OXFORD

THE GERONTOLOGICAL SOCIETY OF AMERICA®

Original Article

Bargaining Power, Parental Caregiving, and Intergenerational Coresidence

Liliana E. Pezzin,[1] Robert A. Pollak,[2] and Barbara S. Schone[3]

[1]Department of Medicine and Health Policy Institute, Medical College of Wisconsin, Milwaukee. [2]Department of Economics, Olin Business School, Washington University in St. Louis, Missouri. [3]Agency for Healthcare Research and Quality, Georgetown University, Washington, District of Columbia.

Correspondence should be addressed to Liliana E. Pezzin, PhD, JD, Department of Medicine and Health Policy Institute, Medical College of Wisconsin, 8701 Watertown Plank Road, Milwaukee, WI 53226. E-mail: lpezzin@mcw.edu.

Abstract

Objective. To examine the effect of *changes* in parent–child coresidence on caregiving decisions of non-resident siblings over a 5-year period while controlling for characteristics of the elderly parent and adult children in the family network.
Method. We use difference-in-difference models applied to Health and Retirement Study-Assets and Health Dynamics of the Elderly data to test the hypothesis that the formation of a joint household between a parent and one of her children raises the bargaining power of non-resident siblings, who then reduce their care to the parent. Similarly, the dissolution of a parent–child household is expected to increase the bargaining power of the child who no longer coresides with the parent relative to her siblings.
Results. We find that children whose parent and sibling begin coresiding during the study period are less likely to provide care and provide fewer hours of care than children whose parents never coresided with a child. Adult children whose parent cease coresiding with a sibling, on the other hand, have a higher likelihood of providing care and provide significantly more hours of care relative to children whose parents either coresided with a sibling in both time periods or never coresided with a child.
Discussion. Meeting the needs of the growing elderly population while maintaining them in the community is a particular focus of long-term care policy. To the extent that shared living is an important component of such care, the observed sensitivity of non-resident children's caregiving efforts has implications for the well-being of both disabled parents and their coresiding adult children.

Key Words: Aging—Caregiving—Family bargaining—Intergenerational coresidence

Because of gradual deterioration with age or sudden health shocks, elderly persons face a considerable probability of becoming disabled and unable to care for themselves.

Roughly one quarter of Americans 65 and older have functional limitations (Congressional Budget Office [CBO], 2013), about one third of all persons 65 and older also

have mobility limitations (Freedman & Martin, 1998; Freedman, Martin, & Schoeni, 2000), and 20% of older U.S. adults have other chronic disabilities (Manton & Gu, 2001). Recent evidence suggests a downward trend in the age-adjusted prevalence of disability and functional limitations, raising hope that long-term care burdens on families and public programs will be less than feared. At the same time, there continues to be growth in the elderly population (from 17% of all adults in 2010 to more than 25% in 2030, CBO, 2013). There is also evidence that the level of disability of those who are disabled has increased (Spillman & Pezzin, 2000), suggesting that the direction of change in the overall need for long-term care is uncertain.

The assistance provided to disabled elderly persons is often the product of numerous individual and joint decisions by family members with different preferences facing different constraints. Family members not only make caregiving decisions on behalf of disabled family members but often provide hands-on care themselves and share the financial consequences of caregiving decisions. Moreover, the preferences of disabled elderly persons may differ from those of their adult children, and the preferences of one child may differ from those of her sibling(s). Differences may arise about the type of care desired for disabled elderly persons and the setting in which they receive it. For example, children may want a parent to live independently in the community but prefer that a sibling be the parent's primary caregiver. The possibility of conflict regarding caregiving and the roles of different family members in providing care suggest that family members may have incentives to behave strategically.

Although not the norm, nearly 20% of elderly parents reside with their adult children (Ruggles, 2007). Coresidence facilitates intergenerational exchange along several dimensions and is an important mode of assistance from adult children to their disabled elderly parents. A number of studies have shown that transfers provided in the context of coresidence are distinct from provision of resources to non-coresident family members (Aquilino, 1994; Börsch-Supan, Hajivassiliou, Kotlikoff, & Morris, 1992; Costa, 1999; Davis, Moritz, Neuhaus, Barclay, & Gee, 1997; Lee, 1997). For example, disabled elderly parents who coreside with adult children are less likely than their non-coresiding counterparts to make a transition into a nursing home (Dostie & Leger, 2005; Kemper & Pezzin, 1996). Hays (2002) and Hughes and Waite (2002) provide important evidence to support the notion that coresidence affects the health of disabled elderly persons, including evidence that elderly persons cared for in the home of a family member have better physical and mental health outcomes than those initially in similar health who were cared for by non-relatives or in an institution. Coresidence may also benefit the child. The opportunity to spread the cost of household production that benefits all household members over more users makes residence sharing more efficient than providing similar services without coresidence. In addition, sharing a

household reduces the time cost of providing care by eliminating travel time. Coresidence, however, also entails costs, especially in reduced privacy and autonomy.

Our goal in this article is to examine the association between changes in coresidence between a disabled elderly parent and her child(ren) and informal caregiving provided by non-resident child(ren). Our study differs from the existing literature in two important ways. First, our analysis draws from the emerging economics literature that uses game theoretic concepts to model family caregiving decisions. Game theoretic models are especially suitable for analyzing intergenerational living and care arrangements because such models recognize the divergent, and sometimes conflicting, interests of family members and specify a process for translating these divergent interests into equilibrium outcomes (Pezzin, Pollak, & Schone, 2008). Game theoretic models are also well suited to examining situations involving few "actors," such as families, where the reactions of others cannot be neglected. Second, our analysis focuses on the interplay between siblings in a longitudinal framework. Taking advantage of information collected in a large and nationally representative panel of elderly persons and all of their adult children, we examine the effect of *changes* in parent–child coresidence on caregiving decisions of non-resident siblings over a 5-year period. Given evidence that partnered (e.g., married) elderly persons most often receive care from their partners rather than from children (Dwyer & Coward, 1991; Pezzin, Pollak, & Schone, 2009), and that coresidence of elderly parents with adult children usually does not occur until one parent has died (Boaz, Hu, & Ye, 1999), we focus on coresidence and care decisions of the adult children of unpartnered disabled elderly parents.

