}$ may contain respondent-specific or family effects that are constant across children. It also may capture unobserved factors that determine the relationship between parent i and child j and are correlated with decisions on the intergenerational transfer. The main parameter of interest is β_1, which measures the impact of childcare provision on the likelihood of receiving LTC in old age, thus capturing the extent to which an intergenerational transfer takes place between parents and their children.

We use different specifications and identification strategies to estimate β_1. First, we estimate Equation (1) using OLS. However, it is likely that the OLS estimate is biased due to the lack of accounting for unobservables that drive the decisions of both parents and children. For example, some parents select into childcare provision based on preferences or personality traits, which increases the likelihood of providing grandparental childcare and receiving LTC later. Moreover, the quality of parents' relationship with their children may matter for these decisions. If parents have strong ties to their children and the family environment is healthy and caring, then they may be more likely to provide childcare and receive LTC at later ages.

To overcome these endogeneity issues related to selection and omitted variables, we employ

[4]HRS asks respondents whether they have spent 100 or more hours taking care of grandchildren or great-grandchildren of each of their children since the last interview/wave/last two years. Therefore the measure does not capture childcare from respondents who have spent less than 100 hours of childcare.

two alternative empirical approaches. First, we use an OLS specification in which we control for parent fixed-effects. Our HRS sample consists of parent-child observations, so we can exploit within parent-across child variation. Practically, this implies that we control for all observed and unobserved characteristics of a parent that are constant across children, such as parental preferences for caring. While this approach already takes account of a large number of potential unobservables, it does not allow the capture of any unobservables that are specific to a particular parent-child relationship. For instance, one could assume that parents select to provide childcare based on having a favorite child, and this favorite child, in turn, provides LTC. Such features of the parent-child relationship are unobserved and thus absorbed by $\varepsilon_{ij,old}$.

Potential instruments: To address unobserved heterogeneity that varies across children, we make use of an instrumental variable (IV) approach. The instrument requires inducing sufficient variation in childcare decisions of parents across children, without having any direct effect on children's LTC decision conditional on covariates. Since our sample is rather small, we cannot use instruments that exploit variation across children due to regional and temporal differences. Such instruments would, for instance, be obtained from childcare policies that differ by county or state of living of children (Truskinovsky, 2023). An instrument for grandparental childcare when analyzing a mother's labor supply that recently has been used in the literature is the death of a grandparent. The idea is that the death of a grandmother (or a grandfather) exogenously induces variation in the likelihood of children receiving childcare (Posadas and Vidal-Fernandez, 2013). In our setting, such an instrument would not work, however, because deceased grandparents do not need LTC.[5] Moreover, we would miss to exploit important variation across children. Several studies use the gender of the firstborn child or the sex ratio among all children as an instrument for grandparental care in an analysis of grandparental labor supply (e.g., Rupert and Zanella, 2018; Backhaus and Barslund, 2021; Salm et al., 2021; Eibich and Zai, 2022). The idea of such instruments is to exploit exogenous timing in grandparental care decisions to the randomness of a child's gender and the fact that daughters have children earlier than sons. Similar to instruments using the death of grandparents, such an instrument would be constant across all children of a respondent and thus provide insufficient variation for identification.

Taking these considerations into account, reduces considerably the number of potential instruments for our application. More specifically, our instrument has to induce variation in the childcare provision decisions of grandparents across children. Using the distance between parents and their children would be such a candidate instrument. The geographical distance between grandparents and parents has been used by some studies analyzing the impact of grandparental childcare pro-

[5]Coe and Van Houtven (2009) use parental death to estimate the child's decision to provide LTC on a child's mental health.

vision on grandchildren's cognitive development (see, for instance, Del Boca et al., 2018). While with these outcomes of interest, one may argue that the instrument satisfies the exclusion restriction, it unlikely holds in our case. The quality of the unobserved child-parent relationship (e.g., being the favorite child) could induce a child to live close to her parents and thus directly affect the likelihood of providing LTC.[6].

Finally, some studies use the availability of grandchildren as an instrument for childcare provision. Analyzing the impact of grandparental childcare on grandparent's cognitive functioning, Arpino and Bordone (2014) argue that such an instrument likely satisfies the exclusion restriction if children's fertility decision at the extensive margin (i.e., to have a child) is not based on the parent's health status. To strengthen this argument the authors exclude childless respondents and those who have serious illnesses. In our application, such an instrument would have two drawbacks. First, as the other instruments discussed above it only induces variation in grandparent's childcare decisions for all children. Thus, the instrument does not vary across children. However, we would like to use an instrument that induces variation in childcare decisions across children to analyze LTC receipt at the child-parent level.[7] Thus, it seems to be more likely to provide childcare to one child (and receive LTC from that child) than to another child. Second, an instrument that uses the extensive margin of fertility among all children could indeed be linked to a parent's health status in expectation and thus to the likelihood of providing LTC to parents.

To overcome these concerns, we exploit variation in fertility decisions among all children at the intensive margin. More specifically, we use each child's siblings' average number of children to instrument the parent's childcare provision decision for a particular child j. The idea is as follows: each grandparent has a fixed time budget for childcare provision which she can allocate among all her children. A higher number of grandchildren reduces the available time budget for each child's children (grandchildren). Since we observe grandparents' decision over childcare for every single child $j = 1, ...J$ with children, child j receives less childcare for her children the more children her siblings, $r = 1, .., J - 1$ for $r \neq j$, have. To be a valid instrument, the average number of children of siblings must be strongly correlated with childcare provision decisions of grandparents, it must be exogenous, and satisfy the exclusion restriction. The first condition can be tested.

