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4 The Provision of Time to the Elderly by Their Children

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Has support of the aged by families declined in the postwar period? While the jury is still out, there is substantial evidence pointing in that direction. Over 60 percent of the elderly (those over 60) now live alone, compared with only 25 percent in the 1940s. For the old old (those over 85), the fraction living alone has increased from 13 to 57 percent. At the same time, there has been more than a tripling of the rate of institutionalization; today almost one-quarter of the old old live in institutions, compared with only 7 percent in the 1940s (Sandefur and Tuma 1987). In addition to not living with the elderly, the children of the elderly rarely provide financial transfers to the elderly (Kotlikoff and Morris 1989), and when they do, the amounts are typically quite meager.

One defense of the children's behavior is demographic; the current number of children per elderly parent totals about half the number observed in the 1940s. Since the elderly of today had fewer children than did their parents and have, in some cases, succeeded in outliving their children, the current situation may be much of their own making. A second defense is that the relative income position of the elderly has improved, permitting them to live alone (Michael, Fuchs, and Scott 1980) and obviating the need for financial transfers from their children. A variety of studies (e.g., Boskin, Kotlikoff, and Knetter 1985; and Andrews and Hurd 1990) have demonstrated that current poverty rates of the elderly are close to, if not below, those of the nonelderly.

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Much of the improvement in the relative incomes of the elderly is due to increases in real Social Security benefits legislated in the 1970s. A third point to consider in assessing child support of the elderly involves payment for nursing home care. A good fraction of the elderly in nursing homes are private pay patients. Some of these payments are being made directly by children. While we are not aware of time-series data on nursing home payments by children, it seems plausible that such payments per child measured at constant dollars have increased over time.

While the elderly may need and appear to be receiving less financial help from their children, their needs for companionship and physical assistance may well have increased in the postwar period; the increased longevity of the elderly often means living for years in poor states of health. In addition, those elderly who continue to live will lose a large fraction of their old friends and even some of their children along the way. Most studies of the increasingly separate living arrangements of the elderly conclude that these arrangements reflect the preferences and improved financial means of the elderly. In contrast, Kotlikoff and Morris (1990) suggest that about half the elderly would prefer to live with their children but continue to live apart because of their children's preferences coupled with their children's financial abilities to live apart from their parents.

One reason the jury remains out on family support of the aged involves the issue of time spent by children with their elderly parents. As Morgan's (1984) research suggests, children's provision of time to their elderly parents is an important, if not the most important, form of economic transfer to the elderly by their children. This paper studies the provision of time by children to their elderly parents. We use the 1986 Hebrew Rehabilitation Center for the Aged (HRCA) follow-up survey of Massachusetts elderly and the 1986 HRC-NBER survey of the children of these Massachusetts elderly. While the child survey involved an interview of only one of the children of the elderly (the one designated by the elderly), each child was asked a set of detailed questions not only about his or her own circumstances but also about the circumstances of each of his or her siblings. The combined data are unique in their detail of demographic and economic characteristics of the elderly and each of their children.

We use these data to answer a number of questions about the provision of time by children to their parents. These questions include, How does the health status of the elderly influence the amount of time given by children? How does the health status of the children influence their provision of time to their parents? Do parents with more income and wealth receive more time from their children? How do the employment status and wage rates of children affect their provision of time? Do children free ride on their siblings' provision of time? Are home care corporations used by children as a substitute for their own time? Do the institutionalized elderly receive more or less time? Are daughters, other things being equal, more or less likely to provide time?

We take two empirical approaches in studying the data. First, we estimated

Tobits for the provision of time by children. Second, we estimate a structural model of the joint decision of children to work and to provide time to their elderly parent. Since the opportunity cost of providing time to the parent for working children is the wage, the structural model indicates how wage rates influence the allocation of time by children to the elderly. The model can account for corner solutions in the data; this is important because some children do not work, some do not provide time to their parents, and some neither work nor provide time.