Background

A better understanding of intergenerational family behavior requires greater insight into family members' motivations for providing assistance to one another. A number of perspectives regarding motives for adult child to parent transfers have been advanced in recent years by various disciplines. Within the sociological literature, the notion of *solidarity* has been a dominant perspective from which to explore intergenerational relations. Families are characterized as exhibiting solidarity along a number of dimensions, including the willingness to provide resources to care for each other (Bengtson, 2000; Voorpostel & Blieszner, 2008). An alternative perspective is the notion of *reciprocity* (Silverstein, Conroy, Wang, Giarrusso, & Bengtson, 2002), which can be viewed as grounded in social norms that obligate repayment of debts (Silverstein, 2005), a concept related to the "support bank" of social psychology (Antonucci, 1990) whereby a reserve of gifts or goodwill is produced for consumption over the life course.

Within the economics literature, the leading model of intergenerational relations posits that family transfers are

driven by caring or "altruistic preferences" of a single decision maker with the power to impose behavior consistent with his preferences on all the family members (Becker, 1974, 1991). In this purely altruistic framework, control of resources within the family is irrelevant because family resources are pooled, and any governmental efforts directed at redistribution of resources, including old-age assistance programs, are ineffective because as they simply "crowd out" private, altruistically motivated intergenerational transfers. If the altruist makes all decisions in the best interest of the family as a whole, then there is little difference between the altruistic framework and the solidarity perspective. Increasingly, however, evidence showing that intergenerational households do not pool resources and that control of resources does matter suggests that these households do not behave in a way that is consistent with the purely altruistic model (Altonji, Hayashi, & Kotlikoff, 1992; Bianchi, Hotz, McGarry, & Seltzer, 2008; Brown, 2006; Hayashi, 1995; Pezzin et al., 2008; Pezzin, Pollak, & Schone, 2007; Pezzin & Schone, 1999).

In light of empirical findings rejecting "pure altruism," other economic models have been developed that allow for the "impure" or "imperfect" altruism between parents and children. Some studies have introduced "frictions" (e.g., the "joy of giving" or incomplete information about other family members' preferences) into the altruism framework and examined the conditions under which these frictions undermine the strong and generally unsupported resource pooling and neutrality predictions of the pure altruism framework (Abel & Bernheim, 1991). A second, and more controversial, vein of economic research has departed further from the assumption of altruism and proposed "exchange" as a primary motive for intergenerational transfers (Altonji, Hayashi, & Kotlikoff, 1997; Bernheim, Shleifer, & Summers, 1985; Cox, 1987; Light & McGarry, 2004). Although the precise specification of the exchange mechanism differs across studies, it generally reflects one of two notions: (a) *reciprocity*, whereby current transfers are made as a repayment for past transfers or (b) *strategic behavior*, whereby current transfers are made in anticipation of future transfers, including bequests. An alternative approach that departs from explicitly assuming altruism or exchange as a motivation but still recognizes the individuality of each family member is the *collective model* (Alderman, Chiappori, Haddad, Hoddinott, & Kanbur, 1995; Chiappori, 1992), which assumes that family members have different amounts of "bargaining power" relative to others in the family. The relative bargaining power of family members guides their interactions and is, in turn, reflected in the family's allocation of resources. A key implication of all of these models as applied to adult children and their elderly parents is that heterogeneity in family members' preferences and relative control over resources do determine patterns of intergenerational transfer.

Empirical evidence in favor of any specific hypothesis has been mixed, and a consensus on the most appropriate approach has yet to emerge. In addition, to a large extent, studies have often focused on a particular child and have either ignored other children or simply included variables capturing salient characteristics of the other children in the parent's network. Only a few studies explicitly model strategic interactions among the children. For example, Heidemann and Stern (1999) and Engers and Stern (2002) allow for the possibility that preferences differ across family members and estimate game theoretic models focusing on the family's selection of the *primary* care arrangement among the choices of informal care by one adult child (the "primary" caregiver), institutional care, and independent living in the community with no care provision by any source. Checkovich and Stern (2002) disentangle the living and care arrangement decisions and focus instead on a bargaining model designed to explain the amount of care provided by each adult child. Silverstein, Conroy, and Gans (2008) use a bargaining framework as the theoretic backdrop against which to examine empirically the extent to which filial responsibility affects siblings' negotiation regarding the division of labor involved in parental care. Specifically, the authors propose that children weigh filial responsibility against the costs of caregiving (captured by geographic distance to the parent) and use this model to explain why children who live relatively close to a parent but have low filial responsibility may choose not to provide care while a child who is farther away but exhibits a high degree of filial responsibility becomes a caregiver. Focusing more explicitly on the interplay among siblings, Pezzin and Schone (2001) propose a bargaining model in which information about the responsiveness of each child's transfer behavior to that of her siblings generates testable hypotheses about the motives—altruism, reciprocity, or rivalry—for intergenerational transfers. They find evidence of crowding out or substitution of the child's caregiving efforts based on her siblings' contributions, a finding supported by the work of Wolf, Freedman, and Soldo (1997). In a study examining siblings' influence on the caregiving behavior of adult children in Amsterdam, Tolkacheva, van Groenou, and van Tilburg (2010) report a positive association between a child's caregiving efforts and that of her siblings, a result that the authors interpret as evidence of sibling solidarity. Voorpostel and Blieszner (2008) report evidence of a compensatory mechanism whereby a child's poor relationship with her parent enhances her receipt of emotional support from her siblings. These authors also find that parental support is a reinforcing mechanism in the siblings' relationship serving as a demonstration effect of sorts.

Conceptual Framework

To motivate our empirical work examining the association between changes in parent–adult child coresidence and the caregiving efforts of siblings, we draw primarily from research within economics that has modeled intrafamily

allocation using a game theoretic framework (McElroy & Horney, 1981). Following Pezzin et al. (2007, 2008), we treat family interactions as a two-stage game involving a disabled elderly parent and her multiple (2+) adult children. The first stage determines living arrangements. At the first stage, the children decide, separately and simultaneously, whether to invite the parent to coreside; the parent then chooses among the feasible living arrangements: she can move into a nursing home, live on her own, or accept the invitation of any child who has invited her to coreside. At the second stage, the parent and the children take the living arrangement determined at the first stage as given and make decisions that determine resource allocation under that living arrangement.

