

# Essays on Intergenerational Transfers and Living Arrangements

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**Abstract**

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Intergenerational relationships are playing an increasingly important role in today's family life. In this study, I utilize the data from the Health and Retirement Study (HRS) to explore the linkage between children's residences and their relationships with their parents. I first show that children in closer proximity to their parents are more likely to receive financial transfers from parents, and the differences of the proximity's effect suggest that parents financial transfers are at least in part to compensate for children's future care provisions. I then present a theoretical framework to analyze adult children's residential decisions in relation to the distance of parents residences. The model highlights the tradeoff for the children of being closer to the parents for the lower cost of providing care and having easier access to assist parents versus being closer to his or her desired location of residence that provides better amenities or services. The empirical analysis supports the prediction from the theoretical model: children with lower income, who are less educated, or are not working full-time, tend to live closer to the parents, whether comparing children across families or within a family. The results also demonstrate that living arrangements are closely linked to family caregiving arrangements as gender, sibship size, and sibling's residence all play a role in a child's residential decision. Lastly, I examine the Great Recession's impacts on

living arrangements and care access for elderly parents and find that for average families, little has changed in terms of their proximity to their children or the gender disparity of care assignment. However, families whose mother was living under the poverty line saw increases in the number of children living in close proximity. Further analysis shows that the changes in living arrangements during the recession are strongly associated with the changes of children's financial situations, but its relationship with parent's conditions are mixed. By presenting the theoretical framework and empirical results about family living and caregiving arrangements, this study helps bridge the gap between the two lines of literature and provides a more integrated view of the intergenerational relationships for the elderly parents.

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## DEDICATION

To Yunpu Chin, my wife, my comrade, and my better half

To Sean and Caleb Fu, my sons and my inspiration

To Ming-ren Fu and Yu-yun Pan, my parents and my foundation

## INTRODUCTION

As life expectancy increases, intergenerational relationships are playing an increasingly important role in today's family life. For older parents, the care provided by adult children remains an important source of support as independent living becomes the norm and the desired option for most seniors according to the 2014 United States Aging Survey by the National Council on Aging. The aspect of intergenerational relationships that generates significant interest among economists is the extent of exchange between parent's financial assistance and children's care, partly because it has implications on the policy design to support the elderly and their caregivers. Another line of research on the dynamics between generations focuses on the timing of young adults household formation and, until recently, the distance between parent and child's residences. However, rarely have we seen these two aspects of intergenerational relationships being examined in depth together, despite the connection between a child's residence and his or her relationship with the parents.

In this study, I utilize the household panel data from the Health and Retirement Study (HRS) to explore the linkage between children's residences and their relationships with their parents. The HRS provides unusually rich information about family transfers for elderly parents over the age of 50. In this study, I take advantage of the family panel data and test how children's residential distance may play a role in shaping parents decisions about making financial transfers, and in turn how children's choice of residence may be affected by their income and parents transfers. By presenting the theoretical framework and empirical results about family living and caregiving arrangements, this study helps bridge the gap between the two lines of literature and provides a more integrated view of the intergenerational relationships for the elderly parents.

In the first chapter, I examine the dependence of parents inter-vivos transfers on children's residential distance in the context of caregiving expectations. Informal care by adult children remains an important support for frail seniors, yet it is unclear whether this costly service is balanced by parents' financial transfers. Using fixed-effect models controlling for family and individual heterogeneity, I show that children in closer proximity to their parents are more likely to receive transfers on both the intensive and extensive margins. A closer examination of the interaction effects suggests that the difference of the proximity's impact on parents transfers comes from the differences in children's likelihood to provide care. The proximity effect is only prominent among children who are likely to provide care when they live in close proximity. These differences suggest that parents financial transfers to children are at least in part to compensate for children's future care provisions.

In chapter two, I present a theoretical framework to analyze adult children's residential decisions in relation to the distance of parents residences. Incorporating the empirical results shown in chapter one, here I demonstrate the tradeoff for the children of being closer to the parents for the lower cost of providing care and having easier access to parents' assistance versus being closer to his or her desired location of residence that provides better amenities or services. Since parents' financial transfer is a more important source of financial support for children with lower income, the model predicts that children who are more financially strapped would live closer to their parents.

The empirical analysis supports the prediction from the theoretical model: children with lower income, who are less educated, or are not working full-time, tend to live closer to the parents, whether comparing children across families or within a family. In addition, the results suggest that living arrangements are closely linked to caregiving expectations. Biological daughters are mostly likely to live closest to the mother among the adult children even after controlling for their income and education. Moreover, when a child has a sister living near the mother, his or her likelihood to live with or close to the parents is lower than

those who have a brother living near the mother. The dependency of a child's residential decision on sibling's residence demonstrates that living arrangements are a family decision, and the decision is closely linked to the family's arrangement of how to care for the parents.

In the last chapter, I examine the Great Recession's impacts on living arrangements and care access for elderly parents. Substantial job losses during the 2007-2009 recession have delayed young adults household formation and changed married couples relative contributions between paid and unpaid work, but it is unclear whether it has changed older parents access to care (Dunne 2012, Berik & Kongar 2013, Cherlin et al. 2013). Using the 2002-2010 data from the HRS, I show that for average families, little has changed in terms of older parents proximity to their children. However, families whose mother was living under the poverty line saw a slight increase in the number of children living within ten miles and a sharp increase in the number of co-resident children. None of the trends were similar to their non-poor counterparts. Further analysis using fixed-effect models shows that the changes in living arrangements during the recession are mostly associated with the changes of children's financial situations, such as losing their full-time work, but are less so with parents conditions, such as changes in health or wealth. The economic hardship also has not contributed to the gender equality in care provision. While the job losses had disproportionately gone to men, the increases in caregiving children among the poor families almost entirely came from the increases in the number of caregiving daughters instead of sons. These results demonstrate the persistency of family living and caregiving arrangements for average families, despite the magnitude of the 2007-2009 recession. However, the results also highlight the need for the public sector to pay attention to the caregivers of poor families as they may find it difficult to balance their work and family responsibilities with decreasing financial support from their parents as well as the government.

# Chapter I

## Proximity, Informal Care, and Inter-vivos Transfer

Evidence from the Health and Retirement Study

### 1 Introduction

Informal care, the unpaid care provided by relatives and friends, remains a critical source of support for frail parents. The National Alliance for Caregiving (2009) estimated that close to one in five adults in the U.S. were providing unpaid care to someone who is age 50 or older. With the increasing life expectancy and aging population in the U.S., providing or making arrangements for parent care is becoming a common experience among adult children today.

However, taking up such tasks are stressful and costly, as caregivers often struggle to balance their working and family lives with limited training and information (Arno, Levine, and Memmott 1999; Ettner 1996; Latif 2006; National Alliance for Caregiving 2009; Spillman and Pezzin 2000; Van Houtven, Coe, and Skira 2010). Policy makers have long been debating the role of the public sector in supporting family caregivers, but they struggle to come up with cost-effective solutions among a plethora of options such as wage compensation, training, counseling, or respite care. Designing an effective policy first requires an understanding of the intergenerational relationship at the micro level, so the support from the public sector complements, instead of replaces, existing family support.

In this paper, I focus on the relationship between parents' inter-vivos transfers to their adult

children and children's care for their frail parents. The lack of strong empirical support for this type of intergenerational exchange is puzzling, as family models, regardless if parents are altruistic or only interested in securing old-age support, often predict that they will make more financial transfers to a caregiving child than the child's non-caregiving siblings (Barro 1974; Becker 1974; Bernheim, Shleifer, and Summers 1985; Cox 1987; Victorio and Arnott 1993).

I argue that this disagreement is the result of differences in life-cycle timings between parents' financial transfers and children's services. Parents make most inter-vivos transfers to their adult children in their 50s, as this is the time when their children are early stages of household formation and parents are at the peak of their earnings (Lee 1994). The downward flow of financial transfers dwindles as both adult children and parents age, and as a result, tests on *contemporaneous* exchanges between parent's financial transfer and adult child's care often appear to be weak or inclusive.

My approach to answer this puzzle emphasizes the role of a parent's expectation of making financial transfers, as such quid pro quo exchange should be analyzed in two stages of family life instead of as simultaneous decisions. If parents are indeed making advance payments to finance their children's future services, they need to determine their child's likelihood to provide care in the future. A child's current residential proximity is a strong indication about his or her future likelihood to provide care. Thus, if parents are making transfers in exchange of or to compensate for a child's future services, there should be a relationship between a parent's financial transfers and a child's residential proximity.

There are three main challenges in testing the proximity's effect on a parent's inter-vivos transfer. First, the heterogeneity in families and individuals can bias the relationship in unexpected directions. To rule out effects such as socioeconomic status, ethnicity, or relationships with the parent, I use logistic models with family or individual fixed effects. Secondly, the categories of residential distances reported in the data may introduce measurement errors.

To check the result's robustness, I constructed proximity rankings as an alternative measure for intergenerational proximity. Lastly, the estimated relationship between financial transfer and proximity may come from factors other than a child's likelihood to provide care. To address the concern of endogeneity, I use difference-in-difference estimators to tease out the pathways of the proximity's influence. If the proximity effect comes from its influence on provision of future care, this effect should differ for candidates with different caregiving likelihoods.

Results show that a child's close proximity has robust, positive effects on a parent's decision to make a financial transfer. Children who live nearby consistently receive more financial transfers both on the intensive and extensive margins. However, the proximity effect is only prominent among likely caregivers, which is consistent with the hypothesis that the main driver for the proximity effect is the increased likelihood to provide care when the child is in close proximity.

These results help explain the lack of intergenerational exchanges observed in the literature despite strong theoretical predictions. I find that most parents make their financial transfers before they require children's assistance; however, these financial transfers are linked to a child's likelihood to provide care in the future, which supports the existence of intergenerational exchange. This paper also contributes to the literature by incorporating family living arrangements in the context of intergenerational exchanges. Despite studies like that of Boaz, Hu, and Ye (1999), the interdependency between caregiving, financial transfer, and living arrangements has received little attention. By providing a framework and empirical evidence of the relationship between proximity and intergenerational exchange, this paper provides a more in-depth examination on the role of family living arrangements in intergenerational relationships.

For policy makers, the findings suggest that parents are already financially compensating their caregiving child. It does not disregard the role of cash or tax programs in supporting

family caregivers, as the opportunity costs of care provision remain significant (Arno, Levine, and Memmott 1999; Latif 2006; Van Houtven, Coe, and Skira 2010). However, services such as training, counseling, and temporary adult day care can be more cost effective when policy makers have to prioritize the use of their limited resources.

This paper is organized by first providing a review of the literature on intergenerational transfer in Section 2, followed by the theoretical framework in Section 3 to explain the role of proximity in the context of caregiving. Sections 4 and 5 describe the empirical models and data that are used to establish the links between proximity, caregiving, and inter-vivos transfer. Section 6 presents the results, and Section 7 summarizes the study and briefly discusses its implications.

## 2 Relevant Literature

Economists have a long history in studying the exchange of transfers that seemingly occurs between parent and child. At the macro level, private financial transfers flow overwhelmingly downstream from parents to their children or grandchildren. Lee (1994) found that young households make almost no transfers at all but receive net payments close to a thousand dollars a year from parents. Similarly in my pooled sample from HRS, 15.9% of children had received transfers from parents in the past two years, while less than 3% of them had made contributions to parents. Meanwhile, the only, economically important type of upstream transfers comes from adult children’s care of their frail parents (Arrondel and Masson 2006). Informal care is ever more important today, as people’s longevity continues to increase and the “boomer” generation starts entering retirement. Despite the increasing prevalence of long-term care services, family members remain the largest source of help for frail seniors (Arno, Levine, and Memmott 1999). This demographic shift has prompted researchers to renew interest in the dual streams of transfers between generations. Differences in intergenerational

behaviors would lead to vastly different distributional predictions when the public sector intervenes in the issue (Barro 1974; Becker 1974; Cox 1987).

Economists commonly model the parent's decision to give financial gifts to their children in two ways. The exchange theory predicts that parents use financial gifts to secure their old age support from a child, while parents with altruistic motives use transfers to compensate a child's costs incurred from providing care. Regardless of their motives, both models predict that parents make more transfers to a caregiving child than the non-caregiving ones. Empirical evidence, however, has not been consistently supporting this prediction (Arrondel and Masson 2006; Brown 2006; Dunn and Phillips 1997; Laferrère and Wolff 2006; McGarry and Schoeni 1995, 1997).

One reason for the mixed results is the difference in measuring the financial transfers from the parent. While the literature on intergenerational transfer started with the focus on bequests, this paper will instead use inter-vivos transfer for several reasons. First, evidence suggests that bequests are often accidental and thus not necessarily linked to a child's behavior (Hurd 2003; Laitner and Sonnega 2012). Inter-vivos transfer also has lower transaction costs than bequest and is easier to distribute discreetly among children (Norton and Houtven 2006). However, the link between inter-vivos transfers and caregiving is not sufficiently studied, as few household surveys record both parents' financial transfers and children's services.

Prior empirical tests have used income or wealth as proxies for a parent's inter-vivos transfers. Altonji, Hayashi, and Kotlikoff (2000) used the 1988 wave of PSID and found that a parent's income or wealth does not increase the time transfers from the child, and their caregiving was not complemented by money flows from their parents. McGarry (1998) uses the first wave of the AHEAD survey and finds a negative relationship between a parent's wealth and the probability of receiving care. Since wealth is an imperfect measure for financial transfer, some cross-sectional studies have used survey data that directly asked questions on financial transfers and care services, but the results remain mixed. For example, Henretta

et al. (1997) also used the first wave of the AHEAD study and found that the children who have received financial help from parents in the past ten years are more likely to be the caregivers. McGarry and Schoeni (1997) used the same data but found that current caregiving children are no more likely to receive financial transfers in the same time period than their non-caregiving siblings.

Only until recently have researchers begun to use longitudinal data to test family transfers. Norton and Houtven (2006) used two waves of AHEAD data and found that caregivers are more likely to receive financial transfers from parents. A newer study by Norton, Nicholas, and Huang (2013) used two waves of data from the National Longitudinal Survey of Mature Women. It concluded that being a caregiver increases the probability for the child to receive financial transfers but has no impact on the amount of transfers. While these two studies provide some support for the exchange between parent and child, the empirical relationships are not as robust as what could be expected from the theories. Part of the reason for the weak empirical relationship comes from the timing of the exchange. The data captures only the transfers that occurred within a two- to four-year period. If a parent makes transfers to the prospective caregiving child well before the need for care arises, the exchange could not be observed, and as a result, a weak or even nonexistent empirical relationship can be concluded.

Previous studies have hinted this inter-temporal dimension of family transfers. For example, the aforementioned study by Henretta et al. (1997) suggests that children who have received *prior* transfers are more likely to be caregivers. However, if parents indeed transfer money to a future caregiving child, a question would need to be addressed: how should a parent pick or predict the prospective caregiver among his or her children? In the next section, I argue that the residential distance between parent and child is one of the indicators for parents to determine their likely caregiver. Consequently, when parents are compensating or exchanging a child's service in the future, they should distribute the financial transfers

based on today's living arrangements.

### 3 Theoretical Framework

The decision to provide financial help to a child should be contextualized in family living arrangements and the life stages of each members. Parents often make transfers to a child well before they need the child's service. Fig. 1 shows that financial gift-giving from parents peaks when the mother is around age 45-60; at this stage, most don't need services from children yet. If they are making financial transfers with the idea of compensating a child's care in the future, parents have to be able to determine a child's likelihood to provide care when they become frail. Among other factors, I argue that a child's residential proximity is a useful determinant of how likely this child will provide care in the future. As a result, the type of inter-vivos transfers that compensates the child's future care be closely linked to his or her current geographical proximity.

We can analyze intergenerational transfer as a two-stage game where children make their locational choices and parents decide their levels of financial assistance in the first stage. The second stage occurs when parents become frail and in need of the children's assistance with completing daily activities. In addition to Fig. 1, analyzing this quid pro quo exchange between a parent's inter-vivos transfer and the child's service as a two-stage process is justified based on two observations.

First, adult children often face the problem of credit constraints long before they need to face the issue of caregiving for their parents. The down payments, mortgages, and costs of education for their kids all put tremendous pressure on adult children's finances when their careers are young. On the other hand, the parents in their 50s or 60s are at the peak of their earnings. During this stage, they are in better positions to help their children financially than

later on when they become frail and face the prospect of paying medical bills with dwindling savings. The difference in timing for this exchange implies that one should consider how factors in the second stage have implications for the first stage.

**Stage II: Caregiving** When a parent becomes frail and needs assistance completing daily activities, his or her children need to decide how to arrange care with other family members. The children are assumed to be altruistic of the parent's wellbeing and thus care about the total amount of support that the parent will receive. However, the children are subjected to their time constraints, which are divided by working, private consumption, and their contributions to the parent's care. Each child's problem is thus to decide their individual levels of consumption between private and public goods.

This study focuses on one particular factor that would affect this decision: the geographical distance between a child and parent. Close proximity is the prerequisite for providing care. All else being equal, the child who lives closer to the parents has lower cost of providing care than his or her siblings that live farther away. As a result, the child in closest proximity to the parent would then be in a weaker bargaining position relative to the siblings in this game of voluntary contribution. With insights from the analyses by Pezzin, Pollak, and Schone (2007) and Brown (2006), we can expect that, as long as children are altruistic enough to the parent's care needs, the one in the closest proximity is most likely the one to take on the role of caregiver in this stage.

**Stage I: Location and Transfer Decision** When adult children are 18-30 years old, they make locational choices based on various reasons like job prospects, affinity to a particular region, spouse's preference, etc. In this study, these reasons are assumed to be exogenous to the decision of caregiving. After the children have decided which neighborhood to live, their parent decides whether to give financial help to the children, and the goal is to secure

old-age support from children in the second stage of life.

While either a parent or child can relocate to be closer to each other when the need for care arises, such moves are costly. Literature on residential mobility often observes the *cumulative inertia* in which the likelihood of a household to stay in the area increases as the duration of prior residence increases (McGinnis 1968). For example, Belot and Ermisch (2009) found that the more rooted a household is in a local area, the harder it is for them to leave these social ties behind. Thus long-distance relocations could be prohibitively costly for people with a long history in a neighborhood. As a result, when a parent wants to use financial transfer to either compensate or incentivize a child's service in the second stage, he or she will prefer the child in closer proximity to the current residence, as it avoids the financial and psychological costs of relocation.

Assuming the parent's dividable assets and income are exogenous, the parent's decision in this stage is whether to make financial transfers to each of the children. The results can be extended from the model of estate division analyzed in Brown (2006). Since the parent's main objective is to ensure support in the second stage of life, transfers will only be made to those who will make positive contributions to care. The financial assistance will help relax the caregiver's financial constraint and thus enable the caregiving child to provide more care. Since those in closer proximity are the likely candidates for caregiving, it can thus be expected the parent makes transfers to those who are living closer.

Living arrangements and caregiving decisions are no doubt complex choices that involve a multitude of other participants and factors, and parents also make inter-vivos transfers for more reasons than are considered in this paper. However, if compensating a child's future service is indeed a factor in the parent's decision, and there are enough parents using proximity as an indicator for future care giving, we can expect to see a positive correlation between close proximity and inter-vivos transfer. I refer to this proximity's effect on a parent's decision to make inter-vivos transfer as the *proximity effect* hereafter.

## 4 Empirical Approach

The conceptual framework can be summarized in the following three expressions. First, a parent's decision to make transfers ( $T_{i,t}$ ) depends on current and expected care provision from the child ( $c_{i,t}$ ):

$$\begin{aligned} T_{i,t} &= f(E_t(c_{i,t+1}), c_{i,t}) \\ &= \gamma_1 \cdot E_t(c_{i,t+1}) + \gamma_2 \cdot c_{i,t} ; \quad \gamma_1 \geq 0; \gamma_2 \geq 0 \end{aligned} \tag{1}$$

where the child is indexed by  $i$  and the time period by  $t$ .  $E_t$  denotes the expectation at the time period. Both coefficients are expected to be positive.

The second expression summarized the relationship between care giving and proximity. Since care provision requires close proximity between the caregiver and recipient, a child in closer proximity is more likely to provide care than the siblings who live farther away. It should thus be expected that there is a negative relationship between caregiving and the distance between a parent and the child:

$$c_{i,t} = \beta_0 + \beta_1 d_{i,t} + \epsilon_{i,t} ; \quad \beta_1 \leq 0 \tag{2}$$

where  $d_{i,t}$  denotes the distance and  $\epsilon_{i,t}$  is a random variable.

Lastly, the third expression describes the persistency of residential choices. Studies cited in the previous section have shown that residential choices are persistent. The proximity today thus is predictive of the proximity tomorrow:

$$d_{i,t+1} = \alpha d_{i,t} + \mu_{i,t+1} ; \quad 0 \leq \alpha \leq 1 \tag{3}$$

where the coefficient  $\alpha$  captures the intertemporal persistency for proximity, and  $\mu$  is a

random variable with zero mean.

These three basic assumptions provide the following testable hypotheses:

**H1: Child's Caregiving on Inter-vivos Transfer** To first give attention to the relationship between caregiving and a parent's financial transfer, the persistency of a caregiving arrangement can be expressed by rearranging the previous transfer function from eq. 1 as a function of current care provision.<sup>1</sup>

$$T_{i,t} = \gamma_1(1 - \alpha)\beta_0 + (\gamma_1\alpha + \gamma_2)C_{i,t} - \alpha\gamma_1\epsilon_{i,t} \quad (4)$$

Note that  $\gamma_1$  and  $\gamma_2$  come from eq. 1 which reflects the increase in transfer from parents when a child is providing care now or is expected to provide it next period. The  $\alpha$  parameter comes from eq. 3, which describes the persistency of residential distance. Since expected care depends on expected proximity, and proximity is persistent, care provision will also be persistent. As a result, transfers made from parents to current caregivers include payments not only for the current services, but also for the services in the future. Table 3 will show the regression results for this relationship, and the results will be discussed in Section 6. Based on previous assumptions, the relationship between current care provision and transfer,  $(\widehat{\gamma_1\alpha + \gamma_2})$ , is expected to be positive.