Our model assumes that the child is altruistic in that he or she cares about the utility the parent receives from their time spent together. The model does not, however, consider the utility the child might derive from the consumption of the parent. Including the utility of parent's consumption in the child's utility function would require an analysis of financial transfers from children to parents. But given that only 2.6 percent of children in our sample report making financial transfers to their elderly parent(s), the extra complications of modeling financial transfers seems to outweigh the potential benefits.[1] While we ignore financial transfers, the model does consider the simultaneous decisions by siblings as to how much time each sibling should provide the parent. The model assumes that each sibling takes time provided to the parent as given; that is, the siblings play noncooperative Nash.

Another issue not considered by the model is the possibility that children are not altruistic but, in effect, sell their time (à la Bernheim, Shleifer, and Summers 1985) to their parents. The quid pro quo for this sale of time is a financial payment by parents to their children. But such transfers are also quite rare in our sample: only 0.9 percent of children report receiving financial transfers from their parents. In addition, as described below, children receiving financial transfers from their parents are no more likely to provide time to their parents than those not receiving transfers. While the possibility remains that parents pay for time transfers by leaving larger future bequests, it is not clear how one would estimate the magnitude of such contingent payments.

Section 4.1 presents our simple structural model. Section 4.2 describes the data and our sample selection. Section 4.3 presents Tobit estimates of the allocation of time by children to their parents as well as estimates of the structural model. Section 4.4 concludes the paper with a summary of our findings.

4.1 A Simple Structural Model of the Joint Labor Supply and Time Provision Decisions

4.1.1 The Model

Our model assumes that the child's utility is logarithmic and depends on his or her consumption, leisure, and the total amount of time the parent receives

1. The mean amount of transfers from children to parents, when positive, is $2,159 per year.

from him or her and his or her siblings. The utility function of sibling i, U_i, is given by

$$U_i = \alpha \log C_i + \beta \log \ell_i + \log(d_i + \sum_{j \neq i}^{N_i} d_j + m). \tag{1}$$

In (1), α, β, and m are constants. The terms C_i, ℓ_i, d_i, and d_j ($j \neq i$) stand, respectively, for consumption of child i, leisure of child i, time provided to the parent by child i, and time provided to the parent by sibling j. There are N_i siblings of child i. The displacement value m (which we set equal to one) in the logarithm of time received by the parent permits the possibility that child i provides zero time to his or her parent even if all his or her siblings also provide zero time.

The child maximizes this function subject to constraints (2), (3), and (4):

$$C_i \leq W_i(1 - \ell_i - d_i) + Y_i, \tag{2}$$

$$d_i \geq 0, \tag{3}$$

$$d_i + \ell_i \leq 1. \tag{4}$$

Equation (2) says that consumption cannot exceed labor earnings plus exogenous income, Y_i. Equation (2) says that time provided to the parent cannot be negative, and equation (3) says that the sum of leisure time plus time spent with the parent cannot exceed the endowment of time that is normalized to unity.

Since (2) will always be binding, solutions for the values of ℓ_i and d_i satisfy:

$$\left[\frac{\beta}{\ell_i} - \frac{\alpha W_i}{W_i(1 - \ell_i - d_i) + Y_i}\right](1 - d_i - \ell_i) = 0, \tag{5}$$

$$\left[\frac{1}{d_i + \sum_{j \neq i}^{N_i} d_j + m} - \frac{\beta}{\ell_i}\right] d_i = 0. \tag{6}$$

Letting $[\ ]_a$ and $[\ ]_b$ stand, respectively, for the values in the square brackets in (5) and (6), we have the following four cases:

1. $d_i + \ell_i = 1$ and $d_i = 0$ (the child is retired and provides no time) hold if $[\ ]_a > 0$ and $[\ ]_b < 0$.
2. $d_i + \ell_i = 1$ and $d_i > 0$ (the child is retired and provides time) hold if $[\ ]_a > 0$ and $[\ ]_b = 0$.
3. $d_i + \ell_i < 1$ and $d_i = 0$ (the child works and provides no time) hold if $[\ ]_a = 0$ and $[\ ]_b < 0$.
4. $d_i + \ell_i < 1$ and $d_i > 0$ (the child works and provides times) hold if $[\ ]_a = 0$ and $[\ ]_b = 0$.