The crucial assumptions of this two-stage game are as follows: the first stage involves a big, up-front decision (i.e., whether to coreside) that affects second-stage bargaining power, and family members cannot or will not make binding commitments at the time of the first stage regarding transfers (caregiving) at the second stage. In what follows, we focus on the implications of family bargaining for caregiving if coresidence emerges as the outcome of the first-stage game.

Although it is tempting to assume that when the parent coresides with one of her children, their interactions are the result of a cooperative game, the assumption of efficient outcomes implied by cooperative models has not been well supported empirically (Light & McGarry, 2004; McGarry, 1999; Pezzin & Schone, 1999; Thomas, 1990). To avoid assuming efficiency, we opt for an alternative modeling approach and postulate an "allocation rule" for the coresident household (Chiappori, 1988, 1992). The allocation rule specifies each child's second-stage behavior as a function of their coresidence status (with the parent) that was determined at the first stage, as well as their economic and demographic characteristics.

With multiple children, allocation within the coresident household plays an important role because each non-coresident child must decide on transfers (of time and/or money) to the coresident household, taking account of the coresident household's allocation rule. Empirical work on allocation within households has established that resources controlled by one household member have a different effect on household expenditure and time utilization patterns than resources controlled by other family members (Lundberg & Pollak, 2005; Pezzin & Schone, 1999). For non-coresident family members, monitoring is a crucial issue. For example, a non-coresident child who is altruistic toward the parent may undercontribute to the coresident household relative to what she would contribute if binding, enforceable agreements were possible because of her concern that the coresident child will exploit her position. This result is consistent with the observation that care is usually concentrated and provided by one "primary caregiver."

Two hypotheses emerge from this analysis. The first suggests that coresidence would strengthen the bargaining power of the non-coresident child and correspondingly weaken the bargaining power of the coresident child. The non-coresident child, knowing that the coresident child cannot easily evict the parent, leave herself, or withhold care may be concerned that her efforts will simply crowd out the efforts of her coresiding sibling. Thus, she will contribute less parental care than she would if the parent did not coresided with any of her children. Similarly, if the parent and coresident child dissolve their joint household, then the child who leaves the joint household would gain bargaining power *relative to her siblings*, resulting in higher caregiving hours by the other siblings relative to the case where the joint household remained intact (and relative to other children who never had a sibling coresiding with a parent). Our empirical work focuses on testing these hypotheses by examining the extent to which changes in children's caregiving efforts across survey waves are associated with changes in their siblings' coresidence with the parent.

Data Source

Data for this analysis are drawn from the Assets and Health Dynamics of the Elderly (AHEAD) cohort of the Health and Retirement Study (HRS). The HRS-AHEAD cohort is an ongoing panel that began in 1993 with a nationally representative sample of individuals aged 70 and older living in the community (though there was an over sampling of blacks, Hispanics, and Florida residents). Respondents are resurveyed biannually by the Survey Research Center at the University of Michigan. Because it is a panel, HRS-AHEAD provides information on changes in the economic status of respondents, along with changes in their health, family structure, and living arrangements. Specifically, HRS-AHEAD includes questions in four broad categories: health measures (including activity limitations), income and assets, family structure, and intergenerational transfers (including hours of help from all sources). For each respondent, the biannual survey collects a roster of all household members, regardless of their relationship to the respondent, of all children of the respondent, regardless of living arrangements, and information on all other individuals who provide disability care. We use the full complement of family members, including resident and non-coresident, biological and stepchildren, to identify children who provide care to a disabled respondent in each survey wave.

We work with the subsample of unpartnered respondents with chronic disabilities. We define a respondent as chronically disabled if, in both Wave 1 (1993) and Wave 3 (1998) of the survey, he or she has difficulty with at least one of the five instrumental activities of daily living (IADLs: grocery shopping, preparing meals, taking medications, using a telephone, and managing household finances) or difficulty with at least one of the six activities of daily living (ADLs: transferring, dressing, bathing, toileting, eating, and walking across a room). We further restricted our sample to respondents who report their marital status as widowed or

as divorced/separated, who have *at least* two adult children (over age 18), and who were living in the community in both Waves 1 and 3 of HRS-AHEAD. We then constructed a child-level analysis file by creating individual records for every child identified by an HRS-AHEAD respondent who met our inclusion criteria.

Variables

Our dependent variables are indicators of adult children's informal caregiving to their disabled parents, defined as the provision of help with ADLs or IADLs because of a health problem or disability. We measure both the likelihood of informal care provision (a binary variable taking the value of one if the child provided informal care to the parent during the reference period and zero otherwise) and its intensity (i.e., monthly hours of ADL or IADL assistance).

The key independent variables are a set of four binary indicators identifying adult children for whom (a) the parent and at least one sibling began coresiding between Wave 1 (1993) and Wave 3 (1998), (b) the parent and (all) coresiding sibling(s) in Wave 1 no longer coreside in Wave 3, (c) the parent and at least one sibling coresided in both waves, and (d) the parent did not coreside with any child in either wave (reference category). To control for differences across parents and children that might influence the likelihood of coresidence at the beginning of the study period, their likelihood of forming or dissolving an intergenerational household during the study period as well as the likelihood and intensity of caregiving efforts, we include a number of additional independent variables that capture differences across elderly respondents along sociodemographic, health, and economic dimensions. In particular, the elderly parent's baseline functioning is captured by indicators of limitations in ADLs (ranging from 0 to 6) and IADLs (ranging from 0 to 5) defined as IADLs only (reference category), limitations with one to two ADLs (mild disability), and limitations with three or more ADLs (severe disability). Sociodemographic characteristics of the unpartnered elderly parent include age (categorized as <80 years old [reference category], 80–84, 85 or older), gender, race/ethnicity (African American/black; Hispanic; and non–African American, non-Hispanic [reference group]), marital status (currently divorced relative to the reference category of currently widowed), and years of formal education (categorized as less than high school, high school [reference category], and at least some college). Finally, the elderly parent's economic status is incorporated into the analysis by two constructs: income (based on wages, Social Security, and pension income) and wealth (measured by the respondent's total net worth, both measured at study entry and based on the RAND-imputed variables available in the HRS-AHEAD public use files).