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<sup>1</sup> Eq. 2 can be rearranged as

$$\beta_1 d_{i,t} = C_{i,t} - \beta_0 - \epsilon_{i,t}$$

Then expected care in  $t + 1$  can be expressed by current care provision:

$$\begin{aligned} E_t(c_{i,t+1}) &= \beta_0 + \beta_1 E_t(d_{i,t+1}) && \text{by eq. 2} \\ &= \beta_0 + \alpha\beta_1 d_{i,t} && \text{by eq. 3} \\ &= \beta_0 + \alpha(C_{i,t} - \beta_0 - \epsilon_{i,t}) && \text{by eq. 1} \\ &= (1 - \alpha)\beta_0 + \alpha C_{i,t} - \alpha\epsilon_{i,t} && (5) \end{aligned}$$

Substitute eq. 5 into eq. 1, and eq. 4 can then be derived.

**H2: Proximity's Effects on Inter-vivos Transfer** From previous assumptions, a parent's transfer can then be expressed as a function of a child's current residential distance and care provision<sup>2</sup>:

$$T_{i,t} = \gamma_1\beta_0 + \gamma_1\beta_1\alpha \cdot d_{i,t} + \gamma_2 \cdot c_{i,t} \quad (6)$$

The coefficient for proximity,  $\gamma_1\beta_1\alpha$ , captures the effect of a child's proximity on transfers received from parents, which is referred to in this paper as the proximity effect. Since  $\gamma_1 \geq 0$ ,  $\beta_1 \leq 0$ , and  $\alpha \geq 0$ , I expect the proximity effect to be negative ( $\widehat{\gamma_1\beta_1\alpha} \leq 0$ ). Note that the negative sign comes from  $\beta_1$ , which is the effect of distance on care provision, but its impact on transfer is dampened by  $\alpha$ , the persistence of proximity between time periods (see eq. 3). In other words, the proximity's effect on transfer depends on the parent's expectation of a child's future care provision, and the expectation comes from the persistency of a child's location choices. The test for proximity effect will be presented in Table 4.

**H3: Interaction Effects** If the proximity's impact comes from its influence on future care provision, this effect should differ for candidates with different caregiving likelihoods. For example, empirical studies have found female children to be more likely to take on parental care than their male siblings (Szinovacz and Davey 2007). Consider the case when both female and male children move closer to their parents, the increase in the likelihood to become a caregiver should be more substantial for the female child than her male sibling. Thus, the increase in her probability to receive transfers due to her now closer proximity should be higher than her brother with the same relocation, who has moved closer but still is unlikely to provide care. The differences in the proximity effects based on child characteristics

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$$\begin{aligned} T_{i,t} &= \gamma_1 \cdot E_t(c_{i,t+1}) + \gamma_2 \cdot c_{i,t} \\ &= \gamma_1(\beta_0 + \beta_1 \cdot E_t(d_{i,t+1})) + \gamma_2 \cdot c_{i,t} && \text{by eq. 2} \\ &= \gamma_1\beta_0 + \gamma_1\beta_1\alpha \cdot d_{i,t} + \gamma_2 \cdot c_{i,t} && \text{by eq. 3} \end{aligned}$$

are captured here by the interaction effect.

The general expression for the interaction effect can be expressed as

$$T_{i,t} = \gamma_1\beta_0 + \gamma_1\beta_2 \cdot g_i + \gamma_1\alpha(\beta_1 + \beta_3g_i) \cdot d_{i,t} + \gamma_2 \cdot c_{i,t} \quad (7)$$

where  $g_i$  is a dummy variable indicating the child characteristic that could potentially interact with the coefficient for the proximity variable<sup>3</sup>.

The main difference between eq. 6 and 7 is the proximity effect when  $g_i = 1$ . To continue the example, let  $g_i$  denote whether the child is female. The proximity effect for a daughter will then become  $\gamma_1\alpha(\beta_1 + \beta_3g_i)$ , while the proximity effect will only be  $\gamma_1\alpha\beta_1$  for a son. The difference-in-difference is thus captured by the estimates of  $(\gamma_1\alpha\beta_3)$ , which is expected to be negative given that a daughter moving closer indicates a greater increase in expected care received for the parent than a son moving to a close proximity.

It is outside the scope of the paper to address the issue of how parents and children come to decide the caregiving arrangements. Instead, this paper focuses on testing whether parents will make more financial transfers to children who are living closer, and whether this relationship comes from the implied service in the future when a child is living in close proximity

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<sup>3</sup> To obtain eq. 7, first modify the care function in eq. 2 to include a variable that could interact with the proximity's effect on care provision:

$$\begin{aligned} C_{i,t} &= \beta_0 + \beta_1d_{i,t} + \beta_2g_i + \beta_3g_id_{i,t} + \epsilon_{i,t} \\ \beta_1 &\leq 0, \beta_2 \geq 0, \beta_3 \leq 0 \end{aligned} \quad (8)$$

In the example,  $g_i = 1$  indicates child  $i$  is female. The gender difference in providing care is captured by the positive  $\beta_2$ , and the negative effect of long distance on a child's ability to provide care is captured by the negative sign for  $\beta_1$ . However, the total impact of proximity on care provision *for female children* is modified by  $\beta_3$ , which is the differences in the differences of proximity effects between male and female children. Assuming the increases in the likelihood to provide care when a child moves closer is higher for female than male children, I expect  $\beta_3$  to be negative.

Substitute eq. 8 into 1, and eq 7 can then be derived:

$$\begin{aligned} T_{i,t} &= \gamma_1(\beta_0 + \beta_1E_t(d_{i,t+1}) + \beta_2g_i + \beta_3g_iE_t(d_{i,t+1})) + \gamma_2c_{i,t} \\ &= \gamma_1\beta_0 + \gamma_1\beta_2 \cdot g_i + \gamma_1\alpha(\beta_1 + \beta_3g_i) \cdot d_{i,t} + \gamma_2 \cdot c_{i,t} \end{aligned}$$

to the parents. If the proximity effect indeed comes from its implication on future caregiving, the effect will be more prominent for likely candidates of care than children who are unlikely to provide care regardless of proximity.

## 4.1 Econometric Models

The baseline model to estimate the probability of receiving transfers from parents uses logit with robust standard errors clustered by family. To deal with endogeneity, I adopt three separate approaches that includes family fixed effects, individual random effects, and instrument variables for a child’s care provision.

The family fixed effect will control for any time-invariant family variables that are omitted and correlated with informal care and proximity. This model will take away the influence from factors that are common in the family and compare only the differences between siblings. To deal with heterogeneity that comes from the individual traits, I adopt individual fixed effect. Results from individual fixed effect models are often noisier due to the much smaller sample size from the lack of variation in the dependent variables and key explanatory variables. However, it provides a robustness check for other models and helps reveal the possible link between proximity, care, and transfers for each child. Lastly, to further address the biases from endogeneity between care and transfer, I use two variables similar to those in the study by Norton, Nicholas, and Huang (2013) – the number of sisters and the child’s birth order– to instrument for a child’s care provision in estimating eq. 4. These instrument variables are chosen because they were realized long before the family’s decision on care provision and financial transfers. Since the dependent variable is dichotomous, two stage residual inclusion (2SRI) is used to produce consistent estimates (Terza, Basu, and Rathouz 2008), and the standard error is bootstrapped with 300 repetitions.

## 5 Data

This study utilizes data from the RAND-modified version of the Health and Retirement Study (HRS). The HRS is a nationally representative, biennial household survey of Americans over the age of 50 and their family members, regardless of age. It has provided longitudinal data for approximately 26,000 individuals since 1992, with the most recent data being collected in 2012. This study analyzed the sample from waves 1998 through 2010, a total of 7 waves of the panel data. Not all waves are used in every analysis, as some variables were either not recorded or incompatible with other waves.

Each observation from the pooled panel data is a mother-child dyad interviewed in a given wave. Because of women's greater longevity and the age gap between men and women in a marriage, men are more likely than women to have spouse as the caregiver (Szinovacz and Davey 2008). As a result, most caregiving children are assisting their mothers instead of fathers (National Alliance for Caregiving 2009). I restricted the sample to households with at least two living children to capture variations within a family. I further exclude children younger than 18 years old or mothers younger than 45 years old, as the goal is to study the relationship between adult children and their parents. I use alternative sample restrictions for sensitivity testing, including raising the age thresholds for adult children and mothers to 25 and 70 respectively. The number of observations vary across estimations due to the differences in missing values among specifications, and models such as family or individual (child) fixed effects tend to significantly reduce the sample size. In the baseline logit estimation in Table 4, the sample has 165,370 observations with 11,640 unique households and a total of 41,668 children-mother pairs. Not all respondents participated in every wave, and there were 23,624 mother-child pairs in each wave on average.

## 5.1 Dependent Variable

In the survey, parents were asked if they had given \$500 or more to any of their children during the prior two years, and if they did, the HRS then asks for the specific amount. Respondents can give either exact values or bracketed answers, from which the RAND imputed the continuous amounts. Two dependent variables are thus used to capture parent's transfer to a child: an indicator variable of whether the mother has given her child financial help totaling \$500 or more in the past two years, and the amount of total transfers to this child. The financial help was defined to include support, gifts, or loans such as "giving money, helping pay bills, or covering specific types of costs such as those for medical care, insurance, schooling, down payment for a home, rent, etc." In the pooled sample, 15.9% of the children have received financial transfers from their parents in the past two years (See Table 1). On average, the child received about \$1,099, but this figure is heavily skewed, as the majority of children didn't received any transfer. Conditioned on those who have received financial help, the child received an average total of \$6,628 from parents over the two-year period.

## 5.2 Key Independent Variable

The first explanatory variables of interests is whether a child has provided any informal care since the last wave. The indicator for caregiving is 1 if the child had provided any assistance to the mother's activities of daily living (ADL) or instrumental ADLs, or was identified by the mother as a helper. Overall, 3.4% of children in the pooled sample provided care to their mothers. From the parent's perspective, on average, 8.7% of mothers have been helped by at least one child in a given wave (See Table 2). Among those who have received care, 70.9% of them have a single caregiver.

This paper uses two variables to measure the proximity between a mother and her child. For the majority of the paper, the proximity is measured by three categories describing

the distance between a mother and the child's residence: coresidence, within ten miles, or more than ten miles. In the pooled sample, about 8.4% of the children live with their mother, 30.2% live within ten miles from her, and 61.5% live more than ten miles away. The distribution does not differ much across waves.

The second measure of proximity ranks the proximity for each child in a family. In the survey, in addition to identifying non-resident children who live within ten miles, mothers were also asked about whom among her children lives closest. Based on this information, I derived the relative rank of a child's distance to the mother among all the children in the family. In this measure, the closest child, whether he or she is living with the mother or on his or her own, is assigned the value of 1, and the second-closest child, regardless of distance, is assigned the value of 2, and so forth. If two children were in the same distance category and their parents did not distinguish their relative proximity, each will be assigned the average rank. For example, suppose in a family of four children, child (a) and (b) both live within ten miles of the mother, and child (b) is the closest; also, her two other children (c) and (d) are living ten miles away but the mother didn't indicate who lives closer. The rank for this mother's four children will be 1 for child (b), 2 for child (a), and 3.5 for child (c) and (d).

Rank of proximity circumvents the issue of arbitrary boundaries of distance categories. If parents make the decision of transfer based on a child's likelihood to provide care, using the ranking can help us observe the differences among children in receiving transfers when they have different residential distances to the parent.

### **5.3 Other Control Variables**

While the main interest is the exchange between downstream financial transfer from parents and upstream time transfer from children, other types of transfer can also take place and

affect the resources for both parties. To account for their possible effects, I include two indicators for such transfers: 1) whether the child has provided any financial transfer to the mother and 2) whether the mother has helped the child by taking care of a grandchild. In the pooled sample, only 2.6% of children have made financial transfers to their parents, while 11.9% of children had their parents help to care for their grandchild.

At the family level, I include age and a health indicator to control for the mother's need for care. The average age of the mother in the pooled sample is 68.3, and about 8.7% of them self-reported to be in poor health. Since the long-term care needs of married couples are most often met by their spouses, the model controlled for whether the mother is in a couple household, and about 59.6% of them are either married, partnered, or lived in a household with more than one respondent. On average, one in four children in a given wave has a mother who is still working, so I include the logged income and wealth to control for a mother's ability to make financial gifts to children.

At the child level, this study accounts for key demographic and socioeconomic variables including age, gender, education, working status, and biological relationship to the parent. The majority of children in the sample, 89.2%, are the respondent's biological children. On average, the children are in their early 40s, and close to half of them are female. Most of them have completed high school or its equivalent, and 73% of them were working full-time.

## 6 Results

### 6.1 Test on H1: Care and Inter-vivos Transfer

Before we examine the proximity effect, I will first show the relationship between caregiving and inter-vivos transfer, as it is typically tested in the literature. Results here will show the

dependence of a parent’s decision to provide financial help on a child’s care provision to the parents. Table 3 estimates eq. 4 and provides a baseline comparison for the discussion on the proximity effects. Over a 2-year period, close to 16% of children receive financial transfers from parents, and the odds for a caregiving child to receive inter-vivos transfer is about 20 percent higher than non-caregiving siblings.

Table 3 lists three other models utilizing family fixed effects (2), individual fixed effects (3), and instrument variables (4) respectively as robustness checks. The relationship between caregiving and transfer is sensitive to model specifications. The differences in the result may be in part due to the lack of variation in outcome variables among families or individuals, as they dropped out of the sample in fixed-effect models. The weak positive relationship between care and transfer is consistent with the previously stated assumptions. When parents make transfers well before they are in need of care, only weak relationships between informal care and financial transfer are observed during the same time period.

## 6.2 Test on H2: Care, Transfer, and Proximity

Table 4 describes the dependence of a parent’s decision to make transfer on a child’s care provision and residential proximity. It estimates eq. 6, and the first row of Table 4 shows the estimated coefficient for current care provision that is expected to be positive ( $\hat{\gamma}_2 \geq 0$ ). The second and third rows together show whether longer distance is associated with a lower probability of receiving parent’s transfers (i.e.  $\widehat{\gamma_1\beta_1\alpha}$ ). These estimates are in comparison to the coresident child.

The relationship between caregiving and financial transfer remains weak and sensitive to model specification; on the other hand, the impact of living arrangements on transfer is much more robust across specifications. In the baseline logistic model, living more than ten miles away from a parent consistently reduces a child’s chances of receiving financial transfers,

while the difference between a coresident and a nearby child is statistically indistinguishable. Estimates using only the variations within a family produce similar results for children who live more than ten miles away: they are less likely to receive financial help than their siblings who are in closer proximity to the mother. Column 3 compares only the variations from an individual across time, and closer proximity does not appear to increase the child's probability of receiving transfers from parents. Another notable result is that both fixed effects models show higher likelihoods in receiving transfers from parents for children who are living closer (within ten miles) than those who live with the parents. However, Table 4 focuses only on the probability of transfer, so while proximity may not increase the frequency of receiving transfers, it may increase the *amount* that they receive each time; Table 5 thus examines the effect of proximity on the intensive margin. Nevertheless, the results from the baseline logistic model are consistent with those with family fixed effects: first, living far away is associated with a decreased likelihood to receive transfer; secondly, whether a child is *currently* providing care is only weakly correlated with the parent's decision to make a transfer.

Table 5 changes the dependent variable to the amount of transfer, and the results are largely consistent with the previous table. A child's care provision is not a significant factor in affecting the amount of financial transfer he or she might receive. On average, caregivers even receive slightly less than non-caregivers, albeit the difference is statistically insignificant. This result is consistent with Norton, Nicholas, and Huang (2013), who found that caregiving is positively correlated with inter-vivos transfer on the extensive margin but not on the intensive margin. On the other hand, proximity continues to play an important role in determining the amount of transfer received, but the pattern differs from the previous tables. Unlike the results from Tables 3 and 4, which examine the extensive margin of receiving transfer, here, a coresident child has a clear lead over a non-resident child in the total amount received over a 2-year period, while the differences between those who live within or more than ten miles is not statistically significant (The p-value for the difference of these two groups being zero

is 0.1197 and 0.7757 for models 1 and 2, respectively).

Models 1 and 2 both use ordinary least squares with robust standard errors clustered at the family level, but Model 2 is conditioned to the children who have received transfers. On average, a non-resident child who lives within ten miles receives \$324.6 less than a sibling who lives with the parent. Conditioned on those receiving at least one transfer in the past two years, the gap between these two groups widened to \$1171.5. Controlling family fixed effect reveals a clearer pattern for the effect of proximity on the amount received from parents. A coresident child still on average receives more than non-residents, but in this study, children living in close proximity receive more than those who live more than ten miles away. (The p-value for the difference between living within ten miles and more than ten miles being zero is 0.0023.)

Since the amount of financial transfer is a left-censored dependent variable,<sup>4</sup> and the distribution of transfers has a long right tail,<sup>5</sup> I use the Tobit model to correct for potential bias (see column 5). The estimates from the Tobit model are not directly comparable to the previous columns since the numbers from the Tobit model are the marginal effects on the uncensored latent variable (McDonald and Moffitt 1980).

Compared to the expected amount of transfer received by a coresident child, those living within ten miles on average receives \$63.6 less, and those living more than ten miles away receive about \$242 less. The estimates for away children are statistically different than estimates for the coresident child, and the estimates for children living more than ten miles away are also statistically different than estimates for those living within ten miles. Among the empirical models in Table 5, I prefer the results from the Tobit model, as it corrects the limiting nature of the observed expenditure on transfer.

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<sup>4</sup>If I factor in the financial transfers from the child in the same period, the net transfer from parents can be negative. However, such cases are rare and don't change the results.

<sup>5</sup>The majority of children (85%) did not receive transfers from parents in a given wave.

**Ranking as Alternative Dependent Variable** Previous results confirm that a parent’s decision to make financial transfers is closely linked to a child’s proximity category. One concern is that the result may be sensitive to the definitions of the proximity categories used in the analysis. In Figure 2, I use a child’s relative ranking of proximity among siblings as an alternative measure to test the proximity effect.

Figure 2 shows a child’s predicted probability of receiving parent’s financial transfer with 95% confidence intervals. I estimated the nonparametric logistic model with the same covariates as those in Column 1 of Table 3, but the rank of a child’s proximity among siblings is used instead of proximity categories. Figure 2 shows that it is reasonable to assume a linear, negative relationship between the rank of distance and a child’s probability of receiving transfer. Table 6 shows the result with the assumption that every increase in ranking has similar marginal effect on a child’s probability in receiving transfers. A higher rank of proximity has the average marginal effect of -3.1 percentage point on a child’s probability of receiving transfer (p-value = 0.00). All else being equal, the closest child (rank = 1) is about 1.5 times more more likely to receive transfers than the sibling who is the third closest in proximity to the parent (predicted probabilities of 21.7% and 14.7% respectively).

### 6.3 Test on H3: Interaction Effects

Results from the previous section demonstrate that inter-vivos transfers are inversely correlated with a child’s residential distance to the parent. It can be argued that these differences can be driven by the children’s financial needs instead of the differences in their likelihoods to provide care. To test whether the proximity’s effect comes from the proximity’s connection to future care provision, I test several interaction effects that are relevant to a child’s likelihood to provide care. Results show that the increases in transfer on the extensive margin are more prominent among likely candidates of caregiving, which supports the hypothesis

that future care provision is the likely pathway for the observed proximity effect.

I first compare the effect of proximity on transfer between sons and daughters. Table 7 estimates the results for eq. 7. In these difference-in-difference regressions, I use the logistic model with the same covariates as those in Column 1 of Table 3, except the main explanatory variables are the three proximity categories plus their interaction terms with gender.<sup>6</sup> Since it can be difficult to interpret the estimates for interaction terms, I present Figure 3 to show the differences in predicted probabilities between sons and daughters.

For daughters, the probability in receiving transfers increases as they move closer, but the benefits of living in close proximity are not clear for sons. All else being equal, a son is just as likely to receive transfers from parents as his sister, when they are both living more than ten miles away. When the daughter who were living more than ten miles away moves in with the mother, her predicted probability in receiving financial help would increase from 9.7% to 11.6%. The son's chances, however, would be statistically the same regardless of where he lives.

Figure 4 tells a similar story, as I use a child's working status as the interaction term. The change on the extensive margin when a non-working child moves closer is evident, while there is no distinguishable increase when a working child moves closer (see Table 8 for the full result).

The three-way interaction presented in Fig 5 further disentangle some of the motives behind a parent's transfer (see Table 9 for results on interaction terms). Between working and non-working sons, the substantial gap between their respective probabilities to receive transfer can be interpreted as evidence of parents directing more resources to less well-off children. Regardless of employment status, the proximity effect – the increases in probability as a child moves closer – is non-existent for either groups of children. A similar albeit smaller

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<sup>6</sup>The first row presents the estimates for  $\gamma_1\beta_2$ ; the second and third rows show the proximity effect when  $g_i = 0$ , i.e.  $\widehat{\gamma_1\alpha\beta_1}$ . The fourth and fifth rows shows the difference-in-difference estimates, i.e.  $\widehat{\gamma_1\alpha\beta_3}$ .

gap on the extensive margin also exists between working and non-working daughters, but the proximity effect is evident for the non-working daughters.

To conclude, the interaction effects show that parents indeed respond to their child's financial needs, as they are more likely to make transfers to those who are in need. This type of compensating transfer results in the differences on the extensive margin between working and non-working children. However, not all children in need can increase their chances in receiving transfers by living closer to the parent, and the proximity effect is only evident for daughters.

## 6.4 Robustness Checks

Table 10 tests whether the results are robust against various sample restrictions. Model 1 excludes families with the amount of transfers to a single child in any wave that exceeds \$20,000. Models 2 and 3 separate samples into families with mothers in good and poor health. The proximity effects are present across these specifications, but parents in general are more likely to make financial transfers when they are healthy (0.166) than when they are in poor health condition (0.089).