4.1.2 Estimation

The condition $[\quad]_a \geq 0$ implies

$$\log[W_i(1 - \ell_i - d_i) + Y_i] - \log(W_i\ell_i) \geq \log \alpha_i - \log \beta_i,$$

and the condition $[\quad]_b \leq 0$ implies

$$\log\ell_i - \log(d_i + \Sigma_{j \neq i} d_j + m) \leq \log \beta_i.$$

In these expressions, each child has individual-specific preference parameters, that is, α and β are subscripted by i. We let $\log \alpha_i = x_i'\theta + \mu_i$ and $\log \beta_i = x_i'\psi + \upsilon_i$, where x_i' is a vector of characteristics of child i and his or her parent(s), θ and ψ are coefficient vectors, and μ_i and υ_i are mean zero independent normal errors with bivariate density $f(\mu_i, \upsilon_i)$. Define

$$H_i \equiv \log[W_i(1 - \ell_i - d_i) + Y_i] - \log(W_i\ell_i) - x_i'\theta + x_i'\psi$$

and

$$Z_i \equiv \log \ell_i - \log(d_i + \Sigma_{j \neq i} d_j + m) - x_i'\psi,$$

then $H_i \geq \mu_i - \upsilon_i$ and $Z_i \leq \upsilon_i$. The probability of observing child i working and providing time can now be expressed as

$$\Pr(H_i = \mu_i - \upsilon_i \text{ and } Z_i = \upsilon_i) = f(H_i + Z_i, Z_i), \tag{7}$$

where H_i and Z_i are evaluated at the observed values of ℓ_i and d_i.

The probability of observing child i retired and providing time is

$$\Pr(H_i > \mu_i - \upsilon_i \text{ and } Z_i = \upsilon_i) = \int_{-\infty}^{H_i + Z_i} f(\mu_i, Z_i) d\mu_i, \tag{8}$$

where H_i and Z_i are evaluated at the observed value of d_i and ℓ_i is evaluated at one minus the observed value of d_i.

The probability of observing child i retired and providing no time is

$$\Pr(H_i > \mu_i - \upsilon_i \text{ and } Z_i < \upsilon_i) = \int_{z_i}^{\infty} \int_{-\infty}^{H_i + \upsilon_i} f(\mu_i, \upsilon_i)\, d\upsilon_i d\mu_i, \tag{9}$$

where H_i and Z_i are evaluated $d_i = 0$ and $\ell_i = 1$.

The probability of observing child i working and providing no time is

$$\Pr(H_i = \mu_i - \upsilon_i \text{ and } Z_i < \upsilon_i) = \int_{Z_i}^{\infty} f(H_i + \upsilon_i, \upsilon_i) d\upsilon_i, \tag{10}$$

where H_i and Z_i are evaluated at $d_i = 0$ and ℓ_i equals one minus the observed amount of time child i spends working.

Denote L_k as the probability of the observed labor supply and time provision of child k, then the likelihood, L, of the sample with N observations is

$$L = \prod_{k=1}^{N} L_k. \tag{11}$$

4.2 The Data, Sample Section Criteria, and Data Characteristics

4.2.1 The 1986 HRCA Elderly Survey and the 1986 HRC-NBER Child Survey

The 1986 HRCA Survey of the Elderly is part of an ongoing panel survey of Massachusetts elderly that began in 1982. In addition to the 1982 and 1986 surveys, the elderly sample was reinterviewed in 1984, 1985, 1987, and 1989. The 1986 HRC-NBER Child Survey is a survey of the children of those elderly interviewed in the 1986 HRCA Survey of the Elderly. One child of each elderly respondent was interviewed and asked a set of questions concerning his or her household, parents, and siblings.

The original 1982 stratified sample of 3,856 elderly individuals was drawn from two populations. The first population, accounting for 2,674 of the elderly in the total sample, was drawn from communities in Massachusetts. In forming the community sample, the state of Massachusetts was divided into twenty-seven home care areas. Within each home care area, communities were stratified, on the basis of population, into large, medium, and small, and communities within each of the three groups were selected at random. Next, HRCA used Massachusetts police records, which record the ages and addresses of all Massachusetts residents, to stratify the elderly by age, separating those age 75 and older from those younger than age 75. Elderly individuals within each subgroup were then randomly selected. The community and age stratifications produced an intentional overrepresentation of the old old as well as the elderly living in rural communities.