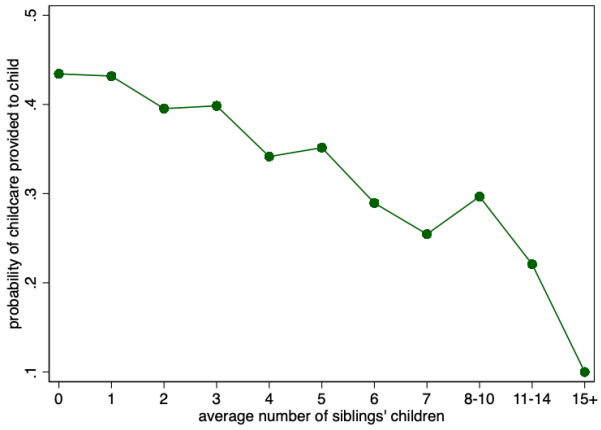
Relevance: The instrument is strongly correlated with childcare provision conditional on covariations. The correlation from an OLS regression is $\hat{\tau} = -.015$ with $t = 6.62$ and F-statistic value of F=43.83 (unconditional correlation $\hat{\tau} = -.019$ with $t = 8.46$). If our conjecture is correct

[6]Table 2 shows that excluding children living within 10 miles (including co-residing children) leads to much lower rates of LTC receipt and the difference by childcare provision is small and insignificant.

[7]In our data, we find that childcare decisions seem to be made individually for each child with children. In our sample of respondents who have at least one grandchild from each child, the within variation is 0.30 parents' childcare provision (which is a binary variable), suggesting that some children receive childcare while others do not.

that more grandchildren impose a constraint on the available time budget for childcare provision for each child, then we should see that the probability of childcare to child j decreases with the number of children of siblings $r = 1, ..., J-1$. Figure 5 plots the childcare provision probability as a function of the number of children of siblings. Note that the value zero is only assigned to children who do not have siblings because we excluded children who do not have children. About 16% are single children. Overall, a child has on average 3 siblings and only 5% have eight siblings or more. Moreover, the share of childcare provided to a particular child decreases with the number of children siblings have.

Figure 5: Share childcare provided by average number of siblings' children



The measure of childcare provision is a binary variable, while the instrument is continuous. To estimate the impact of childcare provision on LTC receipt, we model the first stage as a probit model, i.e.,

$$P(cc_{ij,young} = 1|\boldsymbol{x}_{ij}, z_{ij}) = \Phi(\boldsymbol{\gamma}'\boldsymbol{x}_{ij} + \pi z_{ij}),$$

where z_j is the instrument. This specification accounts for the binary nature of our main regressor of interest. We then construct the residuals from the first stage, $\hat{r}_{ij}$, as the difference between the original childcare provision measure and the predicted values from the first stage and include this residual as a control variable, in addition to the childcare provision variable, in the second stage equation.

$$y_{ij,old} = \beta_0 + \beta_1 cc_{ij,young} + \boldsymbol{\gamma}'\boldsymbol{x}_{ij} + \rho\hat{r}_{ij} + u_{ij,old} \tag{2}$$

Thus, our estimation procedure is a control function approach. The idea is that the residual captures all endogenous variation related to $cc_{ij,young}$, i.e., it proxies for the factors in $\varepsilon_{ij,old}$ that

are correlated with $cc_{ij,young}$. The new error term $u_{ij,old}$ is uncorrelated with the right-hand side variables, including childcare provision, $cc_{ij,young}$. A simple test on the exogeneity of $cc_{ij,young}$ in Equation (2) is to inspect the estimated coefficient on $\hat{\rho}$. Under the null hypothesis $\rho = 0$, meaning that $cc_{ij,young}$ is exogenous (for details, see Wooldridge, 2015).

Validity of exclusion restriction: The average number of children of one's siblings must affect the likelihood grandparents provide childcare to child j but must not directly affect the likelihood grandparents receive LTC from child j. In other words, the fertility decisions of siblings must not directly effect child j's LTC provision, and child j's LTC provision must not directly effect the fertility decisions of siblings. One concern is that if child j has more siblings and/or more nieces and nephews then there are more children and/or grandchildren to provide care and this directly reduces child j's likelihood of providing informal care to their parent. First, grandchildren are unlikely caregivers. According to Gruber and McGarry (2023), in the HRS, only 8% of informal care is provided by the recipients' grandchildren. Second, since we use the average number of children of one's siblings and not the total number, the instrument's correlation with the total number of siblings is low. Third, we show in the Online Appendix that the findings are robust to controlling for the number of siblings and the total number of children and grandchildren.

Table 7 provides estimates of β_1 using various specifications. OLS estimates (column 1-2) indicate that parents who provided grand childcare to their kid are 6.9 percentage points more likely to receive long-term care support from them at older ages absent any controls and 4.7 percentage points more likely with controls. If we control for parental fixed effects in addition to the other controls, the magnitude increases to 6.4 percentage points. The magnitude of the parameter estimate goes up to 17 percentage points (column 6) when we include our aforementioned IV along with the other parent and child controls. However, the standard error also increases. Despite this, the effect remains significant at the 10 percent level.

3 Structural Model

We develop a stationary overlapping-generations model with limited commitment to study intergenerational time transfers between parents and their adult children. The model is designed to match two key caregiving margins observed in the data: (i) grandparental child-care provision when the child is a young adult, and (ii) informal long-term care (LTC) provision by the adult child when the parent is old.

Time is discrete and one model period corresponds to 15 calendar years. At any point in time there are three economically relevant generations within a family: an old parent (o), an adult child

Table 7: Estimated impact of childcare provision on LTC receipt

	LTC received from child j or their spouse					
	(1)	(2)	(3)	(4)	(5)	(6)
Childcare to child j	0.069***	0.047***	0.122***	0.064***	0.226**	0.170*
	(0.012)	(0.012)	(0.016)	(0.017)	(0.100)	(0.102)
Constant	0.149***	-0.179			0.089**	0.249
	(0.007)	(0.121)			(0.039)	(0.280)
Observations	5,550	5,046	5,550	5,046	5,545	5,042
$\hat{\rho}$					0.188*	0.143
					(0.099)	(0.109)
Parent & child controls		✓		✓		✓
Parent fixed effects			✓	✓		

Standard errors are clustered at the parent level; *** p<0.01, ** p<0.05, * p<0.1. Parent-specific controls: female, college degree, black; total household income, has ADL, has IADL, self-reported health, married or partnered. Child-specific controls: female, college degree, birth order; lives within 10 miles, number of children, married, works full-time or part-time. Time-varying measures for parents and children are averages or dummies (maximum taken) in the childcare and the LTC period and are controls from both periods. In all regressions, we control for (average) parent and child age during the LTC period. Columns (3)-(4): controls for parent fixed-effects. Columns (5)-(6): childcare provision is instrumented with the average number of children the siblings of child j have, z_{ij}. The residual from the first stage $\hat{r}_{ij}$ is included as a control variable in the second stage. Standard errors obtained from cluster bootstrap with $R = 399$ replications.