Characteristics of each adult child of the elderly parent include age (categorized as <50 years old, the reference category, 50–54, 55–64, and 65 or older), gender, marital status (married/partnered relative to unmarried/unpartnered), years of formal education, and number of children. We also control for characteristics of the child's sibling network: in particular, its size, captured by number of siblings; gender composition, captured by an indicator of any sister; and marital status composition, captured by an indicator of any unmarried sibling. Table 1 contains a complete list of variable definitions and summary information for our sample.

Empirical Estimation

We use a difference-in-differences estimator (Meyer, 1994) to examine the extent to which changes in children's caregiving efforts across survey waves is associated with changes in their siblings' coresidence with the parent.

Defining Δ_{iI} as a child for whom a sibling and the parent made a transition into (I) coresiding, Δ_{iO} as a child for whom the parent and (all) coresiding sibling(s) made a transition out (O) of coresidence, K_B as a child for whom the parent and at least one sibling coresided in both (B) waves, and K_N as a child for whom the parent did not coreside (N) with any child, we model care from each child j ($j = 1 \ldots J$) in family i as:

$$C_{ji} = X_i\beta + Z_{ki}\delta + \phi \times t + \alpha_1\Delta_{iI} + \alpha_2\Delta_{iO} + \alpha_3K_{iB}$$
$$+ \tau_1 \times t \times \Delta_{iI} + \tau_2 \times t \times \Delta_{iO} + \tau_3 \times t \times K_{iB} + e_{ji}$$

Where depending on the model, C_{ji} represents either (a) the probability that child j provided care in family i or (b) the number of monthly parental care hours provided by child j in family i, X_i represents family (and parent) characteristics of the ith family, Y_{ji} represents a vector of child-specific characteristics for the jth child in family i, and Z represents characteristics of the other children in the ith family.

The variable φ captures the effect of time on caregiving for a child who never had a sibling coresiding with a parent, whereas the vector $\{\alpha\}$ measures group differences in baseline year parental care relative to the effect of baseline year parental care for a child who never had siblings who coreside with a parent. The key parameter estimates for our hypotheses are the interaction terms between wave and groups, the vector of variables $\{\tau\}$. They represent the *changes* over time in a child's provision of parental care across waves for each group relative to a child whose siblings did not live with the parent in either wave of the survey—that is, relative to K_N, our reference group. These variables measure the effect of time-varying "group" effects and provide a test of the hypothesis that time transfers to parents among children whose sibling(s) made a transition into (or out of) coresiding with the disabled parent differ from those of children whose siblings did not live with the parent in either wave. In particular, we expect τ_1 to be negative, reflecting the hypothesis that a non-resident child will gain bargaining power and thereby reduce her caregiving efforts when the parent and sibling begin coresiding. We

Table 1. Variable Definitions and Summary Information

Variable	Definition	
Coresidence group		
Sibling and parent begin coresiding	=1 if (at least one) sibling and parent began coresiding between Wave 1 (1993) and Wave 3 (1998); 0 otherwise	9.3%
Sibling and parent no longer coreside	=1 if coresiding sibling(s) in Wave 1 no longer coresides with parent in Wave 3; 0 otherwise	7.0%
Sibling and parent coreside in both waves	=1 if (at least one) sibling and parent coreside in both Waves 1 and 3; 0 otherwise	21.6%
Parent does not coreside with any child	=1 if there is no coresidence in either Wave 1 or Wave 3; 0 otherwise	62.0%
Adult child characteristics at study entry		
Age: <50	=1 if child's age <50 years old	25.6%
Age: 50–54	=1 if child's age 50–54 years old	16.5%
Age: 55–64	=1 if child's age 55–64 years old	36.7%
Age: 65+	=1 if child's age ≥65 years old	21.2%
Female	= 1 if female; 0 otherwise	51.4%
Married/partnered	=1 if married or living as married; 0 otherwise	64.9%
Number of children	Count of children of adult child	1.7 (2.0)
Less than high school education	=1 if adult child completed less than 12 years of formal education	27.7%
High school graduate	=1 if adult child has 12 years of formal education	41.1%
Some college	=1 if adult child has 13 or more years of formal education	31.2%
Characteristics of child's sibling network		
Number of siblings	Count of adult siblings of the child at study entry	4.3 (1.9)
Any sister	=1 if the adult child has at least one female sibling; 0 otherwise	87.4%
Any unmarried sibling	=1 if the adult child has an unmarried/unpartnered sibling; 0 otherwise	27.7%
Sociodemographic characteristics of elderly parents		
Age	Respondent's age in years	
Female	=1 if female; 0 otherwise	86.2%
African American/black	=1 if race/ethnicity is African American/black; 0 otherwise	23.2%
Hispanic	=1 if respondent's race/ethnicity is Hispanic; 0 otherwise	15.2%
Non–African American/black, non-Hispanic	=1 if respondent's race/ethnicity is non–African American/black, non-Hispanic; 0 otherwise (reference)	61.6%
Divorced	=1 if divorced at study entry; 0 otherwise	9.3%
Widowed	=1 if widowed at study entry; 0 otherwise	90.7%
Less than high school education	=1 if parent completed less than 12 years of formal education	40.9%
High school graduate	=1 if parent reports has 12 years of formal education	51.9%
Some college	=1 if parent has 13 or more years of formal education	7.2%
Parental physical functioning at study entry		
IADLs only	=1 if parent reports limitations with instrumental activities of daily living only; 0 otherwise	19.8%
1–2 ADLs	=1 if parent reports limitations with 1–2 basic activity of daily living; 0 otherwise	37.0%
3+ ADLs	=1 if parent reports limitations with 3 or more basic activity of daily living; 0 otherwise	43.2%
Parental economic status at study entry		
Income	Wages, Social Security, and pension income, in hundreds	704 (1,506)
Net worth	Estimated (assets – debts), including home mortgage and all other financial assets and liabilities, in thousands	184.3 (349.0)

Note. ADL = activities of daily living; IADL = instrumental activities of daily living. Summary statistics are based on the sample of 1,104 adult children of unpartnered, disabled elderly respondents with at least two adult children aged 18 years or older in Wave 1 (1993).

also expect τ_2 to be positive, reflecting the likely increase in parental care by a non-resident child when the parent and sibling cease to coreside relative to children whose parent does not coreside with a sibling in either time period. Finally, we expect τ_2 to be larger than τ_3 because we anticipate that care by a non-coresident child will increase when the parent and sibling stop coresiding relative to a child whose parent is coresiding with a sibling in both time periods.