The second population, which accounts for the remaining 1,182 elderly in the 1982 survey, was drawn from elderly participants of all twenty-seven Massachusetts home health care corporations. In this sample, the elderly were again stratified by age, and the older old were oversampled. The sample's selection procedures are described in more detail in Morris et al. (1987). The 1982 sample of the elderly included only the noninstitutionalized elderly, but each subsequent survey has followed the initial sample as they changed residences, including moving into and out of nursing homes.

Each of the HRCA Surveys of the Elderly include detailed questions about living arrangements and health status. The 1986 reinterview of the elderly also contains a series of questions of the elderly about their children. These questions include the names, sexes, frequency and type of contact with children, the extent of financial aid given to and received from children, and the amount of assistance given by children to their elderly parents in performing

activities of daily living. In addition, the 1986 survey contains a set of questions about the elderly respondent's income and wealth.

At the close of the HRCA elderly survey, the elderly respondent was asked for permission to contact one of his or her children and ask that child to participate in our child survey. While a random selection of the child respondents would have been preferable, it was felt that the elderly respondents would be more cooperative if they were allowed to make the selection. Because of funding limitations, we were able to sample only children of the community sample of elderly; that is, we were not able to contact children of the home care sample of elderly. As mentioned, the community sample of elderly is a stratified random sample of noninstitutionalized elderly.

Like the HRCA Surveys of the Elderly, the HRC-NBER Child Survey is a telephone interview. The Child Survey is roughly forty-five minutes in length. Interviews with the child's spouse were conducted if the child was not available. The questions in the Child Survey concerning the respondent's and spouse's characteristics include age, marital status, number of young children, work and health status, occupation, industry, education, grades in high school, income, and wealth. These questions are also asked of the respondent about his or her siblings. In addition, the child was asked to indicate (1) the frequency of contact between each sibling and each sibling's spouse and the HRCA elderly respondent parent, (2) the amount of financial assistance each sibling and his or her spouse give to or receive from the HRCA elderly respondent parent, and (3) the amount of time each sibling and his or her spouse spends with the HRCA elderly respondent per month. The child is also asked about his or her parents' and in-laws' health status as well as his or her parents' income and net wealth.

The sample size of the initial 1982 Survey of the Elderly is 3,856. In contrast, the 1986 completed sample size of elderly was 2,889, with 22.5 percent of the attrition since 1982 due to death. In the 1986 data, over 90 percent of the elderly are above age 70, over 40 percent are the old old (above age 85), and over two-thirds are female. The number of child respondents in the HRC-NBER Child Survey is 850. We have data for 1,650 children of the HRCA Elderly Survey respondents (including siblings); that is, the 850 child respondents provided information on themselves plus an additional 800 siblings.

4.2.2 Sample Section

The basic sample used in our statistical analysis contains 1,650 children of 706 elderly respondents. We excluded observations if data are missing on a child's age, sex, occupation, health, education, marital status, grades received in school, and employment status. We also excluded children with missing information on time provided their parent, children younger than 18 years of age, children whose co-residence status with the parent respondent was not reported, and children whose parent's age we do not know.

4.2.3 Data Characteristics

Of the 706 elderly parents in our sample, 24 percent are age 55–70, 48 percent are age 71–80, and 28 percent are 81 and older. The 1,650 children (including siblings of the Child Survey respondents) of these parents range in age from 18 to 84; 20 percent are under 40, 29 percent are 41–50, 33 percent are 51–60, and 18 percent are 61 and older. Most of the elderly parents (70 percent) are female, and most (72 percent) are not married. In contrast, only 54 percent of children are female, and 76 percent of children are married. On average, there are 2.42 children per elderly parent. A total of 21 percent of the elderly parents have one child, 32 percent have two children, 23 percent have three, and 24 percent have four or more.

Among elderly who report their total household income, mean income is $11,247, and median income is $6,250. (These and all subsequent dollar figures are in 1987 dollars.) The corresponding figures for child households are $34,392 and $32,500, respectively. Among elderly who report total household net worth, mean net worth is $93,396 and median net worth is $40,000. The corresponding child net worth figures are $175,019 and $125,000, respectively.