In Model 4 and 5, I divided the sample into mothers who are younger than 70 years old and those who are older than 70. Two different patterns can be observed here. First, similar to what has been observed between parents with good and poor health, mothers in their 50s and 60s are more likely to make transfers (baseline predicted probability = 0.19) than those who are more than 70 years old (0.12). Secondly, the proximity effect is present among mothers in the younger age group but not among the older mothers. This result is expected since the premise of the proximity effect is based on expectations of future care. When parents age, the proximity effect should dwindle as parents make more transfers based on other factors, including current care provision, instead of expected services from the child.

The proximity effect is more applicable for parents who are in their later working lives with multiple children. As noted by McGarry and Schoeni (1997), parents in poor health are also more likely to be in a poor financial condition to contemporaneously reimburse their child financially. Fig 6 and Table 10 show that the results are only evident when the parents are in good health and/or younger than the age of 70. For families with only one child, the caregiving responsibility cannot be shifted to siblings, and thus there will be no public good problem and its associated strategic behaviors. Therefore, as Table 11 shows, the proximity effect can only be observed for families with multiple children.

## 7 Discussion

The unequal distribution of parents' wealth and the children's caregiving decisions has important implications on the design of socioeconomic safety nets both for the adult children and their older parents. In this paper, I argue that parents often make financial transfers to their children well in advance of the realization of care. These transfers, however, are based on the parents' expectations of their children's likelihood to provide care. By making financial transfers to children who live in close proximity, a child will have more incentive to stay in close proximity, and parents can also avoid costly relocation once the need for care arises.

Using the longitudinal data from the HRS, I show that a parent's financial transfers flow to the children who are in close proximity. A child's care provision has a weak positive impact on the parent's decision to make financial transfer, but more importantly, a closer proximity to parents has robust, positive effects on a child's likelihood to receive transfer. By comparing the differences in differences on the extensive margin between sons and daughters with different working statuses, I show that the likely pathway of the proximity effect is through a child's prospect to provide care.

Findings from this paper help explain the disagreements in the literature regarding the existence of intergenerational exchange. Economic models predict that, regardless of the parents' motives, whether they are altruistic toward children or simply exchanging for children's services, parents should provide financial transfer disproportionately more toward the caregiving child, but this prediction has only received limited empirical support. In the paper, I show that parents often make advance payments to children who are likely to provide care in the future. Therefore, analysis of *contemporaneous* exchanges within a limited time frame would generate weak empirical results, despite strong theoretical predictions.

For practitioners, these findings suggest that, especially for middle-class families, instead of cash or tax programs, policy makers can prioritize their resources by providing services such as counseling and respite care for supporting family caregivers. These findings also shed light on how living arrangements can influence intergenerational dynamics of a family. As independent living becomes the norm for the elderly and their adult children today and the literature traditionally focuses on household formations, further research on a broader set of living arrangements is needed to understand the intertwined relationship between family geography and familial relationships.

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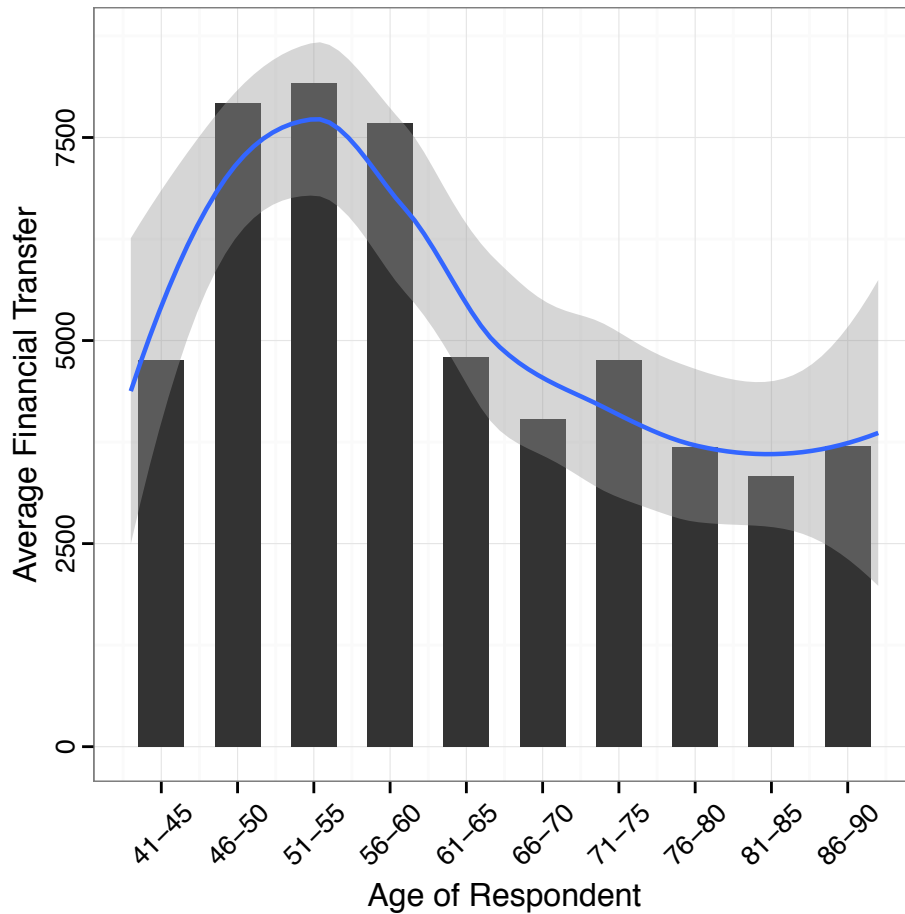
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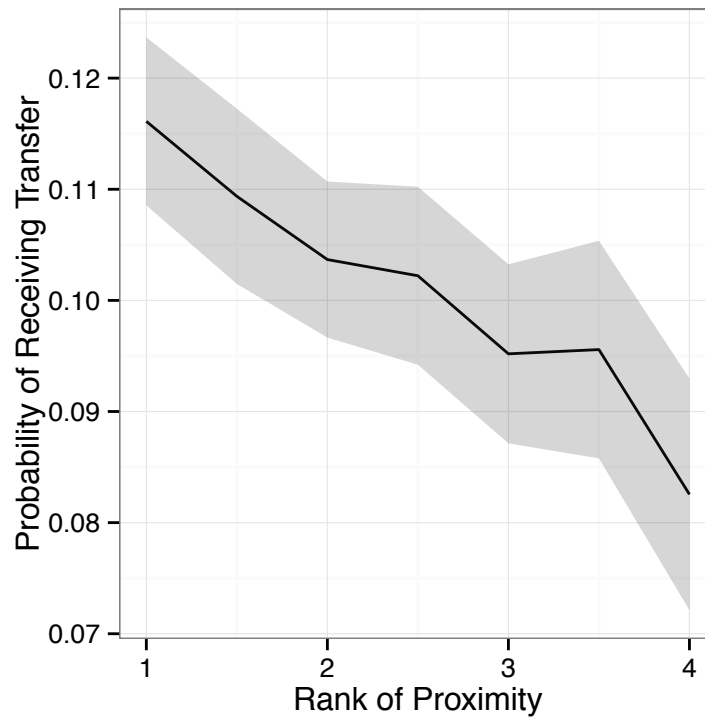
## 8 Appendix

Figure 1: Average Amount of Financial Transfer by Respondent's Age



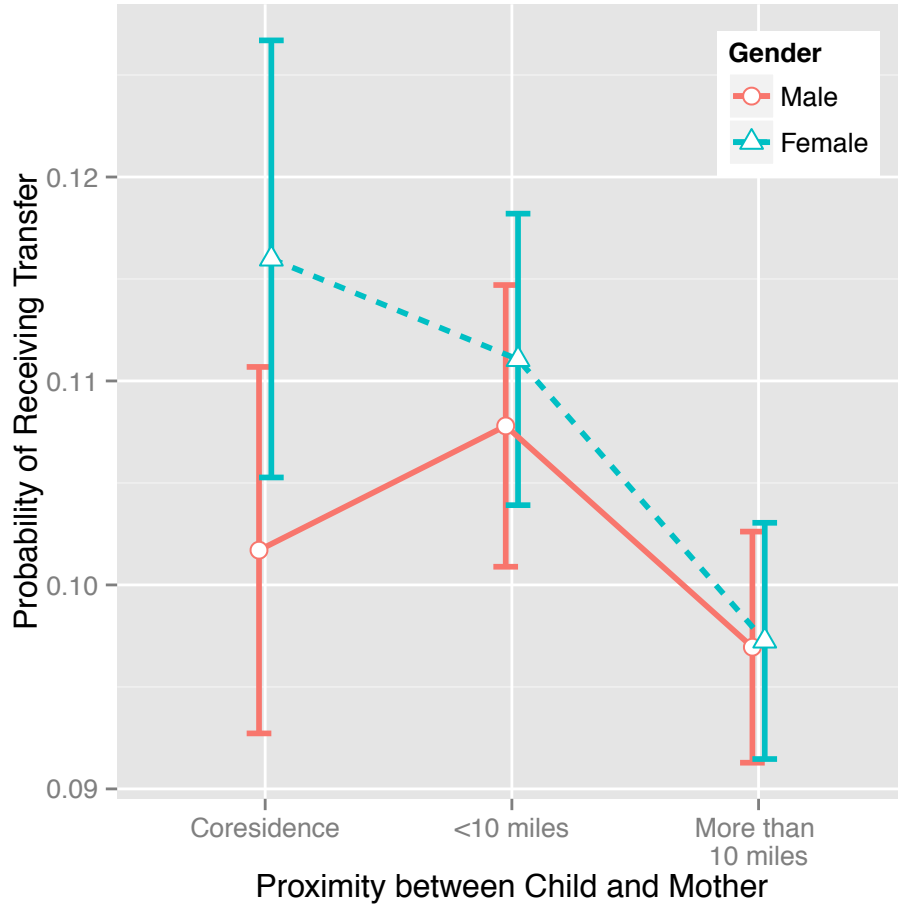
*Source: Data from the 2010 wave of Health and Retirement Study, compiled by author. Each bar represents the average total dollar amount of transfers to their children from respondents in each age group. The average is weighted by the household representation from 2010 March Current Population Survey. The loess curve is fitted using the average amount of transfer by age from 41 to 90.*

Figure 2: Predicted Probability of Child Receiving Transfer by Rank of Proximity



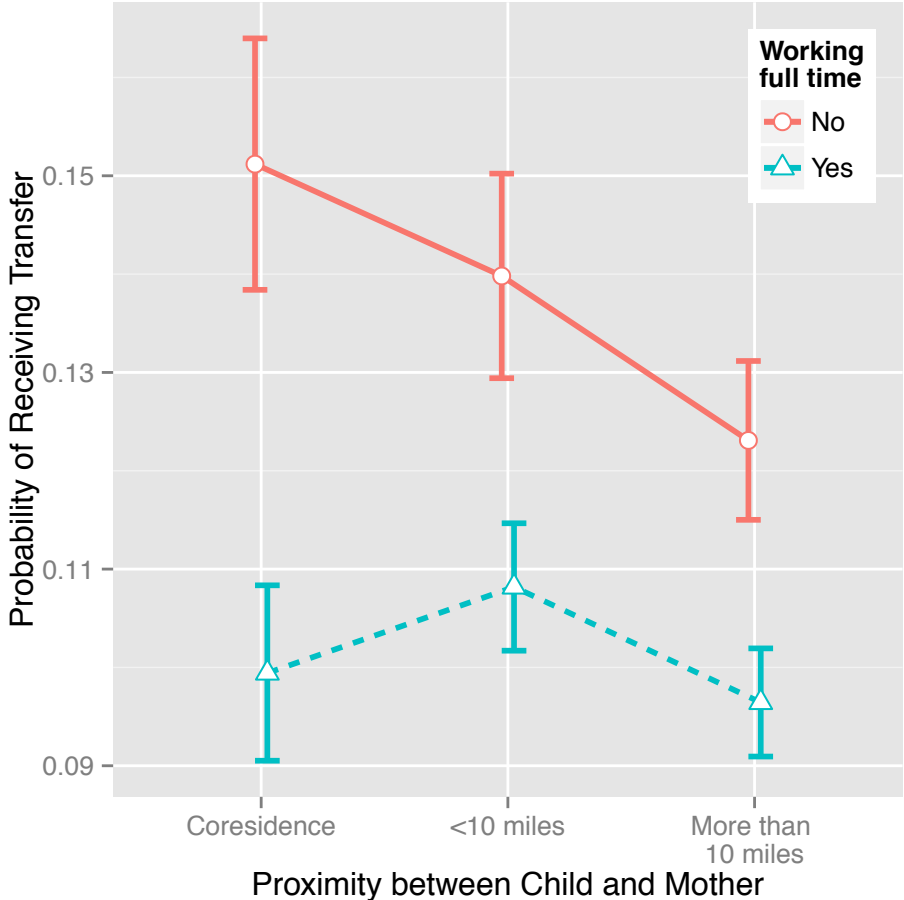
*Higher rank is farther away from the parent. The fitted line shows the predicted probability estimated by nonparametric logistic model. The intervals show 95% C.I. estimated with robust standard errors clustered by family. Results assuming linear trend is shown in Table 6*

Figure 3: Gender and Proximity Interaction Effects on Child Receiving Transfers



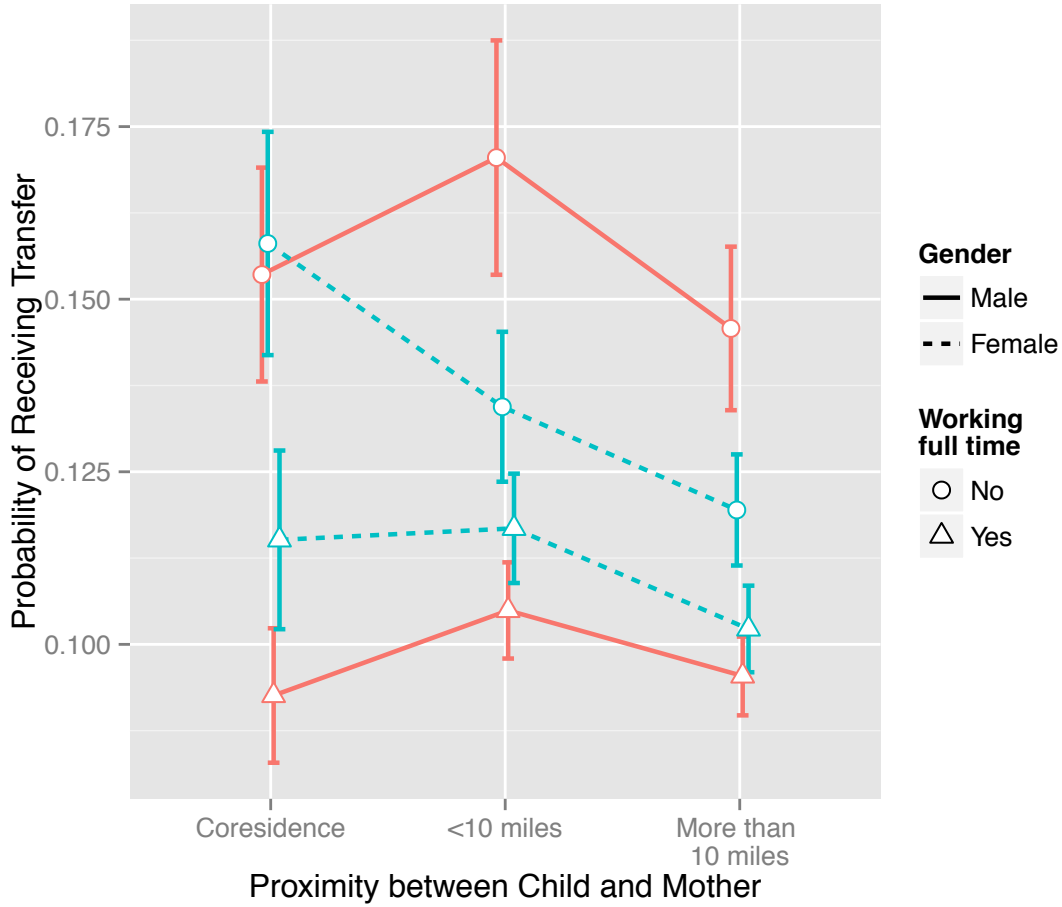
*Point estimates show the predicted probability of a child receiving any financial transfer from the parent. Results are estimated from Table 7. All control variables are held at the sample median. The intervals show 95% C.I. estimated by robust standard errors clustered by family.*

Figure 4: Working Status and Proximity Interaction Effects on Child Receiving Transfers



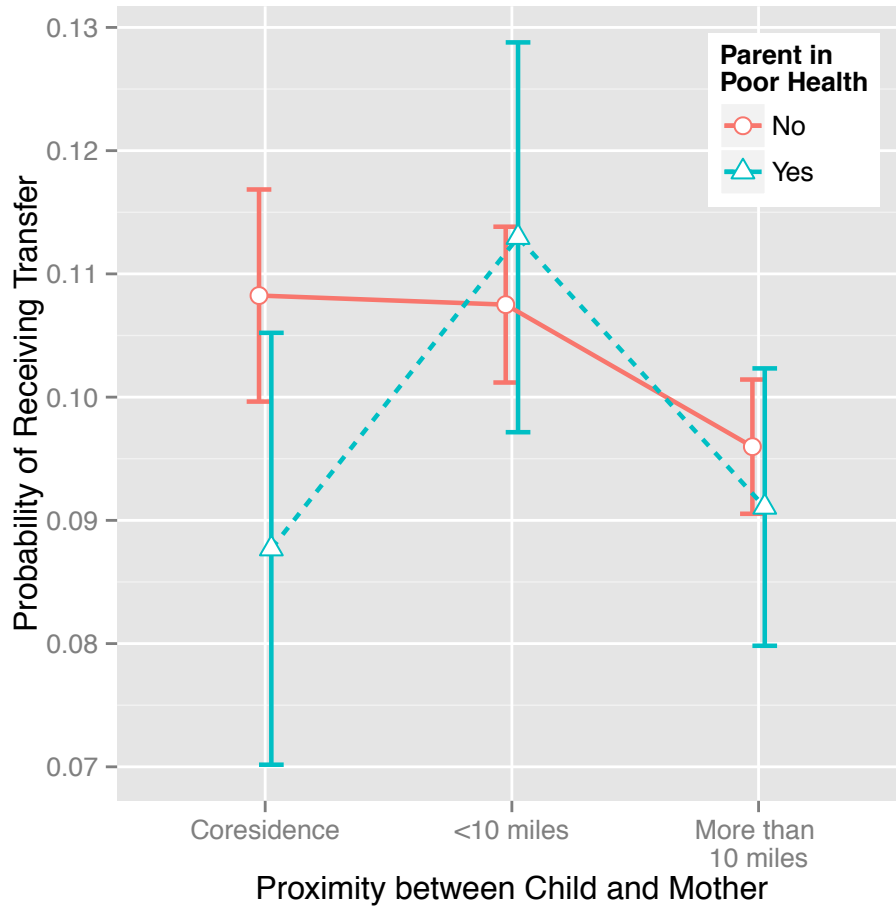
Point estimates show the predicted probability of a child receiving any financial transfer from the parent with varying proximity and full-time working status, holding all other variables at the sample median. Results are estimated from Table 8. The intervals show 95% C.I. estimated with robust std. errors clustered by family.

Figure 5: Working Status, Gender, and Proximity Interaction Effects



Point estimates show the predicted probability of a child receiving any financial transfer from the parent, holding all variables at the sample median except for working status, gender, and proximity. Results are estimated from Table 9. The intervals show 95% C.I. estimated with robust std. errors clustered by family.

Figure 6: Parent's Health and Proximity Interaction Effects



*Point estimates show the predicted probability of a child receiving any financial transfer from the parent, holding all variables at the sample median except for parent's health and proximity. Results are estimated from Table 12. The intervals show 95% C.I. estimated with robust standards errors clustered by family.*

Table 1: Descriptive Statistics

	Mean	S.D.	Min.	Max.	N
<i>Transfers from parent</i>					
Any financial aid to child (=1)	0.16	0.37	0	1	167,233
Amount of transfer to child	1099	7005	0	1,000,000	167,233
Child in parent's will (=1)	0.84	0.36	0	1	95,433
Parent helped grandchild care (=1)	0.12	0.32	0	1	167,233
<i>Transfers from child</i>					
Child provided care (=1)	0.03	0.18	0	1	167,233
Any financial aid to parent (=1)	0.03	0.16	0	1	167,233
<i>Distance to parent's residence</i>					
Coresident child	0.08	0.28	0	1	166,331
<10 miles	0.30	0.46	0	1	166,331
>10 miles	0.61	0.49	0	1	166,331
<i>Child characteristics</i>					
Female (=1)	0.50	0.50	0	1	167,233
Age	42.6	10.4	19	83	167,233
Years of Education	13.65	2.34	1	17	167,233
Working fulltime (=1)	0.73	0.44	0	1	167,233
Biological child (=1)	0.89	0.31	0	1	167,233
<i>Parent characteristics</i>					
Age	68.3	10.2	45	109	167,233
Poor health (=1)	0.09	0.28	0	1	167,233
P:log(Income)	2.8433	4.4459	0	13.63	167,233
P:log(Wealth)	11.1176	3.1147	0	18.27	167,233

Table 2: Number of Helpers in Household by Wave

	<b>0</b>		<b>1</b>		<b>Number of Helpers</b>				<b>4+</b>		<b>Total</b>	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Wave</b>												
1998	7,194	91.6	469	6.0	158	2.0	26	0.3	9	0.1	7,856	100.0
2000	6,746	91.7	439	6.0	132	1.8	21	0.3	16	0.2	7,354	100.0
2002	6,217	90.6	470	6.8	140	2.0	28	0.4	10	0.1	6,865	100.0
2004	6,404	91.1	474	6.7	116	1.6	31	0.4	6	0.1	7,031	100.0
2006	5,757	94.5	237	3.9	73	1.2	15	0.2	9	0.1	6,091	100.0
2008	5,703	90.6	417	6.6	129	2.0	36	0.6	11	0.2	6,296	100.0
2010	5,814	89.4	444	6.8	191	2.9	41	0.6	14	0.2	6,504	100.0
<b>Total</b>	43,835	91.3	2,950	6.1	939	2.0	198	0.4	75	0.2	47,997	100.0

Source: HRS Family Data.