(y), and the child's own children (grandchildren), who generate exogenous child-care needs. Each parent–child link lasts for two periods: a child-care stage (period 1) and an LTC stage (period 2). At the end of period 2 the old parent dies with certainty. The adult child becomes the old parent in the next cycle and interacts with a newly arrived adult child (the next generation).

The key friction is limited commitment within the family: in each period the parent and child can renegotiate or dissolve their arrangement. Cooperation is sustained only if both agents prefer it to their outside options given the realized shocks.

3.1 Environment

Markets and government. There is a risk-free one-period asset with gross return $1 + r$. Agents face a borrowing constraint $a \geq 0$. Competitive labor markets pay a wage w. Working-age labor income is taxed at rate τ. Old parents receive an exogenous transfer (Social Security/pension) SS each period.

Preferences. In each period $t \in \{1, 2\}$, each adult $i \in \{y, o\}$ derives utility from consumption c_t^i and leisure ℓ_t^i:

$$u(c, \ell) = \frac{\left(c^\gamma \ell^{1-\gamma}\right)^{1-\sigma}}{1-\sigma}, \qquad \gamma \in (0, 1),\ \sigma > 0. \tag{3}$$

The old parent also derives warm-glow utility from terminal assets a_T^o:

$$\psi(a_T^o) = \phi \frac{(a_T^o)^{\gamma(1-\sigma)}}{1-\sigma}, \qquad \phi > 0. \tag{4}$$

Reciprocal guilt. If the adult child does not provide informal care in period 2 when the parent has LTC needs, the child experiences a utility loss ("guilt"). This loss depends on whether the parent provided grandchild care in period 1. Let $I_1 \in \{0, 1\}$ indicate whether the family cooperated in period 1 (and hence grandparents provided child care). The guilt penalty is

$$\chi(\lambda, I_1) = [I_1 \phi_1 + (1 - I_1)\phi_2]\, \lambda, \qquad \phi_1 \geq \phi_2 \geq 0, \tag{5}$$

where λ is the parent's LTC need in period 2.

Nursing home risk. At the end of period 2, the old parent may enter a nursing home with probability $p_{NH}^k(\lambda)$, where $k \in \{\text{informal}, \text{formal}\}$ denotes whether care was provided informally by the child (cooperation) or purchased formally (non-cooperation). Nursing home entry generates an expected utility loss $\bar{u}_{NH} > 0$ (reduced-form). Thus expected terminal utility is

$$\psi(a_T^o) - p_{NH}^k(\lambda) \bar{u}_{NH}. \tag{6}$$

3.2 Idiosyncratic Heterogeneity and Shocks

Permanent productivity. Each adult has a permanent labor productivity type $\epsilon \in \{\epsilon_1, \ldots, \epsilon_N\}$. In period 1 and period 2, the adult child's earnings are proportional to ϵ^y. The old parent's productivity ϵ^o matters for their potential labor earnings in period 1 if they work under non-cooperation.

When an adult child becomes an old parent in the next cycle, they carry their productivity forward: $\epsilon^{o'} = \epsilon^y$. The productivity of the new adult child in the next cycle, $\epsilon^{y'}$, is drawn according to an intergenerational process (a Markov transition matrix) that can generate parent–child correlation in permanent productivity.

Care needs.

- **Child-care requirement (period 1).** Grandchildren generate an exogenous child-care time requirement. If the family cooperates, grandparents supply a fixed amount of grandchild

care, imposing a time cost κ^{gp} on the old parent. If the family does not cooperate, the adult child supplies child care themselves, imposing a time cost κ on the child.

- **LTC requirement (period 2).** In period 2, the old parent draws an LTC need shock $\lambda \in \{0, \lambda_L, \lambda_M, \lambda_H\}$ from distribution F^λ. If the family cooperates, the adult child supplies λ units of informal care. If not, the parent purchases formal care at price p^{LTC} per unit, incurring expenditure $p^{LTC}\lambda$.

Love shocks (limited commitment). In each period t, the parent and child draw a common idiosyncratic "love" shock q_t, which shift the value of cooperation relative to non-cooperation and generate endogenous transitions in cooperation status. These shocks are i.i.d. over time and across agents.

3.3 Limited Commitment and Contracting

In each period, the parent–child pair can either cooperate (pool resources and implement a Pareto-efficient allocation) or not cooperate (each consumes/saves on their own and uses market care when necessary). Cooperation is governed by limited commitment: each party can walk away to their outside option in the current period after shocks are realized.

Let $\theta_t \in [0, 1]$ denote the Pareto weight on the adult child's utility in period t; the weight on the old parent is $1 - \theta_t$. New cooperative relationships begin from a default weight $\bar{\theta}$ (e.g., $\bar{\theta} = 0.5$). If a cooperative relationship continues from period 1 to period 2, the period-2 starting weight is inherited from period 1. If the pair did not cooperate in period 1 but starts cooperating in period 2, we assume the period-2 relationship starts from the default weight $\bar{\theta}$.

3.4 Decision Problems

We describe the parent–child interaction within a given cycle. Denote by a_1^y, a_1^o the assets held by the child and parent at the beginning of period 1, and by a_2^y, a_2^o the assets carried into period 2. In period 2 the child chooses end-of-period assets a_3^y, which become the old parent's beginning-of-period-1 assets in the next cycle ($a_1^{o'} = a_3^y$). The old parent chooses terminal assets a_T^o in period 2.

3.4.1 Period 1: Child-Care Stage

At the beginning of period 1, the state is

$$s_1 = (a_1^y, a_1^o, \epsilon^y, \epsilon^o, \theta_0)\,,$$

and the draw of love shock (q_1). They decide whether to cooperate.