Using unweighted data, we estimate the models using a probit specification for the propensity and a Tobit specification for the intensity of child-provided care. Given the relatively small sample and cell sizes, we report *p*-values for all coefficients instead of conforming to the conventional *p* < .05 as the critical level to determine significance.

Results

Our sample is composed of 1,104 adult children of unpartnered, disabled elderly HRS-AHEAD respondents who were community dwelling and participated in both Waves 1 and 3 of the survey. Of those, 16.3% had a sibling who experienced a change in coresidence status with the parent between 1993 and 1998. Table 2 provides descriptive information for each of the four mutually exclusive groups of children on the probability and intensity of child-provided care and differences in these outcomes between the two waves.

The likelihood that a child provides informal care increases 6 percentage points (from 27% to 33%) for those whose parent never coresided with a sibling and decreases 2 percentage points (from 18% to 16%) for those whose parent and sibling began coresiding between survey waves, resulting in a difference-in-differences estimate of 8 percentage points. Similarly, children for whom the parent and a sibling cease coresiding between waves increase their likelihood of providing informal care by 19 percentage points (from 12% to 31%), whereas children for whom the parent and at least one sibling coresided in both waves increase their probability of providing care by 2 percentage points (from 6% to 8%), resulting in a difference-in-differences estimate of 17 percentage points. Finally, the

difference-in-differences estimate of the likelihood of providing parental care for children whose parent and a sibling began coresiding relative to children whose parents ceased coresidence with a sibling between survey waves is even more marked (21 percentage points: 19 percentage points minus –2 percentage points).

Unadjusted difference-in-differences results for intensity of caregiving efforts tell a similar story. Children whose parent and sibling began coresiding between waves reduced their caregiving by 7.3 hr (from 18.1 to 10.8 monthly hours), whereas children with parents who did not coreside with a sibling in either time period increased their caregiving by 8.6 hr (from 21.3 to 29.9 hr). In contrast, non-resident children whose parent and sibling(s) cease coresiding increase their hours of care by a substantial 16.8 hr (from 5.3 to 22.1 monthly hours), nearly double the caregiving efforts of non-resident children whose parent does not coreside with a sibling in either period and four times the caregiving efforts of non-resident children whose parent coreside with at least one sibling at both survey waves.

Although these bivariate results are generally consistent with our hypotheses that changes in parent–sibling coresidence are associated with changes in transfers by non-coresident children, they do not control for important confounders, chief among them the parent's level of disability. The parameter estimates for the full difference-in-difference multivariate models shown in Table 3 address this problem.

The results in Table 3 are consistent with our descriptive results and are generally supportive of our hypotheses. Perhaps the most striking finding in Table 3 is the association between a parent–sibling's transition out of coresidence (Δ_O) relative to children whose parents did not coreside with a sibling in either wave and caregiving. Non-resident children whose siblings ceased to coreside with the parent between 1993 and 1998 are significantly more likely (0.52, *p* = .03) to provide parental care in Wave 3 than in Wave 1 compared with non-resident children who never had a parent coreside with a sibling. They also provided significantly more hours of care in Wave 3 relative to Wave 1, as indicated by the Tobit coefficient (90.1, *p* = .08). These associations persisted despite controls for parent's health

Table 2. Provision of Parental Care by Sibling(s)' Coresidence Status Group and Wave

Coresidence status group	N	Proportion of children providing informal care 1993	Proportion of children providing informal care 1998	Difference in proportion providing informal care (Wave 3 [1998] – Wave 1 [1993])	Hours of care provided 1993	Hours of care provided 1998	Difference in hours of care provided (Wave 3 [1998] – Wave 1 [1993])
Sibling and parent begin coresiding	103	0.18	0.16	–0.02	18.1	10.8	–7.3
Sibling and parent coreside in both waves	239	0.06	0.08	0.02	3.4	7.4	4.0
Sibling(s) and parent no longer coreside	77	0.12	0.31	0.19	5.3	22.1	16.8
Parent does not coreside with any child in either wave	685	0.27	0.33	0.06	21.3	29.9	8.6

Table 3. Difference-in-Difference Multivariate Regression Results

	Informal care propensity		Hours of informal care	
	Coefficient	*p* Value	Coefficient	*p* Value
Time and group indicator variables				
$\Delta_{I\times t}$	−0.34†	.13	−63.5	.15
$\Delta_{O\times t}$	0.52**	.03	90.1*	.08
$K_{B\times t}$	−0.10	.62	−14.1	.72
t: survey wave	0.18**	.02	18.6	.21
Δ_I: sibling and parent begin coresiding	−0.32**	.05	−63.3**	.04
Δ_O: sibling and parent no longer coreside	−0.69***	.00	−145.1***	.00
K_B: sibling and parent coreside in both waves	−0.92***	.00	−163.5***	.00
Parent's characteristics				
Age				
80–84	0.13	.18	26.1	.17
85+	0.20**	.02	37.8**	.03
Gender: male	−0.12	.21	−22.1	.23
Race/ethnicity				
African American/black	0.11	.22	27.4†	.12
Hispanic	0.06	.56	54.1***	.00
Education				
Less than high school	0.19*	.06	10.6	.59
Some college	−0.16	.27	−25.7	.38
Marital status: divorced	−0.19†	.15	−21.2	.41
Disability level				
1–2 ADLs	0.13†	.11	47.6***	.00
3+ ADLs	0.20**	.02	70.2***	.00
Economic status				
Income	−8.46E-5***	.00	−0.01***	.01
Net worth	−1.2E-7	.88	−0.02	.78
Adult child's characteristics				
Age				
50–54	−0.31***	.00	−57.7***	.00
55–64	−0.34***	.00	−43.8***	.01
65+	−0.38***	.00	−46.6**	.03
Gender: male	−0.66***	.00	−125.1***	.00
Marital status: married/partnered	−0.14**	.04	−39.7***	.00
Number of children	−0.05**	.04	−11.7***	.00
Education				
Less than high school	−0.15*	.08	−11.9	.46
Some college	0.05	.55	−10.6	.48
Sibling network characteristics				
Number of siblings	−0.05***	.00	−8.9***	.00
Any sisters	−0.12**	.05	−24.8†	.14
Any unmarried sibling	0.05	.59	6.8	.64
Constant	0.23*	.14	0.58**	.02
Log likelihood	−1,003		−3,654	
χ^2	364***		315***	