Table 3: Probability of Child Received Any Transfer from Parents

	(1)	(2)	(3)	(4)
	Logit	Family FE Logit	Indiv. FE Logit	2SRI
Child provided care	0.180*** (0.059)	0.128* (0.072)	0.018 (0.074)	2.326*** (0.257)
<i>Child Characteristics</i>				
Age	-0.060*** (0.002)	-0.068*** (0.003)	-0.151*** (0.028)	-0.050*** (0.001)
Biological child	0.527*** (0.046)	0.771*** (0.059)		0.544*** (0.029)
Female	0.027 (0.021)	0.159*** (0.025)		-0.007 (0.015)
Eldest child	0.288*** (0.023)	0.059** (0.028)		
Works fulltime	-0.311*** (0.021)	-0.283*** (0.025)	-0.301*** (0.029)	-0.294*** (0.018)
Years of education	0.065*** (0.006)	-0.060*** (0.008)		0.072*** (0.004)
Married	-0.569*** (0.021)	-0.554*** (0.025)	-0.488*** (0.032)	-0.555*** (0.016)
<i>Parent Characteristics</i>				
Age	0.019*** (0.003)	0.024*** (0.005)	0.100*** (0.028)	0.007*** (0.001)
Poor health	-0.045 (0.058)	-0.093 (0.070)	-0.077 (0.056)	-0.217*** (0.041)
log(Income)	0.019*** (0.003)	0.004 (0.004)	0.004 (0.003)	0.022*** (0.002)
log(Wealth)	0.288*** (0.011)	0.077*** (0.013)	0.079*** (0.010)	0.293*** (0.006)
Couple household	-0.078** (0.034)	-0.189*** (0.065)	-0.203*** (0.046)	-0.035* (0.018)
<i>Other Transfers</i>				
Parent received transfer from child	-0.299*** (0.072)	-0.179** (0.082)	-0.001 (0.081)	-0.412*** (0.057)
Parent helped grandchild	0.562*** (0.027)	0.507*** (0.030)	0.188*** (0.033)	0.561*** (0.020)
Observations	167233	103160	58478	167233
Pseudo $R^2$	0.126	0.052	0.021	0.125

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

Note: *Family FE*: Mother Fixed Effects; *Indiv. FE*: Individual Fixed Effects; *2SRI*: Two-Stage Residual Inclusion. Further controls for race and ethnicity.

Table 4: Probability of Child Received Any Transfer with Controls for Proximity

	(1)	(2)	(3)
	Logit	Family FE Logit	Indiv. FE Logit
Child provided care	0.143** (0.060)	0.089 (0.073)	0.024 (0.075)
<i>Proximity Category</i>			
Lives within 10 miles	0.011 (0.036)	0.155*** (0.044)	0.121** (0.053)
Lives more than 10 miles+	-0.122*** (0.035)	-0.089** (0.043)	0.006 (0.051)
<i>Child Characteristics</i>			
Age	-0.059*** (0.002)	-0.068*** (0.003)	-0.147*** (0.029)
Biological child	0.497*** (0.047)	0.746*** (0.060)	
Female	0.028 (0.021)	0.158*** (0.025)	
Eldest child	0.282*** (0.023)	0.055* (0.028)	
Works fulltime	-0.309*** (0.022)	-0.286*** (0.025)	-0.302*** (0.030)
Years of education	0.070*** (0.006)	-0.054*** (0.008)	
Married	-0.556*** (0.022)	-0.557*** (0.025)	-0.495*** (0.033)
<i>Parent Characteristics</i>			
Age	0.018*** (0.003)	0.024*** (0.005)	0.097*** (0.028)
Poor health	-0.042 (0.058)	-0.085 (0.071)	-0.070 (0.056)
log(Income)	0.019*** (0.003)	0.005 (0.004)	0.005 (0.003)
log(Wealth)	0.288*** (0.011)	0.076*** (0.013)	0.078*** (0.010)
Couple household	-0.076** (0.034)	-0.184*** (0.065)	-0.198*** (0.047)
Observations	165370	101793	57691
Pseudo $R^2$	0.126	0.054	0.021

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

*Note:* Further controls for other types of transfer in all models, and race and ethnicity in the basic logit model.

Table 5: Amount of Transfer from Parent to Child

	(1)	(2)	(3)	(4)	(5)
	OLS	Conditional OLS	Family FE	Indiv. FE	Tobit
Child provided care	-51.7 (82.9)	124.1 (673.6)	-79.2 (86.0)	-22.2 (103.4)	1520.5** (630.6)
<i>Proximity Category</i>					
Lives within 10 miles	-324.6*** (86.9)	-1171.5*** (362.4)	-206.5** (86.1)	-211.9 (164.0)	-457.1 (377.0)
Lives more than 10 miles+	-401.6*** (82.5)	-1249.3*** (317.8)	-342.1*** (85.4)	-326.0* (166.5)	-1740.0*** (366.9)
<i>Child Characteristics</i>					
Age	-76.7*** (5.7)	-174.9*** (29.4)	-32.3*** (4.0)	-83.4 (56.8)	-626.2*** (49.7)
Biological child	340.4*** (69.1)	319.5 (469.7)	408.7*** (82.5)	0.0 (.)	4833.6*** (587.6)
Female	-39.9 (46.7)	-165.8 (259.2)	-1.7 (39.4)	0.0 (.)	200.9 (231.0)
Eldest child	357.2*** (53.7)	727.3*** (280.3)	-104.3** (48.2)	-90.1 (180.3)	3029.7*** (325.5)
Works fulltime	-618.6*** (52.1)	-1371.7*** (254.1)	-338.9*** (45.0)	-374.9*** (71.8)	-3434.0*** (283.3)
Years of education	161.9*** (12.2)	524.3*** (64.5)	-6.5 (8.7)	0.0 (.)	913.5*** (90.1)
Married	-524.4*** (46.2)	-252.8 (236.8)	-303.3*** (42.3)	-228.7*** (78.4)	-5297.9*** (377.8)
<i>Parent Characteristics</i>					
Age	43.0*** (5.4)	163.9*** (30.9)	30.9*** (8.4)	78.5 (55.5)	241.2*** (32.4)
Poor health	110.2* (60.2)	534.9 (502.5)	-131.0 (112.0)	-130.2 (107.5)	-218.3 (563.8)
log(Income)	-14.1* (7.3)	-128.2*** (31.9)	-9.4 (7.6)	-10.5 (7.5)	116.4*** (31.2)
log(Wealth)	180.1*** (10.8)	1303.5*** (118.0)	53.9*** (14.5)	55.0*** (14.1)	2979.2*** (230.2)
Couple household	-54.2 (59.1)	-952.5*** (325.3)	-245.3** (110.0)	-259.8** (106.0)	-888.1** (356.1)
Observations	165288	26340	165288	165288	165288
(Pseudo) $R^2$	0.023	0.043	0.265	0.001	0.024

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

Note: *Conditional OLS* restricted the sample to those who have financial transfers from mother to the child. Further controls for other types of transfer, race, and ethnicity.

Table 6: Effect of Rank of Distance on Probability of Child Received Any Transfer

	Logit	
Distance rank	-0.074***	(0.011)
Child provided care	0.074	(0.063)
<i>Child Characteristics</i>		
Age	-0.057***	(0.003)
Biological child	0.260***	(0.051)
Female	0.055**	(0.022)
Eldest child	0.068***	(0.023)
Works fulltime	-0.287***	(0.023)
Years of education	0.040***	(0.006)
Married	-0.527***	(0.023)
<i>Parent Characteristics</i>		
Number of living child	-0.205***	(0.013)
Age	0.020***	(0.003)
Poor health	-0.006	(0.061)
log(Income)	0.018***	(0.003)
log(Wealth)	0.262***	(0.011)
Couple household	-0.009	(0.035)
<i>Race (Ref. Group: non-Hispanic White)</i>		
White (Hispanic)	-0.564***	(0.068)
Black (Hispanic)	0.282	(0.264)
Black (Non-Hispanic)	-0.118**	(0.048)
Other race	-0.249***	(0.090)
<i>Other Transfers</i>		
Parent received transfer from child	-0.328***	(0.077)
Parent helped grandchild	0.504***	(0.028)
Constant	-3.196***	(0.210)
Observations	131596	
Pseudo $R^2$	0.143	

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. Standard errors in parentheses.

Note: Robust standard error clustered by family.

Table 7: Interaction Effects: Gender and Proximity

	Logit	
<i>Interaction Effects</i>		
Daughter	0.147***	(0.053)
Within 10 miles (<10m)	0.065	(0.047)
More than 10 miles (>10m)	-0.053	(0.044)
Daughter and <10m	-0.114*	(0.062)
Daughter and >10m	-0.144**	(0.059)
Child provided care	0.138**	(0.060)
<i>Child Characteristics</i>		
Age	-0.059***	(0.002)
Biological child	0.497***	(0.047)
Eldest child	0.282***	(0.023)
Works fulltime	-0.312***	(0.022)
Years of education	0.070***	(0.006)
Married	-0.557***	(0.022)
<i>Parent Characteristics</i>		
Age	0.018***	(0.003)
Poor health	-0.041	(0.058)
log(Income)	0.019***	(0.003)
log(Wealth)	0.289***	(0.011)
Couple household	-0.076**	(0.034)
<i>Race (Ref. Group: non-Hispanic White)</i>		
White (Hispanic)	-0.671***	(0.068)
Black (Hispanic)	0.363	(0.266)
Black (Non-Hispanic)	-0.245***	(0.048)
Other race	-0.379***	(0.090)
<i>Other Transfers</i>		
Parent received transfer from child	-0.310***	(0.073)
Parent helped grandchild	0.536***	(0.027)
Constant	-4.803***	(0.196)
Observations	165370	
Pseudo $R^2$	0.126	

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. Standard errors in parentheses.

Note: Robust standard error clustered by family.

Table 8: Interaction Effects: Working Status and Proximity

	Logit	
<i>Interaction Effects</i>		
Working full time	−0.478***	(0.050)
Within 10 miles (<10m)	−0.092*	(0.052)
More than 10 miles (>10m)	−0.238***	(0.047)
Working full time and <10m	0.186***	(0.062)
Working full time and >10m	0.204***	(0.056)
Child provided care	0.138**	(0.060)
<i>Child Characteristics</i>		
Age	−0.059***	(0.002)
Biological child	0.496***	(0.047)
Female	0.033	(0.021)
Eldest child	0.282***	(0.023)
Years of education	0.070***	(0.006)
Married	−0.556***	(0.022)
<i>Parent Characteristics</i>		
Age	0.018***	(0.003)
Poor health	−0.042	(0.058)
log(Income)	0.019***	(0.003)
log(Wealth)	0.288***	(0.011)
Couple household	−0.076**	(0.034)
<i>Race (Ref. Group: non-Hispanic White)</i>		
White (Hispanic)	−0.672***	(0.068)
Black (Hispanic)	0.365	(0.266)
Black (Non-Hispanic)	−0.244***	(0.048)
Other race	−0.377***	(0.089)
<i>Other Transfers</i>		
Parent received transfer from child	−0.303***	(0.073)
Parent helped grandchild	0.540***	(0.027)
Constant	−4.662***	(0.196)
Observations	165370	
Pseudo $R^2$	0.126	

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. Standard errors in parentheses.

Note: Robust standard error clustered by family.

Table 9: Interaction Effects: Gender, Working Status, and Proximity

	Logit	
<i>Interaction Effects</i>		
Within 10 miles (<10m)	-0.405***	(0.074)
More than 10 miles (>10m)	-0.578***	(0.064)
Working full time	-0.586***	(0.066)
Daughter	0.118*	(0.071)
Working FT and <10m	0.094	(0.087)
Working FT and >10m	0.108	(0.078)
Daughter and <10m	-0.309***	(0.097)
Daughter and >10m	-0.380***	(0.086)
Daughter & Working FT	0.194**	(0.096)
Daughter, working FT, & <10m	0.210*	(0.120)
Daughter, working FT, & >10m	0.197*	(0.110)
Observations	165370	
Pseudo $R^2$	0.090	

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. Standard errors in parentheses.

*Note:* Robust standard error clustered by family.

Table 10: Robustness Checks

	(1) Exclude extreme transfers	(2) Mother in good health	(3) Mother in poor health	(4) Mother age 45-70	(5) Mother age 70+
Child provided care	0.153** (0.061)	0.146** (0.072)	0.087 (0.114)	0.077 (0.103)	0.113 (0.073)
Lives within 10 miles	0.035 (0.037)	0.017 (0.037)	-0.055 (0.124)	0.068* (0.041)	0.119 (0.076)
Lives more than 10 miles+	-0.105*** (0.036)	-0.108*** (0.036)	-0.310** (0.122)	-0.065* (0.038)	0.012 (0.075)
Observations	161937	150930	14440	93865	71505
Pseudo $R^2$	0.118	0.121	0.161	0.134	0.106
Baseline predicted probability	0.149	0.166	0.089	0.190	0.120

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

*Note:* Robust standard error clustered by family.

Table 11: Probability of Receiving Transfer: Only Child vs. Multiple Siblings

	Only Child		Multiple Siblings	
	$\beta$ / SE	AME	$\beta$ / SE	AME
Child provided care	0.096 (0.150)	0.018	0.110 (0.069)	0.014
Coresident child	(ref)			
Lives within 10 miles	0.164 (0.118)	0.030	-0.022 (0.039)	-0.003
Lives more than 10 miles	0.086 (0.115)	0.015	-0.164*** (0.037)	-0.020***
Observations	5767		135817	
Pseudo $R^2$	0.115		0.124	
Baseline predicted probability	0.302		0.161	

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

*Note:* Robust standard error clustered by family.

Table 12: Interaction Effects: Parent's health and Proximity

	Logit	
<i>Interaction Effects</i>		
Parent in poor health	-0.233**	(0.109)
Within 10 miles (<10m)	-0.008	(0.037)
More than 10 miles (>10m)	-0.134***	(0.035)
Poor health and <10m	0.289**	(0.120)
Poor health and >10m	0.175	(0.114)
Child provided care	0.151**	(0.060)
<i>Child Characteristics</i>		
Age	-0.059***	(0.002)
Female	0.028	(0.021)
Biological child	0.497***	(0.047)
Eldest child	0.282***	(0.023)
Works fulltime	-0.309***	(0.022)
Years of education	0.070***	(0.006)
Married	-0.556***	(0.022)
<i>Parent Characteristics</i>		
Age	0.018***	(0.003)
log(Income)	0.019***	(0.003)
log(Wealth)	0.288***	(0.011)
Couple household	-0.076**	(0.034)
<i>Race (Ref. Group: non-Hispanic White)</i>		
White (Hispanic)	-0.669***	(0.068)
Black (Hispanic)	0.364	(0.267)
Black (Non-Hispanic)	-0.244***	(0.048)
Other race	-0.377***	(0.089)
<i>Other Transfers</i>		
Parent received transfer from child	-0.313***	(0.073)
Parent helped grandchild	0.539***	(0.027)
Constant	-4.737***	(0.195)
Poor health		
Observations	165370	
Pseudo $R^2$	0.126	

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors in parentheses.

*Note:* Robust standard error clustered by family.

# Chapter II

## Income, Intergenerational Transfer, and Geographical Proximity

### 1 Introduction

Over the past few decades, intergenerational coresidence has been declining in the United States and other industrialized societies, and elderly parents are increasingly living independent lives (Bethencourt and Ríos-Rull 2009; Chu, Xie, and Yu 2011; Isengard and Szydlak 2012; Lin and Rogerson 1995; Ruggles 2007). However, their ability to live independently often depends on their access to services or care such as meal preparation, transportation, and housekeeping. Today, informal care – the type of regular assistance provided by unpaid caregivers, mostly family members – remains the main source of support for seniors who require assistance with daily living (National Alliance for Caregiving 2009). Since the level of support from family members is closely linked to their residential distance, there has been renewed interests in examining the factors that may shape the geographical proximity between the parents and their adult children (Compton and Pollak 2013; Heylen et al. 2012).

This paper aims to examine the key determinants of adult children’s proximity to their mothers, with the emphasis on socioeconomic variables including income, education, and working status. The theoretical framework presented in the paper shows that, when older parents provide financial assistance based on proximity, adult children who live closer to their parents tend to be economically disadvantaged. The model thus expects a positive relationship between income and residential distance between parent and child.

To test this hypothesis, I first examines the distribution of intergenerational proximity using family panel data from the Health and Retirement Study (HRS). Using a multinomial logit model, I show that children's education, income, and working status are closely linked to their proximity to their parents. The results also hint the interdependency of living arrangements among family members. Sibship size increases the likelihood of a child living farther away, but there is a gender difference for the effects of sibling's residence on a child's proximity to the mother, which suggests that the caregiving expectation may play a role in shaping the family living arrangements.

To further test these relationships, I use a child's relative residential distance in the family to further examine the dynamics within a family. The results confirm that children with lower income and education attainments tend to live closer to their mother when compared to his or her siblings with higher income or education attainment. Also consistent with the previous results, the estimates from the family fixed effects model show that daughters are more likely to be the closest child to the mother in terms of residential distance.

As a whole, these results paint a consistent picture for this complex family living arrangement decision. Whether one is measuring the absolute distance or distance relative to other siblings, children who are economically disadvantaged tend to live closer to their parents. More importantly, the result demonstrates that, whether explicitly or not, a family living arrangement is a coordinated decision among family members. A child's residential distance to his or her mother does not only depend on his or her characteristics, but it also depends on other children's residential choices. Specifically, having a sister living in close proximity to the mother reduces one's likelihood of living with the mother, while having a brother in close proximity to the mother has no such effect. Thus the living arrangements for the elderly parents are likely linked to the caregiving arrangement, and these decisions are likely family decisions, instead of individual ones.

This paper is organized by first providing a review of the literature on intergenerational

proximity in Section 2, followed by Section 3, which provides the theoretical framework in understanding the link between intergenerational proximity and a child's income. Section 4 describes the data and empirical models used to establish the relationship between proximity and income. Section 5 presents the results, and Section 6 summarizes the study and briefly discusses its implications.

## 2 Interdependence of Family Living Arrangements

To understand older people's residential decisions, Litwak and Longino (1987) formulated a life-cycle framework in which the decision to relocate can be analyzed in three stages. The first stage happens as they reach the retirement age and relocate for amenities such as warm weather, lower cost of living, or leisure activities. The second stage occurs when they start to experience minor to moderate disabilities and thus relocate for easier access to assistance with activities of daily living (ADL). The last stage of migration takes place near the end of life, as institutional or intensive care is needed to support the elderly. In the context of care provision, this paper mainly focuses on the migrating decision in the second stage, where proximity to a child's residence starts to play a role in the parent's life.

From the parent's perspective, health issues and widowhood usually led to a closer residential distance to their children (Choi et al. 2014a; Silverstein 1995; Silverstein and Angelelli 1998). Access to family care is likely an important factor at this stage of relocation. For example, in Silverstein and Angelelli (1998) analyzed the cross-sectional data and found that most parents 70 years of age and older expect to move closer to their daughters instead of their sons, since daughters have been the main family caregiver for most families.

**Economic Wellbeing and Living Arrangement** Socioeconomic status has also been shown to be important in understanding the pattern of family dispersion. The study by

Zhang, Engelman, and Agree (2013) shows that parents with lower incomes were more likely to be in close proximity to their children. A longitudinal analysis by Choi et al. (2014a) further confirms this result, as it finds that older parents with lower socioeconomic statuses live closer to their children prior to the onset of the ADL limitations. This leads to a reduced likelihood for the poor families to depend on formal care or go to nursing home when they become disabled. Both studies focus mostly on the parent's economic status, and the children's characteristics were aggregated into family variables.

Most studies on the relationship between children's socioeconomic statuses and their proximity to parents analyze the timing of household formation during the nest-leaving phase of a family. This line of literature generally finds that children with better financial resources or employment opportunities tend to leave home earlier or live further away from the parents (Chu, Xie, and Yu 2011; Ermisch 1999; Keene and Batson 2010; Le Blanc and Wolff 2006). Ruggles (2007) reviewed recent studies and concluded that the rise of independent living among the elderly since the nineteenth century is mostly the product of the increased economic opportunities for the younger generation, instead of the growing affluence of the older parents.

**Family Structure and Dispersion** It is only recently that researchers started to examine the interdependency of living arrangements between family members. Michielin, Mulder, and Zorlu (2008) used the administrative records for the Netherlands and analyzed individuals who were between 20 and 50 years old. They found that adult children are more likely to move closer to their parents if there is already a sibling in close proximity to their parents. In addition, a child will be more likely to move away when all siblings are already living away from the parents. They interpret this finding as evidence against filial responsibility as the motivation for relocation: If the presence of siblings decreases the adult children's feelings of responsibility, they should be more likely to move away from, instead of converging to,

the parents. This study highlights the need for empirical models that capture within-family variations. In addition, since their data lack the information regarding the level of education, it cannot be ruled out that the children's education might be causing this pattern of sibling clustering.