Cooperation in period 1. If the family cooperates in period 1, grandparents provide child care and the old parent incurs the time cost κ^{gp}. The cooperative allocation chooses

$$x_1 = (c_1^y, c_1^o, n_1^y, a_2^y, a_2^o, \theta_1)$$

to maximize the weighted sum of utilities, taking expectations over period-2 LTC needs and future love shocks:

$$V_1(s_1, q_1) = \max_{x_1} \Bigg\{ \theta_1 u(c_1^y, \ell_1^y) + (1-\theta_1) u(c_1^o, \ell_1^o) \\ + \beta \mathbb{E}\Big[m_2(\cdot)\, V_2(s_2, \theta_1, q_2) + (1 - m_2(\cdot)) \big(\theta_1 Z_2^y(s_2^y; I_1{=}1) + (1-\theta_1) Z_2^o(s_2^o) \big) \Big] \Bigg\}, \tag{7}$$

subject to

$$\begin{aligned} c_1^y + c_1^o + a_2^y + a_2^o &= (1+r)(a_1^y + a_1^o) + SS + (1-\tau) w \epsilon^y n_1^y - F_1, \\ \ell_1^y &= 1 - n_1^y, \qquad \ell_1^o = 1 - \kappa^{gp}, \\ a_2^y &\geq 0, \quad a_2^o \geq 0. \end{aligned}$$

Here F_1 is a (reduced-form) fixed cost of sustaining cooperation in period 1. The next-period state under cooperation is $s_2 = (a_2^y, a_2^o, \epsilon^y, \epsilon^o, \lambda)$.

The period-2 cooperation indicator $m_2(\cdot) \in \{0, 1\}$ depends on the period-2 state, the inherited weight (if continuing), and the realization of love shocks; it equals 1 if cooperation in period 2 is feasible under limited commitment (defined below).

Non-cooperation in period 1. If the family does not cooperate in period 1, the adult child provides child care themselves at time cost κ, and the old parent has no caregiving responsibility and may choose whether to work a fixed amount $\bar{n}^o$.

The child's period-1 outside option is

$$Z_1^y(s_1^y) = \max_{c_1^y, n_1^y, a_2^y} \Big\{ u(c_1^y, \ell_1^y) + \beta \mathbb{E}\big[m_2(\cdot)\, V_2(s_2, \bar{\theta}, q_2) + (1 - m_2(\cdot)) Z_2^y(s_2^y; I_1{=}0) \big] \Big\}, \tag{8}$$

subject to

$$\begin{aligned} c_1^y + a_2^y &= (1+r)a_1^y + (1-\tau)w\epsilon^y n_1^y, \\ \ell_1^y &= 1 - n_1^y - \kappa, \\ a_2^y &\geq 0. \end{aligned}$$

Importantly, a non-cooperating child in period 1 foresees that cooperation may be started in period 2. If cooperation starts in period 2 after non-cooperation in period 1, we assume the relationship begins from the default weight $\bar{\theta}$.

The old parent's period-1 outside option is

$$Z_1^o(s_1^o) = \max_{c_1^o, a_2^o, n_1^o \in \{0, \bar{n}^o\}} \Big\{ u(c_1^o, 1 - n_1^o) + \beta \mathbb{E}\big[Z_2^o(s_2^o)\big] \Big\}, \tag{9}$$

subject to

$$c_1^o + a_2^o = (1+r)a_1^o + SS + (1-\tau)w\epsilon^o n_1^o, \qquad a_2^o \geq 0. \tag{10}$$

We assume non-cooperating parents do not plan on future cooperation and hence take period-2 behavior as autarky.

Participation constraints and renegotiation in period 1. Let $\widetilde{V}_1^y(s_1, q_1)$ and $\widetilde{V}_1^o(s_1, q_1)$ denote the child's and parent's values under the cooperative allocation chosen in (7), augmented by their love shocks (which shift the value of cooperation). Limited commitment requires

$$\widetilde{V}_1^y(s_1, q_1) \geq Z_1^y(s_1^y), \qquad \widetilde{V}_1^o(s_1, q_1) \geq Z_1^o(s_1^o). \tag{11}$$

If these constraints are violated at the inherited weight, the Pareto weight is renegotiated. If no $\theta_1 \in [0, 1]$ can satisfy both constraints, the pair does not cooperate in period 1.

3.4.2 Period 2: Long-Term Care Stage

At the beginning of period 2, the parent draws LTC needs λ and the pair draws love shocks (q_2^y, q_2^o). The state is

$$s_2 = \left(a_2^y, a_2^o, \epsilon^y, \epsilon^o, \lambda, \theta_1, I_1\right),$$

where I_1 indicates whether the pair cooperated in period 1.

Cooperation in period 2. If the family cooperates, the adult child provides informal LTC time λ and the parent avoids purchasing market care. The cooperative allocation chooses

$$x_2 = (c_2^y, c_2^o, n_2^y, a_3^y, a_T^o, \theta_2)$$

to solve

$$\begin{aligned} V_2(s_2, \theta_1, q_2) = \max_{x_2} \Bigg\{ & \theta_2 u(c_2^y, \ell_2^y) + (1-\theta_2) u(c_2^o, 1) \\ & + \beta\theta_2 \mathbb{E}\Big[m_1(s_1', q_1')\, \widetilde{V}_1^o(s_1', q_1') + (1 - m_1(s_1', q_1')) Z_1^o(s_1^{o'}) \Big] \\ & + \beta(1-\theta_2)\Big(\psi(a_T^o) - p_{NH}^{\text{informal}}(\lambda)\bar{u}_{NH} \Big) \Bigg\}, \end{aligned} \tag{12}$$

subject to

$$\begin{aligned} c_2^y + c_2^o + a_3^y + a_T^o &= (1+r)(a_2^y + a_2^o) + SS + (1-\tau) w \epsilon^y n_2^y - F_2, \\ \ell_2^y &= 1 - n_2^y - \lambda, \\ a_3^y \geq 0, \quad & a_T^o \geq 0. \end{aligned}$$

Here F_2 is a fixed cooperation cost in period 2. The continuation term reflects that the current child becomes the old parent in the next cycle with $(a_1^{o'}, \epsilon^{o'}) = (a_3^y, \epsilon^y)$ and meets a new adult child with state s_1' and love shock q_1'; $m_1(s_1', q_1')$ is the next-cycle period-1 cooperation indicator.