Note. ADL = activities of daily living; IADL = instrumental activities of daily living. Omitted category for disability is parents with only IADLs, for education is completed high school, for elderly parent's age is less than 80 years old, for adult children's age is less than 50 years old, and for family race/ethnicity is non–African American/black, non-Hispanic (primarily Caucasian). Results are statistically significant at ***$p < .01$; **$p < .05$; *$p < .10$; †$p < .15$.

and disability and for other factors likely to influence caregiving. Although the underlying coefficients on the interactions between wave and parent–sibling's transition into coresidence ($\Delta_{I\times t}$) were only marginally significant, their direction is of interest: Parameter estimates indicate that

children whose parent and sibling began coresiding are less likely to provide care themselves (−0.34, $p = .13$) and provide fewer hours of care (−63.5, $p = .15$) after parent–sibling coresidence than they did before, relative to those whose parents and siblings did not coreside in either time

period. Our results also indicate that children who had a sibling cease to coreside with the parent were more likely to provide care and provided more care than children who had a sibling live with the parent in both waves (0.52 vs. –0.10 for the propensity to provide care and 90.1 vs. –14.1 for hours of care, respectively). Finally, as expected, difference-in-difference estimates of the contribution by children whose parents did not experience a transition in living arrangement with a sibling (i.e., those whose parents' coresided with a sibling in both waves [K_B] relative to those whose parents did not coreside with any child in either wave [K_N, the reference group]) were both small in magnitude (–0.10 and –14.1 for propensity and intensity equations, respectively) and not statistically significant (p = .62 and .72, respectively). Taken together, these results are consistent with our hypothesis that non-coresident children take advantage of their increased bargaining power by reducing the care they provide and lose that bargaining advantage when they no longer have a sibling coresiding with a parent.

In addition to these main difference-in-difference findings, results in Table 3 indicate that the likelihood of providing care increases over time (t) for children whose parents never coresided with a sibling while the negative coefficients on the group variables suggest that the propensity to provide care and the intensity of care provision are lower in the baseline year for all groups relative to the children whose parents did not coreside with any child during the 5-year study period (K_N, the reference category).

Other factors are associated with child-to-parent transfers in predictable ways. Disability levels, for example, are strongly associated with both the likelihood and the intensity of care provided by children. In addition, although there were no statistically significant differences in the propensity to provide care, children of Hispanic and African American/black parents provided more hours of care to their disabled parents than did their non–African American/black and non-Hispanic counterparts. The parent's economic status, as measured by current income, decreased the probability that children provided care although parental wealth, as measured by net worth, was not associated with either the propensity or intensity of care provision. Sons (and their spouses, if married) were less likely than daughters (and their spouses, if married) to provide care to a disabled elderly parent. Being married and having more minor children was negatively associated with providing parental care; these competing demands on the time of the child were also negatively associated with the number of hours of care provided in a month. Consistent with the gendered nature of parental care, having a sister in the sibling network decreased the likelihood that a child provided care; the presence of a sister also decreased the intensity of care provided by the child to her disabled elderly parent. Finally, children with a larger sibling network were less likely to provide parental care.

Discussion

The aging of the American population suggests that the demand for long-term care for older persons will increase in the near future. The impending increase in the number of and proportion of older adults has renewed interest in intergenerational relations and the role of families in providing care for their elderly members. Interest in intergenerational family behavior has also been heightened by concerns about the effect of other demographic trends, including changing fertility patterns and family structure. A better understanding of the process by which families come to assume the responsibility and share the burden of caring for the disabled elderly members is essential for designing and evaluating long-term care policies.

In this article, we have used a game theoretic framework of families' living and care arrangements to motivate an empirical model of the association between changes in parent–child coresidence and caregiving efforts by non-resident adult children of unpartnered disabled elderly parents. In general, our results support the notion that changes in coresidence alter the bargaining power of coresiding children relative to their non-coresiding siblings. Specifically, we observe significant reductions in the likelihood of providing informal care and in the intensity of care provided by children with siblings who begin to coreside with their parent relative to children with no sibling who lived with a parent at either point in time. Similarly, children increase their likelihood and intensity of care provision when their siblings and the parent no longer coreside. These findings highlight the importance of understanding the dynamics of family interactions when evaluating long-term care policies.

Our study contributes to the small but growing literature examining long-term care decisions from a family perspective that explicitly accounts for interactions among siblings. In addition to using a game theoretic model to focus on siblings, our analysis differs from related work by examining the association of caregiving efforts of adult children in the presence or absence of a *change* in coresidence between her parent and siblings. By doing so, we provide evidence supporting a plausible alternative explanation for differential adult children caregiving efforts based on relative bargaining power, the source of which is a sibling's coresidence status with the disabled parent. Although our results are consistent with a model of bargaining power that arises from strategic behavior, they do not imply that conflict is the predominant mode of interaction among siblings, nor does it preclude some degree of solidarity among siblings. In addition, although one might interpret our results as consistent with differential filial responsibility among siblings, as proposed by Silverstein et al. (2008), it is not clear why those sentiments of obligation would have changed as a consequence of a change in parental coresidence.