Economic literature has also started to explore the implication of the public good problem of parent care regarding living arrangements. The work by Pezzin, Pollak, and Schone (2007) shows that coresidence may fail to emerge as the equilibrium even if it is the Pareto optimal solution because a coresident child will have less bargaining power relative to the siblings in negotiating parent care. The paper by Konrad et al. (2002) also sheds light on the strategic consideration between siblings. Using a German survey, they find that children with siblings could choose to live further away from their parents to avoid the burden of caregiving even if they are altruistic toward their parents. Furthermore, since the firstborn child has the advantage as the first mover in choosing residence, he or she tends to live further away than the younger siblings. An only child, on the other hand, does not engage in this "location competition" and thus tends to live closer to his or her parents than those with siblings. Rainer and Siedler (2009) used separate German panel data and found similar results for the effect of sibship size on proximity, but not for the effect of birth order. However, a later study by Holmlund, Rainer, and Siedler (2013), who used a large administrative data set from Sweden, does not find sibship size to affect intergenerational proximity for families with two or more children. Nevertheless, these studies demonstrate that, in examining complex family decisions such care provision or living arrangement, it is critical to take the whole family into consideration, instead of just focusing on the respondent.

**Contribution** While the literature on household formation has conveyed the importance of a child's financial resources regarding his or her residential decision, it focuses mostly on younger adult children who are just starting to form their own households. Meanwhile, most

studies on intergenerational proximity and older parent’s access to informal care analyze data at the parent level (Choi et al. 2014a; Silverstein 1995; Silverstein and Angelelli 1998; Zhang, Engelman, and Agree 2013). However, since relocations that enhance proximity are actually more likely to be made by adult children than their parents, there is a need for studies utilizing child-level data for better understanding of the inter-family dynamics (Zhang, Engelman, and Agree 2013). In this paper, I analyze the child-level data and provide estimates for the effect of a child’s characteristics on his or her proximity to parents, instead of the effects from aggregated family variables.

While income and proximity will be the main focus in the analysis, this paper also emphasizes the interdependency of residential choices between family members. By using family panel data, this paper is able to capture within-family variations and to compare a child’s outcome to his or her siblings. In addition to avoiding the possible bias from time-invariant family heterogeneity, this data allows the examination of how a sibling’s residential decision may affect other adult children’s proximities to their mother. Results of the analysis can thus help shed light on the intrafamily dynamics of this complex family living arrangement decision.

### 3 Income and Intergenerational Proximity

#### 3.1 Model Setup

This paper adopts a simple neoclassical model of utility maximization to analyze the relationship between income and residential choice. In this framework, an adult child chooses the optimal allocation of time between leisure,  $L$ , hours of parent care,  $h$ , and the residential distance to the parents,  $\delta$ , in order to maximize his or her private utility  $U = U(L, F, \delta)$ . The parent’s functionality,  $F$ , is assumed to be a function of the amount of care that he or she received from the adult child  $h$ , conditioned on the parent’s health condition,  $g$ ,

i.e.,  $F = F(h; g)$ . Utility from leisure and parent's functionality are assumed to be strictly increasing but at a decreasing rate.

The child is assumed to have a preferred residential location, and  $D$  denotes the distance between the desired residence and the mother's home. The desired location of residence can be influenced by an array of factors such as the child's education, spouse, school district, etc. For the purpose of the study, these factors are assumed to be exogenous.

Moving closer to the desired location increases a child's utility, and  $D$  is assumed to be strictly positive (i.e.  $D > 0$ ) to reflect adult children's desires to form independent households. When the child's distance to the parent, which is denoted by  $\delta$ , equals to  $D$ , the child's utility is at its maximum for a given set of  $L$  and  $F$ . Therefore, the relationship between the distance to the parent, the distance between the desired location and parent's residence, and the child's utility can be characterized as the following:

$$\left\{ \begin{array}{l} 0 \leq \delta < D \quad \rightarrow U(\delta) \geq 0, U_{\delta} > 0, U_{\delta\delta} < 0 \\ \delta = D \quad \rightarrow U(\delta) = U(\delta)_{max}|_{L,F} \\ \delta > D \quad \rightarrow U_{\delta} < 0 \end{array} \right.$$

The main goal of the model is to capture the tradeoffs between the cost of care provision, location preference, and the parent's inter-vivos transfers for the adult children. The distance between the parent and child  $\delta$ , in addition to its intrinsic utility from living closer to the desired location, plays two additional roles in the budget constraint. First, it determines the amount of financial transfers that the child will receive from the parents. The adult child is assumed to receive a non-negative transfer from his or her parent, but the amount is tied with the residential distance between parent and child. This assumption is in accordance with the two empirical observations from the previous chapter: (1) the net intergenerational

transfer has been mostly from the older generations to the younger, and (2) the closer the two parties' residences are to each other, the higher are the frequency and the amount of the transfer. Thus, the model assumes that the parent's financial transfers, denoted by  $\gamma$ , are a function of the distance between child and parent, i.e.,  $\gamma = \gamma(\delta)$ , and  $\gamma$  decreases as  $\delta$  increases, i.e.,  $\gamma_\delta = \frac{\partial \gamma}{\partial \delta} < 0$ .

Secondly, the distance from the parent also adds to the time required to provide parent care due to commuting. Thus, it adds to a child's opportunity cost of providing parent care. Let  $T$  denote the time endowment of the child, and let  $w$  denote the child's wage rate. The child then allocates his or her time between paid work, leisure, and parent care. The total cost of caring for the parent would thus be  $(1 + d(\delta)) \cdot w \cdot h$ , where  $d(\delta)$  is the additional time required to provide care when the child is living away from the parent at the distance  $\delta$ .

Considering these preliminaries, the child's utility maximization problem can be formally written as the following:

$$\begin{aligned} \max_{L, h, \delta} \quad & U(L, F(h), \delta) \\ \text{s.t.} \quad & I + \gamma(\delta) + wT = (P + w)L + (1 + d(\delta))wh \end{aligned}$$

### 3.2 Location Preference, Proximity, and Income

When a child moves away from his parent and move closer to the desired location of residence, three dynamics come into play: (i) the utility derived from  $\delta$  increases by  $U_\delta$ , (ii) the opportunity cost of providing care increases by  $d_\delta h w$ , and (iii) the transfer from parent decreases by  $\gamma_\delta$ . When  $\delta$  is close to zero, i.e. the child is living with the parents, the marginal utility derived from being closer to the desired location is significant while the increase from the cost of providing care (ii) and the marginal decrease from parent's transfer (iii) are minimal.

However, the farther away that a child moves, the more financial transfers he or she will have to trade off before utility is gained from moving closer to the desired location. Such tradeoff will be particularly binding for children with lower incomes, as the parent's help can be a more important source of financial support for the children. The cost of moving away will also be larger for caregiving children as the time to commute to the parent's house increases with the distance. As a result, the model predicts a static distribution in which children with lower income and greater caregiving responsibilities live closer to the parents than their siblings who are financially better off or not expected to provide care.

The positive relationship between wage and distance could eventually die off or even turn negative when the child's wages are high and he or she is close enough to the desired location of residence. Whether or where the curve that describes the relationship becomes downward-sloping depends on the exact form of the utility function. For the purpose of the study, the focus will be on the segment where the relationship between wage and distance is positive. This is shown in the appendix, but the result can be summarized as the following:

**Result.** *If a child's working hours and the decline of transfer from parents due to residential distance are sufficiently large, the relationship between wage and distance will be positive when wages are low, and negative when wages are high.*

*Formally the relationship can be written as the following:*

$$M > \frac{\lambda P}{-U_{LL}} \quad \& \quad \gamma_{\delta} < \frac{-Pd_{\delta}h}{2} \implies \begin{cases} \frac{\partial \delta^*}{\partial w} > 0 & \text{if } 0 < w < w^*, \\ \frac{\partial \delta^*}{\partial w} < 0 & \text{if } w^* < w, \end{cases}$$

where  $w^*$  is the larger real root of the quadratic function defined in eq. 2 in the appendix, and  $M$  is the child's working time, i.e.  $M = T - L - (1 + d)h$  and  $M \geq 0$ .

This result captures the idea that geographical mobility is closely linked to a person's eco-

conomic well-being. The reduction of a parent's financial transfer due to distance has a smaller impact proportionally for adult children who are more financially well-off. Therefore, they will be more likely to live closer to their desired location than their counterparts with less financial resources. On the other hand, it also shows how family plays a bigger role for poor adult children. The financial wellbeing of poor adult children is more closely linked to a parent's help. As a result, they become more likely to live in close proximity to their parents as financial benefits outweigh the utility gains from living in their preferred locations.

## 4 Empirical Approach

### 4.1 Methods

With this theoretical framework, I first use a multinomial logit regression to test the dependency of a child's residential choices on his or her socioeconomic status and the siblings' living arrangements. There are three residential choices for the child: living with the mother, living within ten miles, or living more than ten miles away. Multinomial logit assumes no inherent ordering between these outcomes and thus provides the advantage of examining the covariate's effect on the flow between these three outcomes. The HRS chooses the ten miles as the cutoff point because it is typically the distance that a caregiver can reasonably commute within 30 minutes. While the multinomial logit estimations provide the marginal effects for variables of interest, such as income and sibling's residence, the following methods will adopt measures that are not affected by the boundaries defined by categorical variables.

In the second part of the analysis, I construct outcome variables that focus on a child's proximity to the mother *relative to the siblings*. The outcome variables used here are either a dummy variable indicating whether one is the nearest child to the mother or a numerical variable that ranks a child's distance to the mother among all children in the family. The

emphasis here is to capture within-family variations, so panel models with family fixed effects are the model of choice here. Family fixed effects provide the benefit of eliminating biases that are from unobserved, time-invariant family heterogeneity. I also use estimators with individual fixed effects in estimating a child’s likelihood to be the closest child. These results provide insights on whether a change in income may result in a change in proximity to the mother at the individual level.

## 4.2 Data

The data used in the analysis come from the Health and Retirement Study (HRS). The HRS is a nationally representative, biennial household survey of Americans over the age of 50 and their family members, regardless of age. Each observation from the pooled panel data is a mother-child dyad interviewed between 1998 and 2010. Since this paper analyzes the intergenerational proximity in the context of children’s caregiving, I focus on the mother-child proximity here as most caregiving children are assisting their mothers instead of fathers (National Alliance for Caregiving 2009). The sample is restricted to mothers that are at least 65 years old and children who are at least 25 years old as most have finished school by this age. In estimations that focus on the ranking of proximity (Table 5 and 6), only families with more than one child are included in the sample.

**Outcome Variables** In the survey, the respondents are asked to identify the resident child and other children who are living within ten miles from them. Since it is likely that a respondent may not know a child’s exact residential distance to them and will answer the question based on whether they felt that a child was nearby, we can interpret those in the ten-miles category as children who are in close proximity to the respondent. The three categories: coresident, within ten miles, and more than ten miles away, are then used as the outcome variable in the first part of the analysis.

The HRS also asks the respondent to identify the closest non-resident child. Based on a child's proximity category and this information, I then constructed two outcome variables based on a child's proximity to the mother relative to other siblings. The first one is a dummy variable indicating whether a child is the geographically closest one to the mother in a given wave. The second measure is a ranking of the children's proximity for all adult children in the roster. The indicator and ranking of a child's relative proximity are used in the second part of analysis that focuses on the variations of residential distance within a family.

**Explanatory Variables** The main variables of interest are a child's education, full-time working status, and income. The family respondent reported a child's total family income in the following categories: less than \$10K, \$10-35K, \$35-70K, more than \$35K, or more than \$70K. Note that the categories are neither mutually exclusive nor ordinal, so estimates from these coefficients may not be directly comparable. In addition, income information for children was skipped for alternative waves since Wave 4 (1998), and thus there are certain waves with large numbers of missing values. I carry the information from the previous wave forward for imputation when applicable. Respondents who answer that they don't know the income brackets of their children are still included in the sample to avoid eliminating too many observations when estimating the effects of other variables. While the income measures are imprecise, combined with education and working status, the relationship between socioeconomic status and intergenerational proximity can still be inferred.

Several variables are included to test the interdependency of family member's living arrangements. Adult children who have a sibling tend to live farther from parents than those who are the only child, but the effect of sibship size are not apparent when compared to families with more than one child (Holmlund, Rainer, and Siedler 2013; Konrad et al. 2002; Rainer and Siedler 2009). The insights from the paper by Konrad et al. (2002) suggest that there

might be a birth-order effect in proximity as the firstborn has the advantage among the siblings as the first-mover in choosing his residence. In addition to sibship size and birth order, I include two variables indicating whether a child has a sister or a brother living with the mother or within ten miles from the mother. These variables help in understanding how a sibling's residence may affect a child's residential distance to his or her mother.

The empirical model also incorporates other factors that have demonstrated influences over the residential and caregiving decisions. Daughters are often expected to take on the task of parent care (Szinovacz and Davey 2008). However, such expectation has to compete with other obligations for a child's time. Evidence from Norwegian registry data shows that young couples tend to live closer to the husband's parents, especially for less-educated married couples (Løken, Lommerud, and Lundberg 2013). The arrival of a grandchild may increase a child's proximity as they are less likely to live with the parents as the family size increases. In the meantime, healthy grandparents can help provide childcare for their grandchildren and thus provide incentives to live closer (Compton and Pollak 2013; Raymo et al. 2010).

While we can not directly observe the quality of the relationship between parent and child, factors that may contribute to intergenerational relationship are likely to play a role in shaping the family living arrangement. Shapiro (2003) finds that a divorced father often experiences a decline in contact and coresidence with his child, but the opposite tends happen for a divorced mother. Judith A. Seltzer, Yahirun, and Bianchi (2013) show that biological children and mothers are more likely to live close to each other than stepfamilies.

The respondent's need for informal care are likely an important factor that will affect her proximity to the child. Age, self-reported health status, and the presence of the spouse in the household are thus included to proxy for a mother's need for care. The respondent's earnings and wealth are also controlled when it is applicable as it will affect the respondent's ability to afford paid care and make bequests and financial transfers. Lastly, race and ethnicity are

also included in the model when it is appropriate as family ties can play different roles for different cultures and traditions in shaping their residential choices (Spilimbergo and Ubeda 2004).

## 5 Results

### 5.1 Income and Sibling's Effects on Proximity to Mother

In the first part of the analysis, I use multinomial logit to examine the factors that may affect the distribution of children's discrete residential outcomes. The first column of Table 3 shows the covariate's estimated marginal effect in logits for the outcome of children living with the mother relative to the outcome of children living more than ten miles away. The second set of estimates lists the same relative marginal effects for the outcome of children living within ten miles from the mother. For easier interpretation, Table 4 provides the covariate's average marginal effects in probability to each outcome. The results are consistent with the hypothesis that there is a positive relationship between a child's socioeconomic status and his or her distance to the mother. All else being equal, children with higher incomes or education attainment are more likely to live independently and more than ten miles away from the mother. Full-time working status reduces a child's likelihood to live with the mother, but it has no statistically significant effect on residential distance to her.

Having siblings is associated with greater distance to the mother. In addition, the results also confirm that a child's proximity to the mother is closely linked to the siblings' residence. First, siblings tend to cluster with each other in terms of their residential choices. A child who has at least one sibling living within ten miles from the mother will also be more likely to live near the mother. In addition, there is a gender difference for this clustering effect. Having a brother in close proximity to the mother on average increases a child's likelihood

to live with the mother by 0.8 percentage points and a child's likelihood to live within ten miles from mother by 11.2 percentage points. On the other hand, having a sister in close proximity to mother has no effect on a child's likelihood to live with the mother, and it only increases the likelihood to live in close proximity to the mother by 9.6 percentage points.

The sibling's clustering effect is consistent with the public good aspect of parent care: being the *only* child living close to the mother may affect one's bargaining position in the family when making the caregiving decision. However, this also suggests that family living arrangements can often be influenced by unobserved family characteristics such as a shared affinity to a region among the siblings. In my following analysis that examines the proximity relative to other family members, I will use fixed effect models to address possible biases from unobserved variables.

More importantly, this gender disparity in the sibling's clustering effect suggests that a child's proximity to the mother is likely linked to the family's caregiving arrangements. A child who has a sister in close proximity to the mother may not need to carry as much caregiving responsibility than a child who has a brother in close proximity to the mother, since the mother's care is most often provided by daughters. As a result, we observe a notable reduction in the likelihood to live with the mother when we compare siblings who have a sister in close proximity to the mother to those who have a brother living near the mother.

In addition to socioeconomic status and the sibling's residence, a child's relationship with the mother also plays a role in determining his or her proximity. Children usually live closer to their biological mothers than stepmothers, but the likelihood of being in close proximity decreases if the mother is divorced. Married children in general live farther away from their mother, but the arrival of grandchildren can pull the extended family closer to each other, although they are less likely to live in the same house.

The effect of parents' need for care on a child's residential choice is apparent. As mothers age, children are increasingly likely to be in close proximity to them. A mother's poor health would further increase the likelihood of a child living with her. As most parents in our sample are older than 65 and retired, their earnings have little effect on a child's proximity. However, it does appear that wealthier parents are more likely to have children in close proximity when all else is equal. Lastly, minorities tend to live closer to their mothers than their non-Hispanic White counterparts, which is consistent with the literature that family ties differ by race and ethnicity (Spilimbergo and Ubeda 2004).

## 5.2 Comparison of Proximity within Family

The dependent variable in Table 5 indicates whether a child is the nearest to mother in residence among the living children in a family. Using models of family and individual fixed effects, the results further confirm the relationship between children's economic wellbeing and their proximity to mother. Within a family, those who are less educated or in lower income brackets are more likely to become the closest child in residential distance. The results for income brackets remain robust even when comparing individuals only with themselves. Working full-time also reduces a child's likelihood of becoming the closest one to the mother, although the negative relationship is not statistically significant in the model with individual fixed effects.

Consistent with the previous findings, estimates for other child characteristics show that biological daughters are most likely to be the closest child in residence to the mother among the adult children. By definition, children who live with the mother would be the ones who live closest to her, and thus the closest child in the family tends to be those who is not married and has neither kids nor a house.

Table 6 conducts a similar test but the outcome variable is a child's rank of proximity among

all adult children in the family. In this measure, the closest child to the mother is ranked as 1, the second-closest is ranked as 2, and so on. In models (1) to (3), the rank is treated as a numerical variable, and a linear panel model with family fixed effects is used to estimate the dependency of a child's rank on the child's variables. Model (1) includes all children in families with more than two adult children and mothers who are at least 65 years old, while models (2) and (3) are conditioned to families with three or four children, respectively. In Model (4), a child's rank is treated as an ordinal variable, and thus the empirical model is specified as a ordered logit with robust standard errors at the family level. Across the model specifications, the results are largely in agreement with previous observations. The main difference is that some estimates lost statistical significance when the samples are conditioned to a smaller subset of families.

In the previous section, I look at the distribution of children in each proximity category and conclude that children who work full-time, have more education, or are in higher income categories tend to live farther away from mother. These conclusions hold true even if the children are only compared to their siblings or with themselves over time. Similarly, focusing on the differences within a family, it can be seen that biological children live closer to the mother than stepchildren, and daughters live closer than sons. Lastly, children with competing obligations, such as marriage and their own children, tend to live further away from their mothers than their otherwise similar siblings.

## 6 Discussion

In this study, I present a simple theoretical framework to conceptualize the tradeoffs that adult children face when choosing their residences in relation to their parents' homes. A closer proximity to the parents can facilitate the relationship of mutual assistance between the parents and the child. Children living closer to their parents are more likely to receive

financial help from their parents, and it is also easier for the children to provide care if their parents are in need of care. However, in exchange for being closer to the parents, the child may not live in a neighborhood that best fits the child's other needs. A child's preferred residence is shaped by a variety of life-course events such as career opportunities, spouse's preferences, and children's education. Unless these benefits are perfectly aligned with the interests in living closer to the parents, choosing one location over the other involves a difficult decision where trade-offs must be considered.

In the theoretical framework, I argue that the mutual assistance between the parent and child is a more important factor for children with less financial resources. When the parents's financial help is conditioned on a child's residential distance, children with lower incomes will be more likely to live closer to the parent even though they may have other location preferences. As a result, I expect to see a positive relationship between the children's wages and their proximity to the parents. In addition, we would also see those with greater caregiving responsibilities living closer to their parents as their cost of care provision increases quickly with the distance.

Using data from the Health and Retirement Study, I show a robust relationship between a child's income and his or her distance to the mother. The one who lives closer to the mother tends to be the one has least income and education. In addition, the relationship holds true wether one is measuring the actual distance between mother and child or the child's distance to mother in relation to other siblings.

The results also reveal the dependence of living arrangements on the family caregiving decisions. Children with more caregiving expectations are also more likely to live closer to the mother. Consistent with the literature, biological daughters tend live closest to her mother. Moreover, those who have a sister in close proximity to the mother are less likely to live with the mother than those who have a brother living near the mother. The dependency of a child's proximity to the mother on sibling's residence also demonstrates the interdependency

of residential decisions among family members, which has not been explored much in the economic literature.

This paper expands the literature of family living arrangements by incorporating a child's residential distance to the theoretical framework that traditionally focuses on household formation. The model's emphasis also helps conceptualize adult children's tradeoffs in making residential decisions with the context of care provision and the parent's transfer. A parent's residential location is unlikely to be the only factor that matters in a child's choice of residence, as the empirical results show that competing obligations such as marriage or a child's own children all play a role in determining the proximity between generations.

However, these results raise concerns for the wellbeing of the caregivers. The empirical results here confirms that children who live closest to mother tend to be those who are most economically disadvantaged across and within family. As the closest child tends to carry the responsibility of providing care, the long term career cost of care provision can further put these children in a difficult position to prosper in the labor market. While parents may provide financial compensation through bequests or inter-vivos transfers, it is unclear that those transfers are enough to make up for the loss of wage or career advancements. What is more concerning are the financial situations for the caregivers of poor parents. Without the help from parents, these caregivers may find it difficult to address their financial situations while meeting the responsibility of providing care.

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# A Appendix

## A.1 Distance and Income

**Theorem 1.** *If a child's working hours and the decline of transfer from parents due to residential distance are sufficiently large, wage and residential distance has a positive relationship. If wage becomes large enough, the relationship between wage and distance will eventually be negative. i.e.*

$$M > \frac{\lambda P}{-U_{LL}} \quad \& \quad \gamma_\delta < \frac{-Pd_\delta h}{2} \implies \begin{cases} 0 < w < w^* & \frac{\partial \delta^*}{\partial w} > 0, \\ w^* < w & \frac{\partial \delta^*}{\partial w} < 0. \end{cases}$$

where  $w^*$  is the larger real root of the quadratic function defined in eq. 2.