Non-cooperation in period 2. If the family does not cooperate in period 2, the child provides no LTC time. The parent purchases formal care at cost $p^{LTC}\lambda$.

The old parent's period-2 outside option is

$$Z_2^o(s_2^o) = \max_{c_2^o, a_T^o} \Big\{ u(c_2^o, 1) + \beta\big(\psi(a_T^o) - p_{NH}^{\text{formal}}(\lambda)\bar{u}_{NH} \big) \Big\} \tag{13}$$

subject to

$$c_2^o + a_T^o = (1+r)a_2^o + SS - p^{LTC}\lambda, \qquad a_T^o \geq 0. \tag{14}$$

The adult child's period-2 outside option is

$$Z_2^y(s_2^y; I_1) = \max_{c_2^y, n_2^y, a_3^y} \Big\{ u(c_2^y, \ell_2^y) - \chi(\lambda, I_1) + \beta\mathbb{E}\big[m_1(s_1', q_1')\, \widetilde{V}_1^o(s_1', q_1') + (1 - m_1(s_1', q_1')) Z_1^o(s_1^{o'}) \big] \Big\}, \tag{15}$$

subject to

$$
\begin{aligned}
c_2^y + a_3^y &= (1+r)a_2^y + (1-\tau)w\,\tilde{\epsilon}^y(I_1)\,n_2^y, \\
\ell_2^y &= 1 - n_2^y, \\
a_3^y &\geq 0.
\end{aligned}
$$

The term $\tilde{\epsilon}^y(I_1)$ captures a reduced-form career penalty from having to provide child care in period 1 without grandparent help: if $I_1 = 0$, the child's effective labor productivity in period 2 is scaled down relative to the $I_1 = 1$ case. This penalty is productivity-dependent to reflect higher opportunity costs for high-skill children.

Participation constraints and renegotiation in period 2. Limited commitment in period 2 requires that cooperative values satisfy

$$
\widetilde{V}_2^y(s_2, q_2) \geq Z_2^y(s_2^y; I_1), \qquad \widetilde{V}_2^o(s_2, q_2) \geq Z_2^o(s_2^o), \tag{16}
$$

where $\widetilde{V}_2^y$ and $\widetilde{V}_2^o$ are the child's and parent's values under the cooperative allocation in (12), augmented by love shocks. If the constraints fail at the inherited weight, the Pareto weight is renegotiated. If no $\theta_2 \in [0, 1]$ can satisfy both constraints, the family does not cooperate in period 2.

4 Calibration

We calibrate the model using a two-step strategy following Gourinchas and Parker (2002). In the first step, we discipline all exogenous processes using survey data and a simulation model. These include long-term care (LTC) needs, nursing home (NH) risk conditional on care arrangements, labor productivity processes, and institutional parameters. In the second step, we estimate a small set of internally determined parameters by matching key moments related to intergenerational time transfers and care outcomes.

4.1 Model Period and Data Mapping

One model period corresponds to 15 calendar years. The first model period maps to ages 40–69, during which parents may provide childcare to grandchildren. The second model period maps to ages 75–90, during which parents may require long-term care. This mapping allows us to use the Health and Retirement Study (HRS), which provides rich information on both childcare provision earlier in life and LTC arrangements at older ages.

4.2 First-Step Calibration

4.2.1 Preferences and Technology

Standard preference parameters are taken from the literature. The coefficient of relative risk aversion is set to $\sigma = 2$ and the consumption weight to $\gamma = 0.52$. The discount factor is $\beta = 0.86$, which corresponds to an annual discount factor of approximately 0.99 over a 15-year period. The risk-free interest rate is set to $r = 3\%$. The wage is normalized to one, and Social Security income equals 40% of average earnings, assuming average annual hours equal to one-third of available time.

4.2.2 Labor Productivity

Both parents and children are endowed with permanent productivity types. Productivity follows a log AR(1) process discretized using the Tauchen method with persistence $\rho = 0.74$ and innovation standard deviation $\sigma_\epsilon = 0.344$. The process is approximated with three productivity states for each generation and normalized to have mean one. When a child becomes an old parent in the next cycle, their productivity type is carried forward.

4.2.3 Childcare Needs

Childcare needs are treated as deterministic in the baseline calibration. If the family cooperates in period 1, grandparents provide childcare and incur a time cost equal to $\kappa^{gp} = 0.1846$, corresponding to 18.46% of their time endowment. This value is obtained by assuming 40 hours per week of childcare for ages 0–5 and 15 hours per week for ages 5–15, aggregated over a 15-year period. If the family does not cooperate, the adult child provides childcare themselves and faces a substantially larger time burden. In addition, children who do not receive grandparental childcare suffer a persistent productivity penalty in period 2, reflecting career costs of intensive childcare. This penalty is heterogeneous and equals $\{0.50, 0.70, 0.80\}$ for low-, middle-, and high-productivity children, respectively.

4.2.4 Formal Care Costs

If the family does not cooperate in period 2, parents purchase formal LTC at price p per unit of care. The baseline price is set to $p = 0.55$, corresponding to the average wage of formal care workers relative to the model wage.

4.2.5 Long-term care needs and nursing home risk

A key challenge for calibration is that the model's "old-age" period spans ages 75–90 (a 15-year horizon), while the Health and Retirement Study (HRS) observes individuals at a biennial frequency and only provides point-in-time measures of care use, care hours, and nursing home (NH) utilization. Moreover, selective attrition from mortality mechanically censors the observed care-hours profiles at older ages. To map the biennial HRS measurements into objects that correspond to a 15-year model period, we estimate a high-frequency simulation model of late-life care needs and NH risk. This procedure delivers two sets of reduced-form inputs for the structural model: (i) a discrete distribution over long-term care (LTC) need states $\lambda \in \{0, \lambda^L, \lambda^M, \lambda^H\}$, and (ii) NH probabilities that depend on the LTC need state and on the care arrangement (informal care by children versus formal paid care).