Given the complexities of intergenerational living and care arrangements, no single model can fully capture all dimensions of long-term care decision making within families. In addition, although game theoretic models account

for interactions among a small number of actors, such models require important assumptions regarding family members' preferences in order to generate testable implications. The model considered here is based upon the assumption that all interactions among siblings are fully captured by the shared concern for the parent's well-being, a family-specific public good that enters all children's utility functions. An alternative, more complex specification would allow children to have preferences over their siblings' utilities as well. In particular, siblings may act altruistically toward each other as well as toward their parents. According to such a fully altruistic specification, a child's actions are guided by her preferences for her own consumption, her concern for the parent, and by concern for her siblings' *utility*, the economic counterpart of the sociological notion of sibling solidarity or mutual caring. Such an approach, however, is intractable in a model like ours. Furthermore, data limitations prevented us from investigating the relationship between parent–child geographic proximity and bargaining power. A richer theoretical model that incorporates strategic, longitudinal decision making regarding the relative distances between each sibling and her parent and how these decisions ultimately affect the probability and intensity of caregiving efforts for every child in the family remains an important direction for future work.

A number of additional limitations merit comment. Our analysis describes the experience of adult children of unpartnered, community-dwelling, disabled parents who survived the 5-year study period. Although less than 3% of our eligible sample of parents was excluded due to survey or item non-response and about 5% were excluded due to permanent nursing home entry, attrition due to death was substantial (19%) among this frail elderly population. In addition, although the parent is an active player in the first (living arrangement/coresidence) stage of the game and may indirectly affect the outcome of the second (transfers) stage through the allocation rule reflecting her bargaining with the coresident child, we do not allow the parent to strategically alter the second-stage equilibrium (e.g., by refusing care from the coresiding child). Another complication that we faced when examining the relationship between changes in coresidence status of the parent and siblings' informal caregiving efforts was the possibility that the characteristics of the coresident child might be endogenously determined along with siblings' contributions of informal care due to non-random household formation. To the extent that such assortative matching occurs, our findings regarding the relationship between parent–child coresidence and siblings' transfers could be biased, as they might confound transfer effects with household membership selection effects. To account for this possibility, we incorporated controls for the attributes of all siblings in the child's family network in our models. This approach minimizes the effects of such potential sources of bias, particularly given our focus on *changes* in informal caregiving in response to *changes* in coresidence status with the parent. Finally, we are agnostic

about the production of parental well-being and ignore the possibility of task-specific contributions by child's gender (Litwak & Kulis, 1987) or potential interactions among same-gender siblings and differential productivity of children in providing care. Such extensions remain directions for future research.

Regardless of the theoretical underpinnings of our findings, our empirical findings highlight the sensitivity of care provision in families to changes in coresidence. As the United States explores creative policies to address the needs of its growing elderly population while maintaining them in the community, understanding the implications of shared living arrangements—where family caregiving for the unpartnered elderly parent is likely to be shared unequally among siblings—is an important aspect of the evaluation of such programs.

References

Abel, A., & Bernheim, D. B. (1991). Fiscal policy with impure intergenerational altruism. *Econometrica*, **59**, 1687–1711.

Alderman, H., Chiappori, P.-A., Haddad, L., Hoddinott, J., & Kanbur, R. (1995). Unitary versus collective models of the household: Is it time to shift the burden of proof? *World Bank Research Observer*, **10**, 1–19.

Altonji, J., Hayashi, F., & Kotlikoff, L. (1992). Is the extended family altruistically linked? Direct tests using micro data. *American Economic Review*, **82**, 1177–1198.

Altonji, J., Hayashi F., & Kotlikoff, L. (1997). Parental altruism and inter vivos transfers: Theory and evidence. *Journal of Political Economy*, **105**, 1121–1166.

Antonucci, T. C. (1990). Social supports and social relationships. In R. H. Binstock & K. George (Eds.), *Handbook of aging and the social sciences* (pp. 205–226). Waltham, MA: Academic Press.

Aquilino, W. S. (1994). Impact of childhood family disruption on young adult's relationships with parents. *Journal of Marriage and the Family*, **56**, 295–313.

Becker, G. S. (1974). A theory of social interactions. *Journal of Political Economy*, **82**, 1063–1093.

Becker, G. S. (1991). *A treatise on the family* (Enlarged Edition). Cambridge, MA: Harvard University Press.

Bengtson, V. L. (2000). Beyond the nuclear family: The increasing importance of multigenerational bonds. *Journal of Marriage and Family*, **6**, 1–16.

Bernheim, B. D., Shleifer, A., & Summers, L. (1985). The strategic bequest motive. *Journal of Political Economy*, **93**, 1045–1076.

Bianchi, S., Hotz, V. J., McGarry, K., & Seltzer, J. (2008). Intergenerational ties: Alternative theories, empirical findings and trends, and remaining challenges. In A. Booth, A. Crouter, S. Bianchi, & J. Seltzer (Eds.), *Intergenerational caregiving* (pp. 3–43). Washington, DC: Urban Institute Press.

Boaz, R. F., Hu, J., & Ye, Y. (1999). The transfer of resources from middle-aged children to functionally limited elderly parents: Providing time, giving money, sharing space. *The Gerontologist*, **39**, 648–657.

Börsch-Supan, A., Hajivassiliou, V., Kotlikoff, L., & Morris, J. (1992). Health, children and elderly living arrangements. In D. Wise (Ed.), *Topics in the economics of aging* (pp. 79–103). Chicago, IL: University of Chicago Press.

Brown, M. (2006). Informal care and the division of end-of-life transfers. *Journal of Human Resources*, **41**, 191–219.

Checkovich, T. J., & Stern, S. (2002). Shared caregiving responsibilities of adult children with elderly parents. *Journal of Human Resources*, **37**, 441–478.

Chiappori, P. A. (1988). Rational household labor supply. *Econometrica*, **56**, 63–70.

Chiappori, P. A. (1992). Collective labor supply and welfare. *Journal of Political Economy*, **100**, 437–467.

Congressional Budget Office. (2013). *Rising demand for long-term services and supports for elderly people (CBO publication no. 44363)*. Washington, DC: U.S. Government Printing Office. Retrieved from http://www.cbo.gov/sites/default/files/cbofiles/attachments/44363-LTC.pdf

Costa, D. L. (1999). A house of her own: Old age assistance and the living arrangements of older nonmarried women. *Journal of Public Economics*, **72**, 39–59.

Cox, D. (1987). Motives for private income transfers. *Journal of Political Economy*, **95**, 508–546.

Davis, M. A., Moritz, D. J., Neuhaus, J., Barclay, J. D., & Gee, L. (1997). Living arrangements, changes in living arrangements and survival among community dwelling older adults. *American Journal of Public Health*, **87**, 371–377.