**Lemma 1.** *The sign of the relationship between residential distance and wage is the opposite of the sign of  $|A_{\delta,w}|$ , where  $|A_{\delta,w}|$  is defined in 1. i.e.*

$$\text{sgn} \left( \frac{\partial \delta}{\partial w} \right) = - \text{sgn} (|A_{\delta,w}|)$$

*Proof.* The adult child's utility maximization problem can be set up as the following:

$$\begin{aligned} \max_{L,h,\delta} \quad & U(L, F(h), \delta) \\ \text{s.t.} \quad & I + \gamma(\delta) + wT = (P + w)L + (1 + d(\delta))wh^* \end{aligned}$$

Let  $U_L$  denote the partial derivative of the function  $U$  with respect to the variable  $L$ , i.e.  $\frac{\partial U}{\partial L}$ , and similarly for other partial derivatives. Assume the following properties:

$$\begin{aligned} U_L &> 0, \quad U_F > 0, \quad U_\delta > 0 \\ U_{LL} &< 0, \quad U_{FF} < 0, \quad U_{\delta\delta} < 0 \\ F_h &> 0, \quad F_{hh} < 0, \quad \gamma_\delta < 0, \quad \gamma_{\delta\delta} > 0, \quad d_\delta > 0, \quad d_{\delta\delta} < 0 \end{aligned}$$

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\* The budget constraint is reduced from the child's time and income constraints:

$$\begin{aligned} T &\geq L + (1 + d(\delta)) + m \\ I + \gamma(\delta) + wm &\geq (P + w)L \end{aligned}$$

Set up the Lagrangian as:

$$\mathcal{L} = U(L, F(h), \delta) + \lambda \left\{ I + \gamma(\delta) + wT - (P + w)L + (1 + d(\delta))wh \right\}$$

First order conditions:

$$\begin{aligned} \mathcal{L}_L &\equiv U_L - \lambda(P + w) &&= 0 \\ \mathcal{L}_h &\equiv U_F F_h - \lambda(1 + d(\delta))w &&= 0 \\ \mathcal{L}_\delta &\equiv U_\delta + \lambda\gamma_\delta - \lambda d_\delta h w &&= 0 \\ \mathcal{L}_\lambda &\equiv I + \gamma(\delta) + wT - (P + w)L - (1 + d(\delta))hw = 0 \end{aligned}$$

Bordered Hessian matrix is thus defined as:

$$\mathbf{H} = \begin{bmatrix} U_{LL} & U_{LF}F_h & U_{L\delta} & -(P + w) \\ U_{LF}F_h & U_{FF}F_h^2 + U_FF_{hh} & U_{\delta F}F_h - \lambda d_\delta w & -(1 + d(\delta))w \\ U_{L\delta} & U_{\delta F}F_h - \lambda d_\delta w & U_{\delta\delta} + \lambda\gamma_{\delta\delta} - \lambda d_{\delta\delta} h w & \gamma_\delta - d_\delta h w \\ -(P + w) & -(1 + d(\delta))w & \gamma_\delta - d_\delta h w & 0 \end{bmatrix}$$

The sufficient conditions for a local maximum at critical points require that the determinant of  $\mathbf{H}$  to be negative, i.e.  $|\mathbf{H}| < 0$ .

For the following analysis to be analytically tractable, assume  $U_{LF} = U_{L\delta} = U_{F\delta} = 0$ , and let  $\theta$  denote  $\frac{\partial^2 U}{\partial h \partial h} = U_{FF}F_h^2 + U_FF_{hh} < 0$ . Then the bordered Hessian matrix is simplified to

$$\mathbf{H} = \begin{bmatrix} U_{LL} & 0 & 0 & -(P + w) \\ 0 & \theta & -\lambda d_\delta w & -(1 + d(\delta))w \\ 0 & -\lambda d_\delta w & U_{\delta\delta} + \lambda\gamma_{\delta\delta} - \lambda d_{\delta\delta} h w & \gamma_\delta - d_\delta h w \\ -(P + w) & -(1 + d(\delta))w & \gamma_\delta - d_\delta h w & 0 \end{bmatrix}$$

By Cramer's rule,

$$\frac{\partial \delta^*}{\partial w} = \frac{|A_{\delta,w}|}{|\mathbf{H}|} = \frac{\begin{vmatrix} U_{LL} & 0 & \lambda & -(P + w) \\ 0 & \theta & \lambda(1 + d) & -(1 + d)w \\ 0 & -\lambda d_\delta w & \lambda d_\delta h & \gamma_\delta - d_\delta h w \\ -(P + w) & -(1 + d)w & -(T - L - (1 + d)h)^\dagger & 0 \end{vmatrix}}{|\mathbf{H}|} \quad (1)$$

If the sign of  $|\mathbf{H}|$  satisfies the necessary second order conditions, the sign of  $\frac{\partial \delta}{\partial w}$  will then be

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<sup>†</sup>Note that  $T - L - (1 + d)h = M$ , i.e. the child's working time, and  $M \geq 0$

determined by the sign of  $|A_{\delta,w}|$ :

$$\text{sgn} \left( \frac{\partial \delta}{\partial w} \right) = - \text{sgn} (|A_{\delta,w}|) \quad \because |\mathbf{H}| < 0$$

□

**Lemma 2.** *If a child's working hours and the decline of transfer from parents due to residential distance are sufficiently large,  $|A_{\delta,w}|$  will be negative when  $0 < w < w^*$  and positive when  $w^* < w$ , where  $w^*$  is the larger real root of the quadratic function defined in eq. 2. Specifically,*

$$\begin{aligned} & \text{If } M > \frac{\lambda P}{-U_{LL}} \quad \& \quad \gamma_{\delta} < \frac{-P d_{\delta} h}{2} \\ & \begin{cases} 0 < w < w^* & |A_{\delta,w}| < 0, \\ w^* < w & |A_{\delta,w}| > 0. \end{cases} \end{aligned}$$

*Proof.* Rearrange  $|A_{\delta,w}|$  by  $w$  and we can express  $|A_{\delta,w}|$  as a quadratic function in  $w$

$$\begin{aligned} |A_{\delta,w}| = & w^2 \underbrace{[-\lambda d_{\delta} (1+d) (MU_{LL} + \lambda P)]}_a \tag{2} \\ & + w \underbrace{[-(1+d)^2 \lambda \gamma_{\delta} U_{LL} - M \theta d_{\delta} h U_{LL} - P^2 \lambda^2 (1+d) d_{\delta} - \lambda \theta \gamma_{\delta} - P \theta \lambda d_{\delta} h]}_b \\ & + \underbrace{M \theta \gamma_{\delta} U_{LL} - P \lambda \theta \gamma_{\delta} - P^2 \theta \lambda d_{\delta} h}_c \end{aligned}$$

When  $a > 0$  and  $c < 0$ , equation 2 has two real roots,  $w_1^*$  and  $w_2^*$  and  $|A_{\delta,w}|$  is a convex function in  $w$ . Let  $w_1^*$  be the smaller root of the two. i.e.:

$$w_1^* = \frac{-b - \sqrt{b^2 - 4ac}}{2a}, \quad w_2^* = \frac{-b + \sqrt{b^2 - 4ac}}{2a}.$$

$$\begin{aligned} a > 0 & \implies [-\lambda d_{\delta} (1+d) (MU_{LL} + \lambda P)] > 0 \\ & \implies M > \frac{\lambda P}{-U_{LL}} \end{aligned} \tag{3}$$

$$\begin{aligned} c < 0 & \implies M \theta \gamma_{\delta} U_{LL} - P \lambda \theta \gamma_{\delta} - P^2 \theta \lambda d_{\delta} h < 0 \\ & \implies M \gamma_{\delta} U_{LL} - P \lambda \gamma_{\delta} > P^2 \lambda d_{\delta} h \end{aligned}$$

Assume the condition from 3 holds, we can derive a new inequality from the left side of the above statement:

$$M\gamma_\delta U_{LL} - P\lambda\gamma_\delta > \frac{\lambda P}{-U_{LL}}\gamma_\delta U_{LL} - P\lambda\gamma_\delta = -2\lambda P\gamma_\delta$$

Thus, assuming that  $a >$ , we can derive a sufficient condition for  $c >$  as the following:

$$\gamma_\delta < -\frac{Pd_\delta h}{2} \implies c < 0 \quad (4)$$

A straightforward substitution will show that when both conditions 3 and 4 hold,  $b$  will be negative and the equation 2 will have two real roots.

$$\text{If } M > \frac{\lambda P}{-U_{LL}} \quad \& \quad \gamma_\delta < -\frac{Pd_\delta h}{2} \implies b < 0 \quad \& \quad b^2 - 4ac > 0$$

Together, these conditions ensure that the quadratic function in  $w$  from eq. 2 will be negative when  $w$  is small, and becomes positive when  $w$  is sufficiently large. Together with Lemma 1, it gives us the sufficient conditions to sign  $\frac{\partial \delta^*}{\partial w}$ :

$$a > 0, \quad b < 0, \quad c > 0 \implies w_1^* < 0 \quad \& \quad w_2^* > 0$$

$$\begin{aligned} \implies & \begin{cases} |A_{\delta,w}| < 0 & \text{if } 0 < w < w_2^* \\ |A_{\delta,w}| > 0 & \text{if } w_2^* < w \end{cases} \\ \implies & \begin{cases} \frac{\partial \delta^*}{\partial w} > 0 & \text{if } 0 < w < w_2^* \\ \frac{\partial \delta^*}{\partial w} < 0 & \text{if } w_2^* < w \end{cases} \end{aligned}$$

□

## A.2 Tables and Figures

Table 1: Summary Statistics

	Mean	S.D.	Min.	Max.
<i>Child Characteristics</i>				
Education (years)	13.656	2.420	1	17
Working fulltime	0.722	0.448	0	1
Age	47.909	8.508	25	83
Biological child	0.913	0.282	0	1
Female	0.501	0.500	0	1
Married	0.659	0.474	0	1
Number of children	2.008	1.553	0	23
Own home	0.616	0.486	0	1
<i>Mother Characteristics</i>				
Poor health	0.102	0.302	0	1
Age	74.558	7.226	65	106
Earning (logged)	1.224	3.131	0	13
Wealth (logged)	11.014	3.268	0	18
Foreign born	0.092	0.288	0	1
Ever divorced	0.214	0.410	0	1
Couple household	0.506	0.500	0	1
Number of children	4.663	2.619	1	22
Race: white	0.763	0.425	0	1
Observations	100835			

Table 2: Sample Distribution of Child’s Income and Proximity to Mother

Child’s Income	Coresidence	Within 10 miles	More than 10 miles	Total
<10k	30.08	5.41	4.35	6.36
10k-35k	29.41	18.24	13.83	16.21
35k-70k	12.26	20.60	19.10	19.12
>35k	2.53	9.91	11.04	10.14
>70k	4.76	17.50	23.30	20.30
Don’t know	20.96	28.34	28.38	27.88
Total	100.00 (6,593)	100.00 (31,155)	100.00 (63,087)	100.00 (100,835)

*Note:* Numbers report column percentages. Counts for each proximity category in parentheses.

Table 3: Multinomial Logit: Children's Proximity to Mother

	Base outcome: More than 10 miles			
	Coresidence		Less than 10 miles	
Education (years)	-0.0612***	(0.0119)	-0.1074***	(0.0066)
Working fulltime	-0.2728***	(0.0446)	0.0649**	(0.0257)
<i>Child's income category (ref: &lt;10k)</i>				
10k-35k	-0.4883***	(0.0643)	0.0857	(0.0538)
35k-70k	-1.0228***	(0.0767)	-0.0678	(0.0553)
>35k	-1.7432***	(0.1156)	-0.2313***	(0.0608)
>70k	-1.6992***	(0.1023)	-0.3251***	(0.0590)
Don't know	-1.1354***	(0.0633)	-0.2172***	(0.0525)
<i>Family structure</i>				
Number of siblings	-0.1681***	(0.0140)	-0.1073***	(0.0083)
Sister living near R	0.1778***	(0.0536)	0.4944***	(0.0329)
Brother living near R	0.3824***	(0.0527)	0.5921***	(0.0319)
<i>Child Characteristics</i>				
Age	-0.0347***	(0.0042)	-0.0159***	(0.0025)
Biological child	1.8277***	(0.1869)	0.8228***	(0.0685)
Female	0.0651	(0.0505)	0.1089***	(0.0274)
Married	-1.0558***	(0.0554)	-0.0091	(0.0284)
Number of children	-0.1806***	(0.0176)	0.0306***	(0.0082)
Own home	-1.9699***	(0.0612)	0.2886***	(0.0224)
Firstborn	-0.0239	(0.0650)	0.1015***	(0.0338)
<i>Mother Characteristics</i>				
Age	0.0368***	(0.0051)	0.0082***	(0.0028)
Poor health	0.1726***	(0.0595)	0.0146	(0.0362)
Earning (logged)	0.0066	(0.0069)	0.0039	(0.0037)
Wealth (logged)	0.0133*	(0.0074)	0.0126***	(0.0045)
Ever divorced	-0.5218***	(0.0644)	-0.0845**	(0.0369)
Couple household	-0.7591***	(0.0568)	-0.0717**	(0.0288)
Foreign born	0.1397	(0.0916)	-0.0545	(0.0536)
<i>Race (ref: Non-Hispanic White)</i>				
Black	0.2428***	(0.0691)	0.2388***	(0.0449)
Hispanic	0.4720***	(0.1019)	-0.1698***	(0.0594)
Other	0.5039***	(0.1672)	0.0129	(0.1169)
Constant	-1.3587***	(0.4007)	-0.2668	(0.2093)
Observations	100,835			
(Pseudo) $R^2$	0.129			

\* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01.

*Note:* Dependent variable is children's proximity category: coresidence, living within ten miles from mother, and more than ten miles away. Numbers show the logit estimate with living more than ten miles away as the base outcome. Standard errors corrected for heteroskedasticity at family level.

Table 4: Multinomial Logit – Average Marginal Effects

	(1)	(2)	(3)
	Coresidence	Within 10 miles	More than 10 miles
Education (years)	-0.0011*	-0.0204***	0.0215***
Working fulltime	-0.0141***	0.0177***	-0.0035
<i>Child's income category (ref: &lt;10k)</i>			
10k-35k	-0.0358***	0.0305***	0.0052
35k-70k	-0.0604***	0.0085	0.0519***
>35k	-0.0839***	-0.0161	0.1000***
>70k	-0.0819***	-0.0349***	0.1168***
Don't know	-0.0631***	-0.0201**	0.0832***
<i>Family structure</i>			
Number of siblings	-0.0062***	-0.0185***	0.0247***
Sister living near R	-0.0000	0.0957***	-0.0957***
Brother living near R	0.0080***	0.1117***	-0.1197***
<i>Child Characteristics</i>			
Age	-0.0014***	-0.0026***	0.0040***
Biological child	0.0731***	0.1328***	-0.2059***
Female	0.0012	0.0206***	-0.0219***
Married	-0.0503***	0.0164***	0.0339***
Number of children	-0.0092***	0.0092***	-0.0001
Own home	-0.0991***	0.0917***	0.0074
Firstborn	-0.0029	0.0207***	-0.0178***
<i>Mother Characteristics</i>			
Age	0.0016***	0.0010*	-0.0026***
Poor health	0.0080***	-0.0001	-0.0079
Earning (logged)	0.0002	0.0007	-0.0009
Wealth (logged)	0.0004	0.0023***	-0.0027***
Ever divorced	-0.0235***	-0.0079	0.0313***
Couple household	-0.0350***	-0.0012	0.0362***
Foreign born	0.0076*	-0.0133	0.0057
<i>Race (ref: Non-Hispanic White)</i>			
Black	0.0072**	0.0450***	-0.0521***
Hispanic	0.0276***	-0.0408***	0.0132
Other	0.0259***	-0.0067	-0.0192
Observations	100,835	100,835	100,835

\* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01.

Note: Numbers show the average marginal change in predicted probability for each covariate. Standard errors and p-values corrected for heteroskedasticity at family level

Table 5: Effects on Child's Probability to be the Closest Child

	(1)		(2)	
	Family FE		Individual FE	
	Logit		Logit	
Education (years)	-0.0744***	(0.0054)		
Working fulltime	-0.0682***	(0.0209)	-0.0445	(0.0411)
<i>Child's income category (ref: &lt;10k)</i>				
10k-35k	-0.5644***	(0.0406)	-0.2578***	(0.0731)
35k-70k	-0.8164***	(0.0435)	-0.3138***	(0.0781)
>35k	-1.0302***	(0.0491)	-0.3402***	(0.0860)
>70k	-0.9733***	(0.0470)	-0.2870***	(0.0842)
Don't know	-0.9459***	(0.0411)	-0.2629***	(0.0709)
<i>Child Characteristics</i>				
Age	-0.0088***	(0.0016)	0.0179***	(0.0037)
Biological child	0.8941***	(0.0435)		
Female	0.0740***	(0.0183)		
Firstborn	-0.0578***	(0.0214)		
Married	-0.4158***	(0.0216)	-0.2329***	(0.0561)
Number of children	-0.0402***	(0.0063)	0.0107	(0.0179)
Own home	-0.3536***	(0.0208)	-0.1195***	(0.0367)
Observations	83,066		32,070	
Number of Groups	6,697		7,560	
Pseudo $R^2$	0.045		0.004	

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Outcome variable is 1 if a child was the closest one to mother in residential distance. Numbers show the the logit estimates. Standard errors are reported in parentheses.

Table 6: Effect on Children's Rank of Proximity to Mother

	Linear Rank with Family FE			Ordered Logit
	(1)	(2)	(3)	(4)
	All	Three Kids	Four Kids	Four Kids
Education (years)	0.0317***	0.0451***	0.0416***	0.0377***
Working fulltime	0.0605***	0.0218	0.0119	0.0140
<i>Child's income category (ref: &lt;10k)</i>				
10k-35k	0.2858***	0.1280***	0.3015***	0.4794***
35k-70k	0.4334***	0.2238***	0.4309***	0.6119***
>35k	0.5056***	0.3187***	0.5552***	0.7867***
>70k	0.5017***	0.3082***	0.4689***	0.6292***
Don't know	0.5254***	0.3061***	0.4952***	0.7198***
<i>Child Characteristics</i>				
Age	0.0069***	0.0065***	0.0087***	0.0024
Biological child	-0.5985***	-0.3662***	-0.3574***	-0.2294***
Female	-0.0511***	-0.0176	-0.0088	-0.0038
Firstborn	0.0151	0.0015	-0.0444**	-0.0057
Married	0.1979***	0.1333***	0.0915***	0.1243**
Number of children	0.0125***	0.0139***	0.0103*	0.0191
Own home	0.0992***	0.0838***	0.1247***	0.0667*
Constant	1.7950***	0.9002***	1.1354***	
Observations	91,467	19,215	16,913	16,913
Number of Family	8,325	2,282	1,620	1,620
(Pseudo) $R^2$	0.044	0.059	0.048	0.006

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Dependent variable is a child's rank of proximity to mother in a family. Model (1)-(3) are family fixed-effect models with rank treated as a numerical variable. Model (4) is an ordered logit model with rank treated as an ordinal variable. Model (1) restricts sample to families with at least two children. Model (2) restricts the sample to families with three children only, and both Model (3) and (4) restrict the sample to families with four children only. Standard errors of Model (4) are corrected for heteroskedasticity at family level.

# Chapter III

## Living Arrangements and Caregiving after the Great Recession

### A Recession-Prosperity Comparison

#### 1 Introduction

The repercussions of the Great Recession were felt at many levels of our society, including the family. During and after the recession, young women postponed their childbearing, as they faced uncertain career prospects (Cherlin et al. 2013). Young adults opted for staying with their parents, and the household formation shortfall still has yet to be recovered despite the rebound in the rate of household formation after the recession ended (Dunne 2012). The dismal job market during the recession also prompted wives to join the labor market as the job losses disproportionately affected men (Mattingly and Smith 2010).

Such sudden changes in the economic landscape had implications for the roles and expectations of family members. Today, mothers are increasingly taking up the role as the sole or primary breadwinner (Wang, Parker, and Taylor 2013). Consequently, during the period of 2005 and 2011, there was an increase in the share of married fathers who assumed the role of caregiver for their children (Smith 2015).

The adjustment of day-to-day family life during times of crisis is a testimony of how families weather the storm as a unit. What remains unclear, however, is how the recession has affected the older parents. Independent living among the elderly has become the norm over

the course of the past two centuries (Ruggles 2007). However, the possibility of frail elderly parents living independently in the community requires assistance that is often provided by their daughters, who work while spending nearly 20 hours a week as unpaid family caregivers (National Alliance for Caregiving 2009). When married daughters faced increasing pressure to finance their own households, it was unclear whether the responsibility of caring for the parents would then be shifted to sons, replaced by paid care, or simply left out.

The goal of this paper is thus to examine the changes in the support network for elderly parents after the recession. It utilizes the family panel data from the Health and Retirement Study that was collected biannually between the years of 2002 and 2010. By constructing and comparing time trends throughout the recession, I examine key indicators for the elderly's access to family care, including the geographical availability of the children and their participation in care. I also compare the changes of these indicators with the mother's health and poverty status to highlight the divergent paths between average families and those who were financially strapped. Lastly, I use a fixed-effect panel model to test the possible drivers behind these post-recession changes. The results reveal that the increases in proximity among some population subgroups were closely linked to the changes in the children's situation, but they were linked less to the mother's needs.