Step 1: Measuring care-hours and imputing unmet needs. We start from an HRS sample of elderly respondents observed between ages 75 and 90. For each respondent-wave, we construct a monthly measure of total care hours required. Because reported hours may understate required hours when respondents report unmet needs, we impute required care hours for observations with unmet needs using a regression model estimated on the sub-sample without unmet needs. Specifically, we estimate:

$$tot_hrs_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 age_{it}^3 + \sum_k \gamma_k \mathbf{1}\{ADL_{it} = k\} + \sum_r \delta_r \mathbf{1}\{iADL_{it} = r\} + \varepsilon_{it}, \tag{17}$$

and replace reported hours by predicted hours for observations with unmet needs (imposing non-negativity). This yields an imputed measure of required monthly care hours for all respondent-waves.

Because the structural model's care arrangement decision is between child-provided informal care and market (formal) care, we then net out hours provided by caregivers that are not modeled (e.g., spouse or other relatives) and interpret the residual as the monthly care burden that must be met by either children or paid care.

Step 2: Discrete care-need states. We discretize late-life care needs into a small number of non-overlapping states. Let s_{it} denote the respondent's latent care-need state in wave t, constructed from the (net) imputed monthly care-hours measure. We use a "no-need" state and then split the positive-hours distribution into increasingly intensive categories to define low, medium, and high care need states. For each care-need state, we compute the average monthly care-hours requirement

and convert it into a time-cost measure that is compatible with the model:

$$\lambda(s) \equiv \frac{\text{average monthly care hours in state } s}{\text{monthly time endowment}}, \tag{18}$$

where the monthly time endowment is defined as 16 hours/day $\times$ 30 days/month.

Step 3: Estimating transition matrices and mortality. Next, we estimate age-specific (two-year) transition rates across care states and death. We form two-year age bins (75–76, 77–78, ..., 89–90). For each age bin j and each origin state s, we compute empirical transitions to destination states s' in the subsequent HRS wave, including death as an absorbing state. We also define an NH state based on nursing home utilization (e.g., exceeding a threshold number of NH nights over a recent window) so that transitions into and out of NH are explicitly captured.

Step 4: High-frequency simulation and aggregation to the 15-year model period. The empirical transitions are measured at a two-year frequency, while the model treats ages 75–90 as a single period. We therefore construct a higher-frequency Markov process that matches the two-year transitions when aggregated. Concretely, for each age bin we select a monthly transition matrix $P_j^{(m)}$ such that its 24-step transition probabilities reproduce the corresponding two-year transition matrix $P_j^{(2y)}$. We then simulate a large synthetic cohort starting at age 75 using (i) the empirical initial distribution over care states at age 75–76 and (ii) the age-dependent monthly transition matrices.

In the simulation, each month of life contributes state-specific care hours. For individuals who die before age 90, care hours are set to zero after death so that mortality is correctly incorporated into the distribution of total care needs over ages 75–90. The simulation produces, for each simulated individual, total care hours accumulated over ages 75–90, which we map into the model's discrete LTC-need states $\lambda \in \{0, \lambda^L, \lambda^M, \lambda^H\}$. Aggregating across individuals yields the model-implied population probabilities for each λ state.

Step 5: Nursing home risk conditional on care arrangement. Finally, we estimate NH risk as a function of (i) the LTC need state and (ii) the care arrangement (informal child care vs formal paid care). To do so, we use the HRS to estimate reduced-form NH transition risks that vary with care needs and caregiving inputs. In practice, we estimate (linear probability or nonlinear) models of NH entry of the form:

$$\begin{aligned}\Pr(\mathit{NH}_{i,t} = 1 \mid s_{i,t-1} = s) = f_s\Big(&\mathbf{1}\{\mathit{child_care}_{i,t-1} = 1\},\ \mathit{spouse_share}_{i,t-1},\\ &\mathit{age}_{it},\ \mathit{age}_{it}^2,\ \mathit{ADL}_{i,t-1},\ \mathit{iADL}_{i,t-1}\Big).\end{aligned} \tag{19}$$

where $\mathbf{1}\{\textit{child_care}_{i,t-1} = 1\}$ indicates whether children provided any care (or were the primary caregiver) and $\textit{spouse_share}_{i,t-1}$ captures the share of total care hours provided by the spouse. We allow the mapping $f_s(\cdot)$ to differ by the prior care-need state s.

We feed these estimated NH risks into the high-frequency simulation model to obtain NH probabilities over the model's 15-year old-age period. We then collapse the resulting NH probabilities into objects that depend only on the model's discrete LTC-need state λ and whether the care arrangement is informal (child-provided) or formal (paid). These conditional NH probabilities are treated as exogenous first-step inputs into the structural model.

Table 8 below provides the aggregated model inputs for LTC need state as well as nursing home risk from the high frequency simulation model described above.

Table 8: Long-term care (LTC) needs and nursing home risk: first-step model inputs

LTC need state	Time cost λ	$\Pr(\lambda)$	Nursing home risk	
			Child provides care	Formal paid care
No needs	0.000	0.3578	0.3592	0.3592
Low needs	0.018	0.4495	0.4056	0.4754
Medium needs	0.110	0.1284	0.3725	0.4583
High needs	0.430	0.0643	0.3654	0.4390

Notes: The table reports the discrete distribution of long-term care needs and the associated time costs, as well as nursing home entry probabilities conditional on the LTC state and the source of care. Time costs λ are expressed as fractions of the time endowment in the model period (ages 75–90). Nursing home risks differ by care arrangement, reflecting lower entry probabilities when children provide informal care. All values are estimated in the first step using the simulation model described in Section 4.2.5.