Dostie, B., & Leger, P. T. (2005). The living arrangement dynamics of sick, elderly individuals. *Journal of Human Resources*, **40**, 989–1014.

Dwyer, J. W., & Coward, R. T. (1991). A multivariate comparison of the involvement of adult sons versus adult daughters in the care of impaired adults. *Journal of Gerontology: Social Sciences*, **46**, S259–S269.

Engers, M., & Stern, S. (2002). Long-term care and family bargaining. *International Economic Review*, **43**, 1–44.

Freedman, V. A., & Martin, L. G. (1998). Understanding trends in functional limitations among older Americans. *American Journal of Public Health*, **88**, 1457–1462.

Freedman, V. A., Martin L. G., & Schoeni, R. F. (2000). Recent trends in disability and functioning among older adults in the United States: A systematic review. *Journal of the American Medical Association*, **288**, 3137–3146.

Hayashi, F. (1995). Is the Japanese extended family altruistically linked? A test based on Engel curves. *Journal of Political Economy*, **103**, 66–74.

Hays, J. C. (2002). Living arrangements and health status in later life: A review of recent literature. *Public Health Nursing*, **19**, 136–151.

Heidemann, B., & Stern, S. (1999). Strategic play among family members when making long-term care decisions. *Journal of Economic Behavior and Organization*, **40**, 29–57.

Hughes, M. E., & Waite, L. J. (2002). Health in household context: Living arrangements and health in late middle age. *Journal of Health and Social Behavior*, **43**, 1.

Kemper, P., & Pezzin, L. (1996). The effect of public provision of home care on living and care arrangements: Evidence from the channeling experiment. In R. Eisen & F. Sloan (Eds.), *Alternatives for ensuring long-term care* (pp. 125–146). Amsterdam, The Netherlands: Kluwer Press.

Lee, R. (1997). Intergenerational relations and the elderly. In K. Wachter & C. Finch (Eds.), *Between Zeus and the Salmon: The biodemography of longevity*. Washington, DC: National Academy Press.

Light, A., & McGarry, K. (2004). Why parents play favorites: Explanations for unequal bequests. *American Economic Review*, **94**, 1669–1681.

Litwak, E., & Kulis, S. (1987). Technology, proximity and measures of kin support. *Journal of Marriage and Family*, **49**, 649–661.

Lundberg, S., & Pollak, R. A. (2005). Family decision-making. In Steven N. Durlauf & Lawrence E. Blume (Eds.), The New Palgrave Dictionary of Economics. New York, NY: Palgrave Mcmillan.

Manton, K., & Gu, X. (2001). Changes in the prevalence of chronic disability in the United States from 1982 to 1999. *Proceedings of the National Academy of Sciences of the United States of America*, **98**, 6354–6359.

McElroy, M., & Horney, M. J. (1981). Nash-bargained household decisions: Toward a generalization of the theory of demand. *International Economic Review*, **22**, 333–349.

McGarry, K. (1999). Intervivos transfers and intended bequests. *Journal of Public Economics*, **73**, 321–351.

Meyer, B. (1994). *Natural and quasi-experiments in economics* (NBER Working Paper # 170). Cambridge, MA: National Bureau of Economic Research (NBER).

Pezzin, L. E., Pollak, R., & Schone, B. (2007). Efficiency in family bargaining: Living arrangements and caregiving decisions of adult children and disabled elderly parents. *Review of Economic Studies*, **53**, 69–96. National Bureau of Economic Research (NBER) Working Paper # 12358 and CESifo.

Pezzin, L. E., Pollak, R., & Schone, B. (2008). Family bargaining and long-term care of the disabled elderly. In A. Booth, A. C. Crouter, S. Bianchi, & J. A. Seltzer (Eds.), *Caring and exchange within and across generations*. Washington, DC: Urban Institute.

Pezzin, L. E., Pollak, R., & Schone, B. (2009). Long-term care of the disabled elderly: Do children increase caregiving by spouses? *Review of Economics of the Household*, **7**, 323–339.

Pezzin, L. E., & Schone, B. S. (1999). Intergenerational household formation, female labor supply and informal caregiving: A bargaining approach. *Journal of Human Resources*, **34**, 475–503.

Pezzin, L. E., & Schone, B. S. (2001). *Examining motives for intergenerational transfers: A new test based on siblings' behavior* (Working paper). Rockville, MD: Agency for Healthcare Research and Quality.

Ruggles, S. (2007). The decline of intergenerational coresidence in the United States, 1850 to 2000. *American Sociological Review*, **72**, 964–989.

Silverstein, M. (2005). Social exchange theory. In V. L. Bengtson, A. C. Acock, K. R. Allen, P. Dilworth-Anderson, & D. M. Klein (Eds.), *Sourcebook of family theory and research* (pp. 407–410). Thousand Oaks, CA: Sage.

Silverstein, M., Conroy, S. J., & Gans, D. (2008). Commitment to caring: Filial responsibility and the allocation of support by adult children to older mothers. In M. E. Szinocacz & A. Davey (Eds.), *Caregiving contexts: Cultural, familial and societal implications* (pp. 71–91). New York, NY: Springer.

Silverstein, M., Conroy, S. J., Wang, H., Giarrusso, R., & Bengtson, V. L. (2002). Reciprocity in parent–child relations over the adult life course. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, **57**, S3–S13.

Spillman, B., & Pezzin, L. E. (2000). Potential and active family caregivers: Changing networks and the "sandwich" generation. *Milbank Quarterly*, **78**, 347–374.

Thomas, D. (1990). Intra-household resource allocation: An inferential approach. *Journal of Human Resources*, **25**, 635–664.

Tolkacheva, N., van Groenou, M. B., & van Tilburg, T. (2010). Sibling influence on care given by children to older parents. *Research on Aging*, **32**, 739–759.

Voorpostel, M., & Blieszner, R. (2008). Intergenerational solidarity and support between adult siblings. *Journal of Marriage and Family*, **70**, 157–167.

Wolf, D. A., Freedman, V., & Soldo, B. J. (1997). The division of family labor: Care for elderly parents. *Journal of Gerontology: Social Sciences*, **52B**, S102–S109.