During the slow recovery after the Great Recession, many wondered what the "new normal" would look like in this new era. This study is an attempt to identify these changes for families with elderly parents and to start conversations about its implications. I first review the information gained about the changes in family life during and after the recession in section 2. Then I will go through the data and measures that were used in the analyses in section 3. I discuss the lack of change in living arrangements for the general population as well as its exceptions in Section 4. This section also includes a discussion on the post-recession changes of the elderly's access to family care and of the children's participation in care provision. Overall, in terms of the gender disparity of care provision, little has changed

since the recession. To conclude, I discuss the policy implications of these findings and the need for services to support the elderly parents and their caregivers in section 5.

## 2 Recession and Intergenerational Relationship

### 2.1 Living Arrangements and Economic Shocks

In the United States, the share of older parents living with their children has been declining since the mid-nineteenth century. By the end of the twentieth century, less than one in five persons age 65 or older were living with their children (Ruggles 2007). This is not an unique phenomenon for the U.S., as independent living is also now the norm for older parents in most European countries (Hank 2007). Most research of household formation has attributed the increase of independent living to the improvement of the younger generation's economic opportunities.

However, the Great Recession represents a significant shift in economic structures and opportunities for young adults, and it thus could have significant effect on intergenerational relationships. Higher housing prices and lower income could hinder young adults from establishing their own households and delay leaving their parent's house (Ermisch 1999). Using the evidence from past recessions, Lee and Painter (2013) show that the high unemployment rate and the presence of economic downturn can discourage young adults from starting their own families.

Even those who have already left home may find that moving closer to their parents is beneficial in times of economic distress. Compton and Pollak (2013) show that access to childcare provided by the grandparents can help young married women stay in the labor force. Even if grandparents are not actually providing childcare, the assurance that irregular

or unexpected needs for childcare can be fulfilled is still important for lower wage workers, since child care subsidies from the public sector have been dwindling since the recession (Scott and Leymon 2013). A Pew Research Center analysis of U.S. Census Bureau data has shown that, between 2007 and 2008, the number of children raised primarily by grandparents increased by 6 percent, a significant jump from previous years of slow increase (Taylor et al. 2010).

In addition, the findings from the previous chapters of my dissertation suggest that parents distribute inter-vivos transfers based on a child's proximity, and as a result, children with lower income potentials tend to live closer to their parents. The Great Recession has created the largest postwar increase in unemployment (U.S. Bureau of Labor Statistics). When combined with the slow recovery of the labor market after 2009, job seekers may change their expectations of their career prospects and decide to move closer to their parents as a result.

However, it is not yet documented in the literature whether the negative economic shocks during the Great Recession have affected older parents and their children's residential decisions. While the previous literature suggests that families may move closer to each other in times of crisis, falling home prices and negative equity could have discouraged family members from moving (Chan 2001; Ferreira, Gyourko, and Tracy 2010).

## **2.2 Changing Family Roles in Times of Crisis**

In addition to the living arrangement, the recession could have also changed the dynamics of the family caregiving arrangement. Job losses during the recession were not experienced equally among all workers, and thus it has changed the division of paid and unpaid tasks among spouses. As a response to men's deteriorating job prospects during the recession, wives of unemployed men sought work or worked more hours during the recession years

(Hoynes, Miller, and Schaller 2012; Mattingly and Smith 2010). In 2011, a record high of 40% of households with children under age 18 had the mother as either the sole or primary breadwinner (Wang, Parker, and Taylor 2013). Overall, Berik and Kongar (2013) analyzed the American Time Use Survey and found that the paid work hours of married mothers has increased during the period of 2007 and 2009, which was accompanied by a decline in married fathers' paid work hours.

The increasing presence in married women's participation in the labor market, however, has implications for older parents who might need care. If there is no gender preference for care provision, the increase in the wife's work outside the household would be substituted by their husbands or brothers. However, empirical evidence suggests that the son's care provision may not be not a perfect substitute for the daughter's, as parents may have gender preferences and/or daughters could be more willing to provide care (National Alliance for Caregiving 2009; Szinovacz and Davey 2008; Wolf, Freedman, and Soldo 1997). As a result, whether the recession can change the gender disparity in providing care for older parents is yet to be seen.

## 3 Empirical Methods

### 3.1 Data

I used five waves of data from the Health and Retirement Study (HRS) that was surveyed between the year of 2002 and 2010. The core HRS is a longitudinal panel survey collected biannually with a sample that is nationally representative of Americans over the age of 50. HRS over samples minorities but constructs a weighted sample that is representative of the age-eligible, non-institutionalized individuals in the U.S. population based on the Current Population Survey of the given year. In constructing time trends of the outcome variables,

I use these weights in addition to restricting the sample to families whose youngest child is at least 25 years old in order to avoid the complications from children's ongoing education.

Table 1 shows the unweighted summary statistics for the pooled panel sample, and Table 2 provides the unweighted averages of each variable by wave. There is a total of 20,751 unique mothers in the pooled sample who were at least 50 years old and their youngest child at least 25 years old in a given wave. The majority (67%) of the mothers in the sample had at least one child living in close proximity, but most of the children were living independently. The average age of mother in the sample is 70 years old, while the average age of the youngest child is 40.9. About 12 percent of the mothers were under the poverty level at some point between 2002 and 2010, and close to 10 percent reported having poor health. Lastly, although the average number of sons and daughters in a family is about the same, there were more caregiving daughters than caregiving sons in a given wave.

The HRS family data are well suited for this analysis for several reasons. First, it tracks families throughout the period of 2002 and 2010. The National Bureau of Economic Research (2010) set the official date of the Great Recession to be December 2007 and the end to be June 2009. The HRS thus allows me to observe the changes of variables of interest before, during, and after the recession. Second, the two-year gap between survey years provides sufficient time for the changes of variables, especially the more difficult decisions such as relocation, to materialize and be observed in the survey. Lastly, the HRS data provides detailed demographic informations as well as time transfers between family members, which allows researchers to capture changes for entire families instead of just individual members.

## 3.2 Measures and Analysis

**Outcome Variables** In this paper, several measures are used to evaluate the intergenerational relationships of the elderly. Child availability for the elderly parents is measured

by the weighted averages for the number of children per family living within ten miles from their mother as well as the number of coresident children. The focus is on the mother here is partly to simplify the interpretation of the results, but it also reflects the relative importance of intergenerational proximity to mothers rather than to fathers. Close to three in four men aged 65 and over lived with their spouse, compared with less than half of women who did in the same age range (Vespa, Lewis, and Kreider 2013).

To determine the actual support that the elderly were receiving, I constructed the weighted time trend for the number of children helping with the mother’s instrumental activities of daily living (IADL) per family. Assistance of IADLs are often required for older seniors to live independently in a community, which includes, for example, meal preparation, grocery shopping, or taking medication. When examining the gender composition of caregivers, I calculate the share of mothers who have received care from daughters only, sons only, or both sons and daughters.

**Comparing Trends by Examining the Mother’s Poverty and Health Status** To uncover possible differences in the changes of these outcome variables, I grouped the sample based on mother’s poverty and health status. The mother’s poverty status was constructed by RAND using her reported household income from the last calendar year, and it was compared with the U.S. Census definition of poverty thresholds. A mother’s poor health was identified by her self-reported general health status. In addition to figures, I also estimate the linear time trends for the period between 2002 to 2006 and between 2006 to 2010.

The statistical differences in time trends are tested using the following model, in which the dependent variable,  $y_{i,t}$  is either the number of children living within ten miles or the number of coresident children:

$$y_{i,t} = \alpha + \beta t + \gamma P_{i,t} + \delta (P_{i,t} \cdot t) + \epsilon_{i,t} \quad (1)$$

where the mother is indexed by  $i$  and the time period by  $t$ . The coefficient,  $\beta$ , denotes the estimated slope of the time trend between the period of 2006 and 2010, and  $\gamma$  denotes the estimated impact when the mother was living under the poverty line ( $P_{i,t} = 1$ ). The estimate for  $\delta$  then gives us the differences in slope between average and poor families.

**Testing the Causes behind Changes** Lastly, to determine whether parents or children drive the living arrangement changes, I used a panel model of individual fixed effects with two time periods of 2006 and 2010. In the following two-period fixed effect model, the dependent variables,  $y_{i,t}$ , are either the number of children living within ten miles or the number of coresident children. The model is specified as the following:

$$y_{i,t} = \alpha + m_i + \beta x_{i,t} + \epsilon_{i,t} \quad (2)$$

where the mother is indexed by  $i$ , and  $t$  indexes the time period that is either 2006 or 2010. Time-invariant fixed effects from mother are denoted by  $m_i$ , and  $x_{i,t}$  denotes a vector of covariates that could cause the post-recession changes of the family living arrangement.

Since this is a two-period fixed-effects model, the estimated coefficients,  $\beta$  can be interpreted in the same manner as in a first-difference regression. It shows how the covariates' changes between 2006 and 2010 are associated with the changes of outcome variables during the same time period. The fixed effect model estimated in Stata also provides an estimate for  $\alpha$  that can be interpreted as a sample wide constant that can help in interpreting the magnitude of the main coefficient of interests,  $\beta$ .\*

The covariates of the model include variables that capture the changes of children's financial situations as well as the assistance from parents, including the number of children who

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\*For  $\alpha$  to be identified, Stata assumes that  $\sum m_i = 0$ . The validity of this assumption has no effect on the estimated  $\beta$ . However, if the assumption is valid, the common intercept estimated by Stata in a fixed-effect model is identical to the intercept estimated in a random-effect model. (Gould 2013)

left their full-time work, the total number of grandchildren, and the number of children whose mothers helped care for the grandchildren. A mother's physical or financial needs are measured by variables including indicators of whether the mother has poor health, whether she was under the poverty threshold, whether she was covered by any health plan – such as Medicaid or Medicare– and numerical variables including the log of mother's household wealth and the number of children providing care in the given wave.

## 4 Findings on Living and Caregiving Arrangements

### 4.1 Trends of Intergenerational Proximity

The top chart of Figure 1 shows the average number of children living within ten miles of the mother, and the bottom chart shows the same for the coresident children. The recession appears to have little impact on an average family. For an average family, there were fewer children living nearby in 2010 than there were in 2002; it declined from an average of 1.21 children per family in 2002 to 1.11 in 2010. However, while most families have slightly less children living in close proximity, mothers who lived under the poverty line actually saw an increase in the number during the recession. While children from the poor families were more likely to live closer to the parents before the recession, the gap between poor and average families had widened since then.

A divergence between average and poor families has also emerged after 2008 for the number of coresident children. Prior to the recession, less than one in five families had an adult child living with their mother, and there was little difference between poor or average families. In 2010, poor families saw a sharp increase in the average number of coresident children, which jumped from 0.23 to 0.34 per family, a 53% increase in the two-year period since 2008. The sudden increase in intergenerational co-residence, however, is not evident for average

families.

Table 3 estimates the slopes of the linear time trends before and during the recession. The first two columns of Table 3-(a) show that the number of children living within ten miles from mother trended downward both before and during the recession. The slope of time trend during the recession for families above the poverty line is almost identical to its slope before the recession (see Col. (3) and (4) of Table 3-(a)). Meanwhile, the trend for poor families reversed its course, as its slope changed from negative to positive after the recession, although the differences between Cols. (5) and (6) are not statistically significant due to the much smaller sample size for families under the poverty line.

We can see a similar pattern for coresident children in Table 3-(b). Overall, there was an increase in the number of coresident children after the recession, but almost all the increases can be attributed to the changes from the poor families, despite representing only about one-tenth of the weighted sample. Families whose mother was living above the poverty line saw a slight increase in the number of coresident children before the recession, but such increase dissipated after the recession. On the other hand, families under the poverty line saw a statistically significant increase in the number of coresident children— an annual increase of 0.035 child per family, roughly 18 percent of the pre-recession level— between the period of 2006 and 2010.

Table 4 tests the statistical significance for the differences in the changes of living arrangements between 2006 and 2010 based on the mother's poverty status. The results confirm that the number of coresident and nearby children for the poor families has increased more than other families, although the difference is only statistically significant for the number of coresident children.

Overall, despite the Great Recession's widespread impact on personal finance and career prospects, it has changed little in terms of the intergenerational proximity for an average

elderly mother. Poor families, however, were the exception as their children clustered around parents during the economic downturn.

## 4.2 Drivers of Post-recession Changes

To understand the causes behind these changes, Fig. 2 further splits the sample by the mother's health and poverty status. The top chart reveals that there was an influx of children living closer to their ill mother, regardless of her poverty status, in the midst of the recession. Most of the increases were dissipated by 2010, but the number of children living near their mother continued its upward trend for poor families whose mothers were still healthy. In the bottom chart of Fig. 2, the number of children living with their mother among the poor families increased during the recession regardless of the mother's health status. The number was also increased for families whose mother was ill but not living under the poverty line, but the increase only briefly occurred in 2008 before dropping back to its pre-recession level by 2010. Overall, the distinctive patterns among families whose mothers were either in poor health or living under the poverty line suggest that both the mother's health and the family members' financial situations are linked to differences in child availability among families.

Table 5 shows the result of the estimation using fixed-effects models to investigate the underlying causes behind the increased child availability for some families. In the sample, each family contributes two observations, and there are a total of 5,553 mothers who were at least 50 years old and whose youngest children were at least 25 years old in 2006. The first three variables captures the children's need to move closer to the mother, and the results demonstrate a close relationship between the children's needs and their proximity to the mother. Children losing their full-time jobs are associated with an increase in shared residence. When adult children have their own kids, they tend to live independently but close to their mother to obtain help with childcare. These results are consistent with the previous chapter, which

uses child-level data to analyze a child's residential distance to mother.

However, the relationship between a mother's need and proximity is more surprising. Changes of both outcome variables during the recession period were not associated with changes of the mother's health status. When looking at a parent's financial situation, it can be seen that mothers who fell under the poverty line during the recession were less likely to have coresident children. Similarly, mothers who were not covered by health insurance were less likely to have adult children living under the same roof. In addition, the decline of a parent's wealth also has no relationship with the changes of intergenerational proximity during the recession. However, it appears that the number of caregiving children is positively correlated with the number of coresident children and the number of children living in close proximity.

For robustness checks, model (1) and (2) in Table 6 use the same methodology except that the sample here includes all three waves of the data collected in 2006, 2008, and 2010. In addition to the expanded sample, model (3) and (4) use a numerical summary of mother's IADL limitations as a proxy for mother's health condition, instead of the binary variable of mother's self-reported poor health. These results are consistent with the estimates reported in Table 5.

As a whole, the evidence suggests that the post-recession changes in living arrangement likely has more to do with the children's situation, while its relationship to the parents' needs is mixed. As adult children lose their full-time jobs or are in need of childcare, they move in or move closer to their mother for support. On the other hand, the changes in the mother's health status or household wealth did not result in living arrangement changes. Moreover, a mother was less likely to live with her children if she was living under the poverty line or not covered by any health insurance. The positive relationship between the number of caregiving children and both outcome variables suggest that it is still possible that a parent's health needs were driving the changes of children's proximity. However, it may also reflect the children's willingness to provide care once they move closer to their parents.

### 4.3 Findings on Adult Children’s Care Provision

**Access to Care for Older Parents** In addition to the adjustments in living arrangements, the literature and the aforementioned results suggests that caregiving arrangement may also be affected by the recession. I use several figures to examine whether care provision to the elderly mother has changed during the recession. Part (a) of Fig 3 shows the average number of children per family who helped with their mother’s IADLs, such as meal preparation, transportation, and home maintenance. Here again, a lack of change for the average families is evident as the number stayed close to 0.1 child per family throughout the period between 2002 and 2010. Families with poor mothers, however, show a turnaround during the recession. The average number of caregiving children had been declining prior to the recession, but it increased by 23% over the four-year period of 2006 and 2010.

Part (b) of Fig 3 shows the time trends for the share of mothers who have at least one child living within ten miles. For an average family, two out three mothers aged 50 or above have at least one child living in close proximity, but the share declined slightly after the recession. On the other hand, in 2002, more than 70% of poor mothers had at least one child living nearby, but the number had been declining until the recession. The divergent path seen here was similar to what was happening in Fig. 1, the gap in terms of child availability between poor and average families has been widening since the recession.

**Gender Composition of Caregiving Children** Part (a) of Fig 4 shows the share of mothers who were helped by their sons. Prior to the recession, parent care was mostly undertaken by daughters, as only one in three mothers who had received care were helped by their sons. This gender disparity, however, changed little after the recession. There has been an increase in the share of mothers who received care from both sons and daughters in both 2008 and 2010. However, almost all of the increase could be attributed to an increase in the number of daughters who helped their mothers while their brothers also helped, and

not vice versa. As Part (b) shows, there has not been much change before or after the recession for the number of sons helping the mother. The only notable increase comes from the number of daughters in the poor families who had provided assistance to their mother in 2008 and 2010.

## 5 Discussion

Despite the magnitude of the Great Recession, the family living arrangements appear to be persistent for most families with elderly parents. Using the family panel data from the HRS, I examine the time trends of child proximity from 2002 to 2010 and find that the average number of children living near their mother or the number of coresident children did not deviate from its pre-recession trajectory. The lack of change could reflect the high costs of relocation and the complexity of family residential decisions. These results further confirms persistency of residential locations and thus the importance of identifying the impact of residential locations on a person's well-being.

What may be even more telling is that little has changed in terms of the participation of care or the gender disparity of the care assignment. There were no significant increase for the share of children providing assistance to their elderly mother for most families. Moreover, while the job losses have disproportionately affected men during the recession, the share of mothers who were helped by their sons remains the same. In fact, if there was any change between 2006 and 2010, it was an increase in the share of mothers who were helped by their daughters.

The only exception for the aforementioned lack of change were poor families. Unlike average families, the number of children living near their mother and the number of coresident children both increased during the recession, although only the latter trend is statistically

significant. Further analysis shows that these increases between 2006 and 2010 were linked to changes in children's financial situations. Those who left their full-time jobs moved in with their elderly mothers to share resources, while those who had their own kids moved closer to their mother for childcare assistance. The empirical relationship between a mother's needs and the children's proximity, however, is mixed. Changes in the mother's health status or wealth did not result in changes of living arrangement. Mothers who fell under the poverty line or lost their health insurance were actually less likely to have co-resident children. However, the number of caregiving children has been rising for families whose children had moved closer to their mother during the recession. Overall, we observe that changes in family living arrangements are rare, but when it does happen, it is usually accompanied by a change in care provision.

In the end, it is most likely that family caregiving decisions go hand-in-hand with the family's living arrangement. With the lack of change in the family living arrangement for most families, little change in the elderly's access to care or the children's gender division for care assignments has been observed. The most vulnerable group of people in this recession revealed in this analysis are daughters who were single mothers or married with a husband who had just lost his job. Facing the mounting pressure to take on the breadwinner role for the family in a difficult economy, they might be forced to take on the dual responsibility as a caregiver if their brothers could not to relocate to help for other reasons such as job prospects, negative equity, and falling home prices.

The persistency in intergenerational proximity even in the face of dramatic economic shocks is also alarming, as the federal and state governments are still struggling to balance their budget. While the demand for assistance among the elderly continues to soar in this aging society, thirty-one states cut non-Medicaid aging and disability services programs for the fiscal year 2010 (Walls et al. 2011). As the population continues to age and independent living remains on the rise among the elderly, the need for services that enable them to live

in a community will only rise in the near future. The public sector's role in providing relief and services to the elderly and their family caregivers is a difficult yet essential discussion even in today's challenging political and fiscal reality.

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# A Appendix

Table 1: Summary Statistics

	Mean	S.D.	Min.	Max.	N
Have at least one child living within ten miles from mother (=1)	0.673	0.469	0	1	43,281
Number of children living within ten miles from mother	1.208	1.266	0	13	43,281
Number of children living with mother	0.235	0.505	0	6	43,952
Age of mother	70.038	10.509	50	109	47,557
Age of the youngest child	40.859	9.808	25	83	43,570
Mother in poverty (=1)	0.118	0.322	0	1	45,924
Mother in poor health (=1)	0.098	0.298	0	1	47,508
Number of living children	3.213	2.221	0	23	47,557
Number of sons in the family	1.719	1.406	0	19	43,952
Number of daughters in the family	1.752	1.395	0	12	43,952
Number of children helping mother's IADL	0.102	0.393	0	6	43,922
Number of daughters helping IADL	0.066	0.299	0	5	43,856
Number of sons helping IADL	0.028	0.181	0	3	43,856
Number of children not working fulltime	1.098	1.349	0	18	42,929
Number of children received mother's help for childcare	0.402	0.762	0	11	38,697

Table 2: Unweighted Sample Average by Year

	2002	2004	2006	2008	2010
Have at least one child living within ten miles from mother (=1)	0.679	0.682	0.672	0.667	0.666
Number of children living within ten miles from mother	1.248	1.243	1.181	1.182	1.187
Number of children living with mother	0.222	0.232	0.228	0.225	0.268
Age of mother	70.067	69.617	70.341	71.058	69.226
Age of the youngest child	40.173	40.325	41.036	41.754	41.054
Mother in poverty (=1)	0.111	0.113	0.109	0.112	0.142
Mother in poor health (=1)	0.101	0.098	0.101	0.098	0.094
Number of living children	3.182	3.183	3.238	3.294	3.174
Number of sons in the family	1.705	1.710	1.728	1.741	1.712
Number of daughters in the family	1.726	1.739	1.762	1.792	1.744
Number of children helping mother's IADL	0.097	0.096	0.097	0.102	0.118
Number of daughters helping IADL	0.063	0.061	0.065	0.066	0.076
Number of sons helping IADL	0.024	0.026	0.027	0.028	0.032
Number of children not working fulltime	1.059	1.050	1.019	1.117	1.240
Number of children received mother's help for childcare	0.421	0.415	0.397	0.371	0.403
Observations	9469	9710	9317	8990	10071

Table 3: Changes of Intergenerational Proximity over Time by Poverty Status

(a) Number of Children Living within Ten Miles from Mother

	All		Not under poverty		Under Poverty	
	(1)	(2)	(3)	(4)	(5)	(6)
	2002-2006	2006-2010	2002-2006	2006-2010	2002-2006	2006-2010
Biennial Growth	-0.0306*** (0.0072)	-0.0204*** (0.0071)	-0.0279*** (0.0077)	-0.0277*** (0.0073)	-0.0526 (0.0348)	0.0215 (0.0362)
Constant	1.2139*** (0.0148)	1.1527*** (0.0151)	1.1875*** (0.0153)	1.1352*** (0.0153)	1.4541*** (0.0502)	1.3249*** (0.0602)
Observations	24799	24791	22153	21868	2646	2923

(b) Number of Coresident Children

	All		Not under poverty		Under poverty	
	(1)	(2)	(3)	(4)	(5)	(6)
	2002-2006	2006-2010	2002-2006	2006-2010	2002-2006	2006-2010
Biennial Growth	0.0050 (0.0033)	0.0088** (0.0039)	0.0068* (0.0036)	0.0014 (0.0042)	-0.0120 (0.0114)	0.0699*** (0.0144)
Constant	0.2214*** (0.0058)	0.2275*** (0.0066)	0.2197*** (0.0062)	0.2318*** (0.0070)	0.2372*** (0.0177)	0.1894*** (0.0170)
Observations	25164	25077	22459	22106	2705	2971

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Poverty status are based on mother's income and wealth. Biennial changes assumes linear time trends over the given period. Standard errors are reported in parentheses and corrected for heteroskedasticity at family level. Observations are weighted by the CPS at the given year.