4.3 Second-Step Calibration

In the second step, we estimate the parameters that govern intergenerational reciprocity, limited commitment, and preferences over care arrangements. Specifically, we calibrate the following four parameters: (i) the standard deviation of the love shock, σ_q; (ii) the guilt parameter when parents provided childcare in period 1, ϕ_1; (iii) the guilt parameter when parents did not provide childcare in period 1, ϕ_2; and (iv) the utility cost of nursing home residence, $\bar{U}_{NH}$.

These parameters are internally identified using the method of simulated moments. Let $\theta = (\sigma_q, \phi_1, \phi_2, \bar{U}_{NH})$ denote the vector of parameters. For a given θ, we solve the model, simulate the stationary distribution of parent–child pairs, and compute model-implied moments. The parameter vector θ is chosen to minimize the quadratic distance between model-implied and data moments.

Targeted moments. The second-step estimation targets four moments that summarize joint cooperation decisions across the two stages of intergenerational interaction.

First, we target three unconditional joint cooperation shares:

$$\Pr(C_1, C_2), \qquad \Pr(C_1, N_2), \qquad \Pr(N_1, C_2),$$

where C_t (N_t) denotes cooperation (non-cooperation) in period t. The fourth joint outcome, $\Pr(N_1, N_2)$, is not an independent moment and is pinned down by the adding-up constraint,

$$\Pr(N_1, N_2) = 1 - \Pr(C_1, C_2) - \Pr(C_1, N_2) - \Pr(N_1, C_2).$$

These unconditional shares discipline the overall level of cooperation in each period as well as the persistence of cooperation across periods.

Second, we target the *conditional transfer gap*,

$$\Delta^{LTC} \equiv \Pr(C_2 \mid C_1) - \Pr(C_2 \mid N_1), \tag{20}$$

which captures the strength of reciprocity in long-term care provision. This moment is central for identifying the differential guilt parameters (ϕ_1, ϕ_2) and the dispersion of the love shock σ_q. Intuitively, ϕ_1 governs the additional moral cost of refusing to provide care after having received childcare, while ϕ_2 governs baseline guilt in the absence of prior childcare.

Finally, the nursing home disutility $\bar{U}_{NH}$ is disciplined by the model-implied share of individuals entering a nursing home at the end of life. While nursing home entry probabilities are taken as exogenous from the first step, the unconditional nursing home share is endogenous in the model and depends on period 2 cooperation decisions and the choice between informal and formal care.

Objective function. Let m^{data} denote the vector of data moments and $m^{\text{model}}(\theta)$ the corresponding model-implied moments. The second-step estimator solves

$$\hat{\theta} = \arg\min_{\theta} \left[m^{\text{model}}(\theta) - m^{\text{data}}\right]' W \left[m^{\text{model}}(\theta) - m^{\text{data}}\right],$$

where W is a positive-definite weighting matrix. In the baseline specification, we use an identity weighting matrix.

Together, these moments ensure that the estimated model matches both the unconditional prevalence of intergenerational cooperation and the conditional reciprocity in long-term care provision observed in the data.

4.4 Summary of Parameters

Table 9 summarizes the calibrated and estimated parameters.

Table 9: Calibration Summary

Parameter	Description	Value	Source
β	Discount factor (15 years)	0.86	Literature
σ	Risk aversion	2.0	Literature
γ	Consumption weight	0.52	Literature
r	Interest rate	0.03	Literature
ρ	Productivity persistence	0.74	Literature
σ_ϵ	Productivity volatility	0.344	Literature
κ^{gp}	Grandparent childcare time cost	0.1846	Data
p	Formal LTC price	0.55	Data
σ_q	Love shock dispersion	Estimated	Model
ϕ_1	Guilt after childcare	Estimated	Model
ϕ_2	Guilt without childcare	Estimated	Model
$\bar{U}_{NH}$	Nursing home disutility	Estimated	Model

5 Counterfactual Experiments

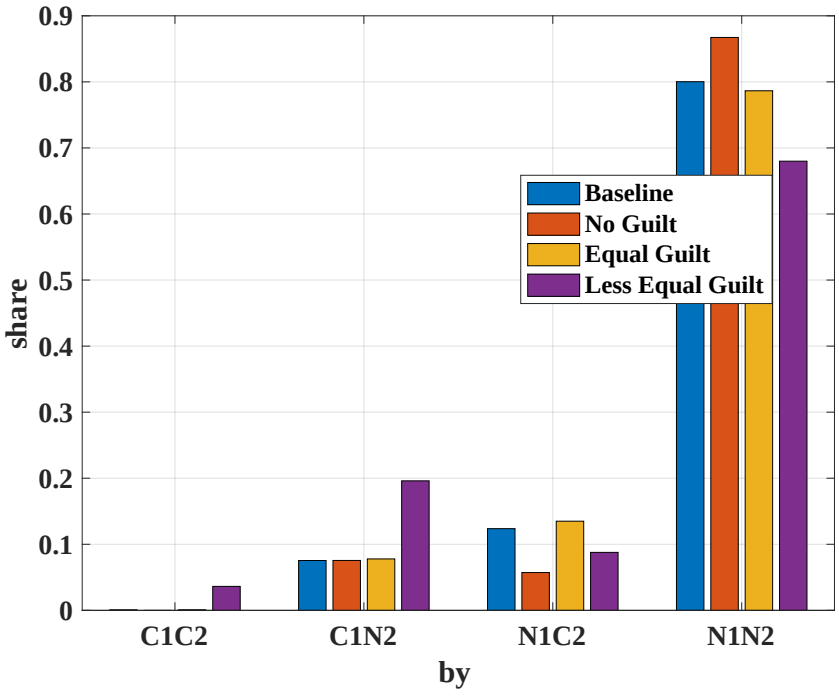
5.1 Role of Guilt

To isolate the role of reciprocal guilt in sustaining intergenerational cooperation, we conduct two counterfactual experiments that modify the guilt channel while holding all other parameters fixed at their baseline values. Both counterfactuals are designed to assess how much of the observed intertemporal reciprocity in time transfers is driven by state-dependent guilt, as opposed to risk sharing or altruism alone.