Table 4: Changes of Proximity to Mother by Poverty Status between 2006 and 2010

	(1) Number of children within 10 miles	(2) Number of coresident children
Biennial growth (slope)	-0.0277*** (0.0073)	0.0014 (0.0042)
Under poverty (=1)	0.1896*** (0.0618)	-0.0424** (0.0182)
Difference in slope if under poverty	0.0492 (0.0378)	0.0685*** (0.0153)
Constant	1.1352*** (0.0153)	0.2318*** (0.0070)
Observations	24791	25077

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Poverty status are based on mother's income and wealth. Biennial changes assumes linear time trends from 2006 to 2010. Standard errors are reported in parentheses and corrected for heteroskedasticity at family level. Observations are weighted by the CPS at the given year.

Table 5: Effect of Children's and Mother's Needs on Proximity

	(1) Number of children within 10 miles	(2) Number of coresident children
Number of children not working fulltime	-0.0224** (0.0110)	0.0168*** (0.0050)
Number of grandchildren	0.0105** (0.0047)	-0.0036* (0.0021)
Number of children helped for grandchild care	0.0304** (0.0144)	-0.0010 (0.0065)
Mother in poor health	-0.0228 (0.0441)	-0.0018 (0.0199)
Mother in poverty	0.0488 (0.0367)	-0.0564*** (0.0166)
Mother not covered by any health plan	-0.0631 (0.0594)	-0.0529** (0.0269)
Mother's total household asset (log of)	-0.0010 (0.0068)	-0.0043 (0.0031)
Number of children provided care for mother	0.1381*** (0.0284)	0.0994*** (0.0128)
Constant	1.1579*** (0.0871)	0.2590*** (0.0394)
Observations	10188	10188
Pseudo $R^2$	0.007	0.019

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Each family contributes two observations. Sample uses the HRS data collected in 2006 and 2010. Standard errors are reported in parentheses. Poverty status are based on mother's income and wealth.

Table 6: Effect of Children's and Mother's Needs on Proximity – Robustness Checks

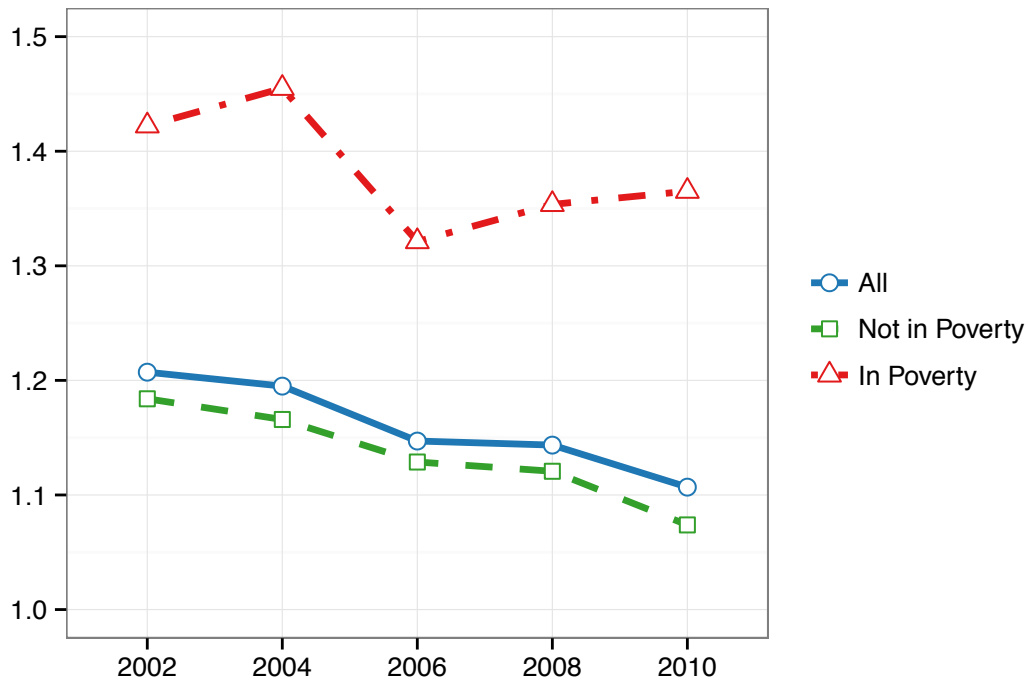
	(1) Number of children within 10 miles	(2) Number of coresident children	(3) Number of children within 10 miles	(4) Number of coresident children
Number of children not working fulltime	-0.0116 (0.0073)	0.0135*** (0.0036)	-0.0111 (0.0073)	0.0136*** (0.0036)
Number of grandchildren	0.0079** (0.0031)	-0.0036** (0.0015)	0.0078** (0.0031)	-0.0037** (0.0015)
Number of children helped for grandchild care	0.0236*** (0.0088)	-0.0013 (0.0043)	0.0234*** (0.0088)	-0.0012 (0.0043)
Mother in poor health	-0.0362 (0.0269)	-0.0148 (0.0132)		
Mother's difficulty with IADL			-0.0082 (0.0107)	0.0058 (0.0053)
Mother in poverty	-0.0344 (0.0232)	-0.0622*** (0.0114)	-0.0352 (0.0232)	-0.0619*** (0.0114)
Mother not covered by any health plan	-0.0315 (0.0387)	-0.0273 (0.0190)	-0.0317 (0.0387)	-0.0275 (0.0190)
Mother's total household asset (log of)	-0.0055 (0.0044)	-0.0064*** (0.0022)	-0.0051 (0.0044)	-0.0059*** (0.0022)
Number of children provided care for mother	0.0900*** (0.0183)	0.0647*** (0.0090)	0.0945*** (0.0203)	0.0586*** (0.0100)
Constant	1.2206*** (0.0572)	0.2860*** (0.0281)	1.2154*** (0.0574)	0.2782*** (0.0281)
Observations	14520	14520	14517	14517
Pseudo $R^2$	0.005	0.012	0.004	0.012

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Note:* Each family contributes three observations. Sample uses the HRS data collected in 2006, 2008, and 2010. Standard errors are reported in parentheses. Poverty status are based on mother's income and wealth.

Figure 1: Children's Proximity by Mother's Poverty Status

(a) Number of children living within ten miles



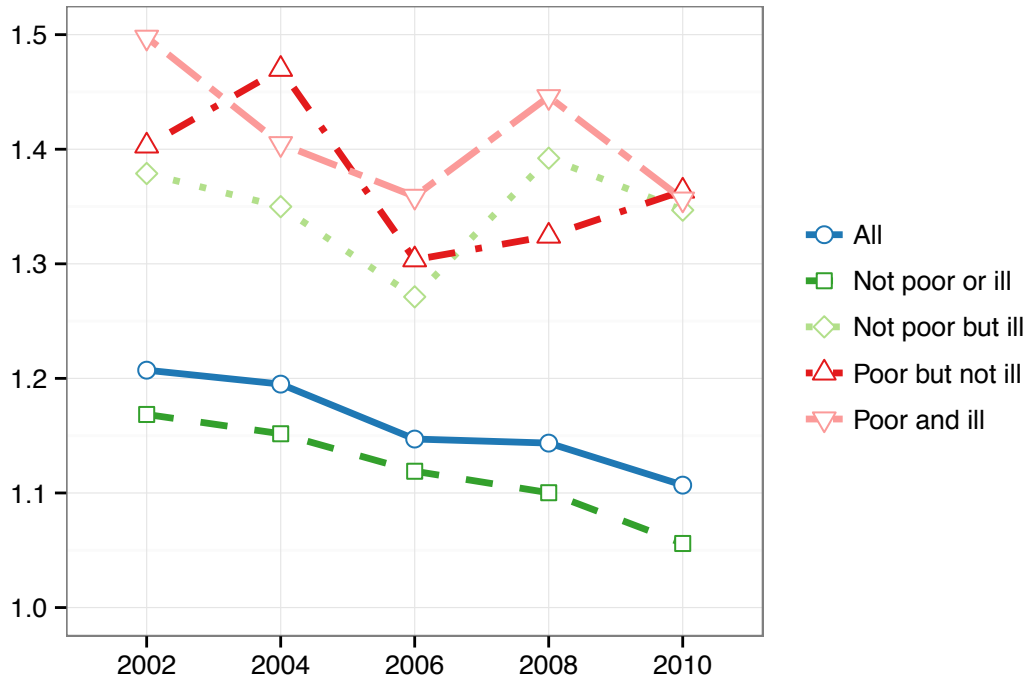
(b) Number of coresident children



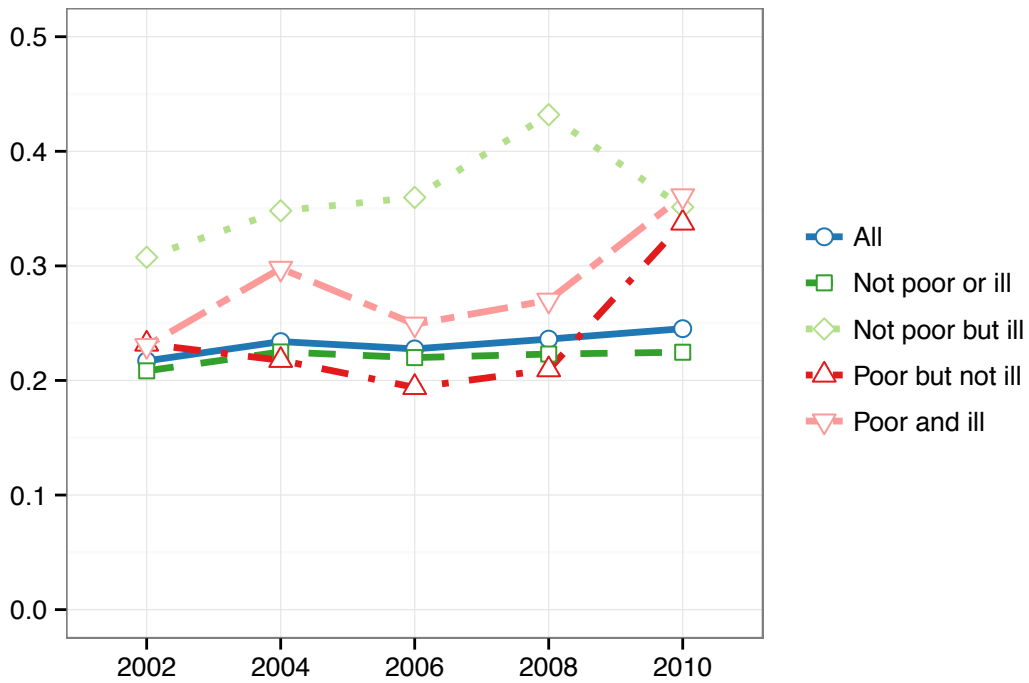
Note: Group averages weighted by the Current Population Survey (CPS) of the given year. Poverty status based on mother's household income and wealth.

Figure 2: Child Proximity by Mother's Health and Poverty Status

(a) Number of children living within ten miles



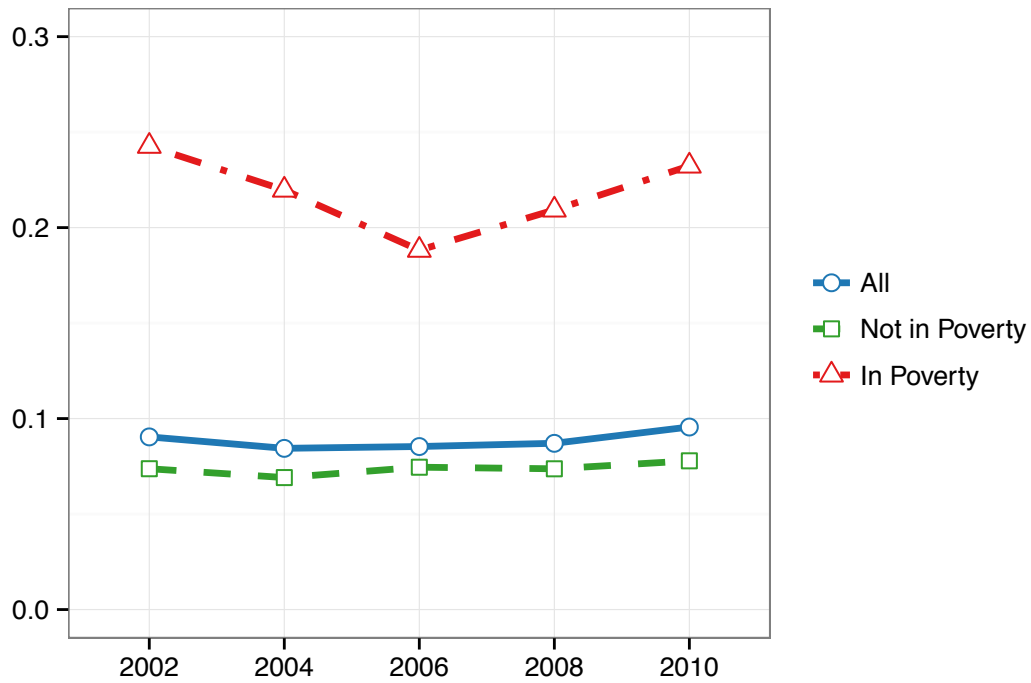
(b) Number of coresident children



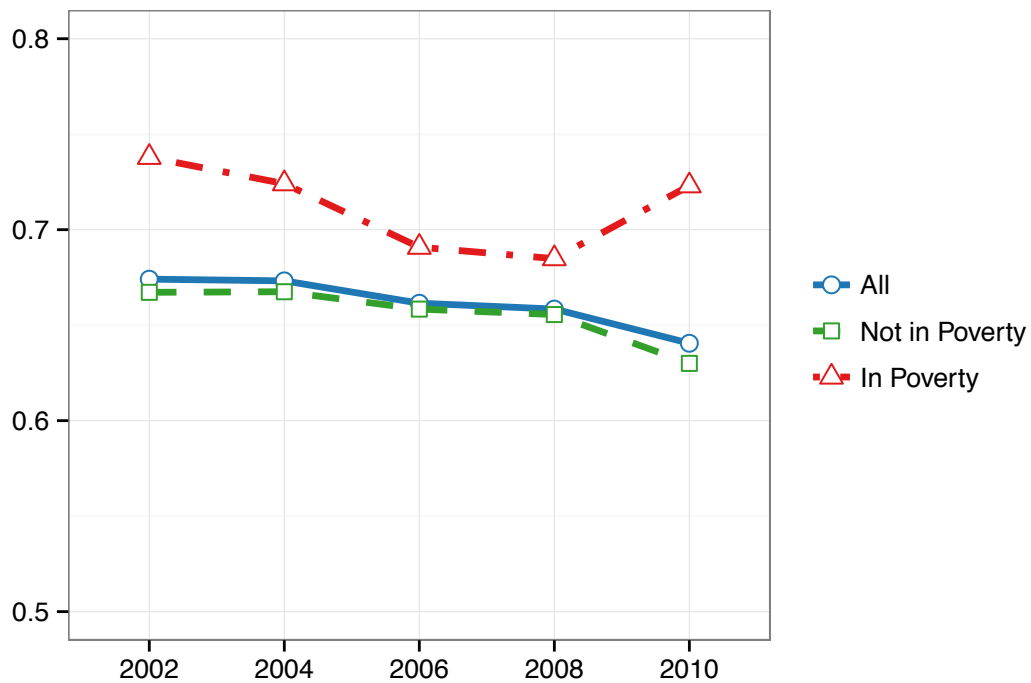
Note: Group averages weighted by the CPS of the given year. Poverty status based on mother's household income and wealth. Health status based on mother's self-reported health status.

Figure 3: Care Provision and Child Availability after the Recession

(a) Number of children helped mother's IADL



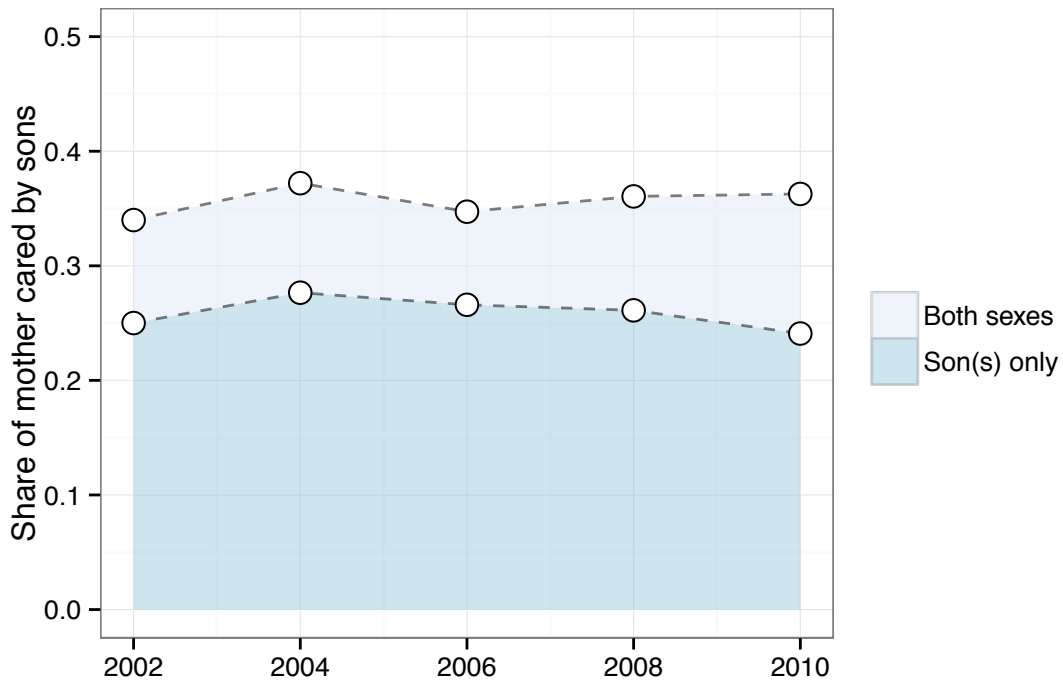
(b) Share of mother with at least one child nearby



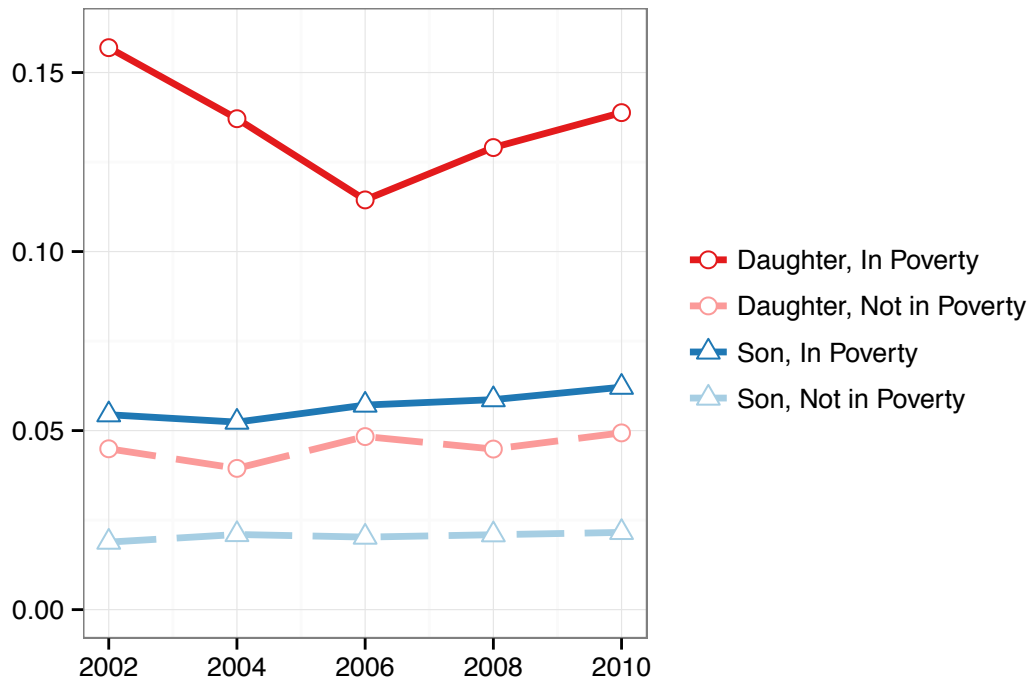
Note: Group averages weighted by the CPS of the given year. Poverty status based on mother's household income and wealth.

Figure 4: Gender Division of Caregiving Children

(a) Share of mother helped by sons



(b) Number of children helping IADL by child's gender and mother's poverty status



Note: Numbers in both figures are weighted by the CPS of the given year. Poverty status based on mother's household income and wealth.