Counterfactual 1: No Guilt. In the first experiment, we shut down the guilt channel entirely by setting $\phi_1 = \phi_2 = 0$. In this economy, children experience no utility loss from refusing to provide long-term care, regardless of whether parents previously provided childcare. As a result, past cooperation does not affect future incentives through guilt, and any intertemporal linkage between period-1 and period-2 cooperation must operate solely through risk sharing and asset accumulation.

Figure 6 ("No Guilt") shows that eliminating guilt leads to a sharp reallocation of mass across joint cooperation outcomes. The share of households that cooperate in both periods (C_1C_2) declines substantially, while mixed outcome C_1N_2 become more prevalent. Intuitively, without guilt,

Figure 6: Cooperation Shares: Different Guilt Structures



children are willing to accept childcare in period 1 but subsequently opt out of long-term care provision in period 2 when the parent's care needs are realized. This breaks the link between early and late cooperation and collapses the conditional cooperation gap observed in the data.

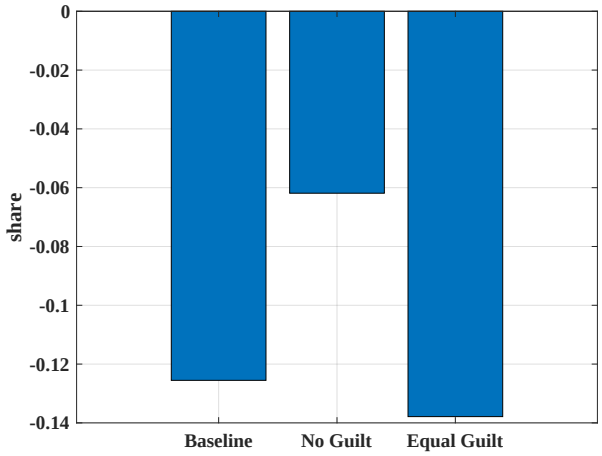
The figure also reveals strong compositional effects. In the absence of guilt, most C_1N_2 outcomes are generated by high-productivity children who are willing to cooperate early to smooth consumption but later refuse to provide care when the opportunity cost of time is high.

Counterfactual 2: Equal Guilt. In the second experiment, we impose *equal guilt* by setting $\phi_1 = \phi_2 = \bar{\phi}$, where $\bar{\phi}$ equals the average guilt level in the baseline calibration. This specification preserves an overall aversion to refusing care but removes the *reciprocal* component of guilt: children now feel the same moral cost from refusing long-term care regardless of whether parents provided childcare earlier.

The "Equal Guilt" bars in Figure 6 illustrate that this counterfactual lies between the baseline and the no-guilt economy. Overall cooperation rates remain higher than under no guilt, reflecting the presence of a general moral cost of refusing care. However, the conditional link between period-1 and period-2 cooperation is substantially weakened. In particular, the mass of C_1C_2 households declines relative to the baseline, while N_1C_2 outcomes increase.

Figure 7 shows that equalizing guilt sharply reduces the conditional cooperation gap, $\Pr(C_2 \mid$

Figure 7: Conditional Transfer Gap: Role of Guilt



$C_1) - \Pr(C_2 \mid N_1)$. This result highlights that it is not guilt per se, but rather the *state dependence* of guilt on past childcare provision, that is crucial for generating the observed strong reciprocity in the data.

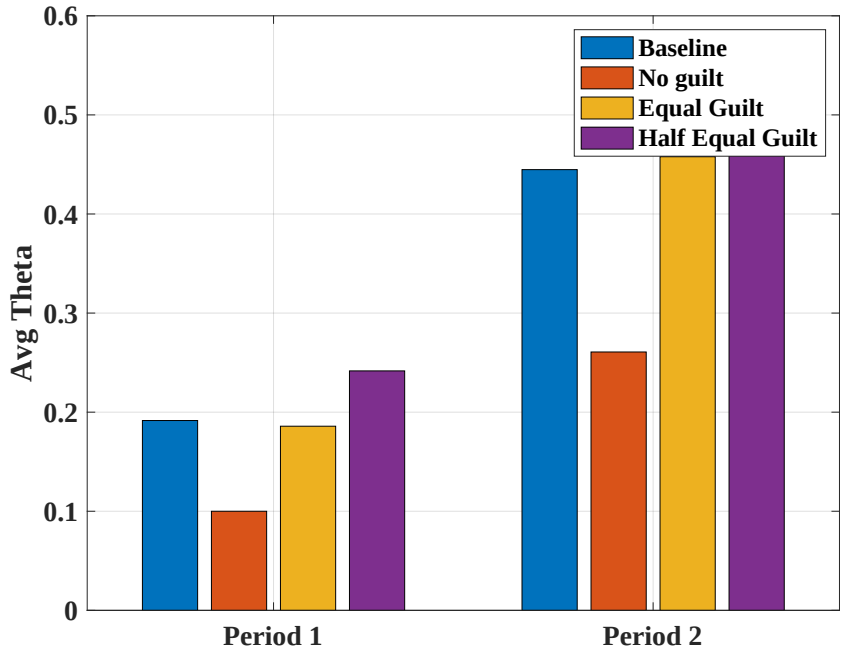
Bargaining weights and intuition. Figure 8 further clarifies the mechanism by showing how average bargaining weights evolve across counterfactuals. In the baseline economy, parents who provided childcare enter period 2 with higher bargaining weights, reinforcing cooperation through both guilt and redistribution. Under no guilt, bargaining weights shift sharply toward parents in period 1. As parents lack an enforcement mechanism to sustain cooperation, they require higher bargaining weights to cooperate with their adult children. The equal-guilt case partially restores children's bargaining power in period 1 but fails to recreate the asymmetric incentives generated by reciprocal guilt.

Taken together, these counterfactuals demonstrate that reciprocal guilt plays a central role in sustaining intergenerational cooperation. While altruism and risk sharing can rationalize some cooperation in isolation, they are insufficient to generate the strong conditional relationship between childcare provision and later long-term care observed in the data.

5.2 Role of Policy

To be completed

Figure 8: Cooperation Weights: Role of Guilt



6 Conclusion

To be completed

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