Many of the elderly in our sample are in poor health; indeed, 13 percent of the sample's elderly are in nursing homes or similar institutions, and 15 percent are enrolled in home care programs. In all, 40 percent of the elderly report their health as fair or poor (as opposed to excellent or good). In terms of ADL (activities of daily living) status, 44 percent report difficulty or inability preparing their own meals, 56 percent taking out garbage, 33 percent performing house chores, 22 percent dressing themselves, 24 percent taking a bath or shower, 10 percent getting out of a chair without assistance, 21 percent maintaining bladder control, and 28 percent walking up and down stairs without assistance.

Not all the children of the elderly are in excellent or good health. A total of 13 percent of the children report their health (or have their health reported) to be either fair or poor. In the case of the 1,255 spouses of these children, 14 percent report (or have had reported) their health to be fair or poor.

In addition to time demands imposed by the elderly parent respondent, the children in our survey may need to respond to the time demands by their other parent and their parent in-laws. The fraction of children with two parents is 30 percent. In the case of in-laws, information was obtained only for the child respondents; that is, the survey did not ask the child respondents about their siblings' in-laws. For child respondents, the percentage with one or two parent in-laws is 43 percent, and 33 percent of these in-laws are reported to be in fair or poor health.

A total of 64 percent of the 1,729 children in the sample report (or have had reported) that they are employed full time, and 12 percent report (or have had reported) that they are employed part time. The average annual wage of children employed full time for those children for whom we have information on

wages is $32,914. Unfortunately, the child survey questionnaire did not ask about the wage plus salary of the child respondent and the wage plus salary of the child respondent's spouse separately but rather asked about combined household wage and salary income. And in the case of the questions about siblings, the survey asks only about the total income of the sibling and the sibling's spouse; it does not ask about siblings' wages and salaries separately.

The wage rate of children is a potentially important explanatory variable for estimation of both our Tobit and our structural models. In the estimation of these models, we use an imputed full-time wage based on a regression of wages of child respondents or their spouses who report that they are working full time and for whom we can determine their wages plus salaries. As an example, if the respondent child is married, reports that he or she works full time, and also reports that his or her spouse does not work, we know that the wages plus salaries of the couple are those of the child respondent. In this wage regression, we use education dummies for years of education, grades in school, occupation, sex, health, and a third-order polynomial in age as explanatory variables.[2]

4.3 Model Estimation

4.3.1 Tobit Estimates

The Tobit model can be viewed as a test of a simpler version of the structural model presented above. It corresponds to the case that the amount of work the child does (which may be zero) is exogenously given and the child simply divides his or her nonwork time between leisure and time spent with his or her parent. In his simpler model, consumption is exogenously determined by the sum of exogenous nonlabor plus labor income, so the child maximizes

$$U_i = \beta \log(\lambda_i - d_i) + \log(d_i + \Sigma_{j \neq i} d_j + m) \quad \text{s.t. } d_i \geq 0,$$

2. There are 157 observations in the auxiliary wage regression. The R^2 from the wage regression is .61. The coefficients (standard errors) from this regression are as follows: intercept = −28,194.65 (71,464.92); age of child = 1,017.71 (4,700.80); age^2 = −5.97 (104.17); age^3 = 0.063 (0.751); dummy for one to eight years of education = −1,599.56 (6,424.95); dummy for nine to twelve years of education = −960.82 (2,236.20); dummy for reported health as "excellent" = 2,165.11 (11,436.56); dummy for reported health as "good" = −1,619.78 (11,388.68); dummy for reported health as "fair" = 1,174.45 (12,058.25); dummy for reported grade in school as "A" = −4,827.79 (12,185.82); dummy for reported grade as "B" = 4,269.33 (11,795.60); dummy for reported grade as "C" = 1,700.29 (11,654.26); dummy for reported grade as "D" = −7,531.44 (11,800.93); dummy for occupation code 2 = 28,664.68 (16,807.28); dummy for occupation code 3 = 1,588,959 (17,069.44); dummy for occupation code 4 = 17,508.99 (17,049.96); dummy for occupation code 5 = 13,341.80 (16,908.94); dummy for occupation code 6 = 14,808.53 (17,332.27); dummy for occupation code 7 = 13,973.28 (16,926.66); dummy for male = 19,662.50 (2,085.96).

where λ_i stands for one minus the exogenously determined supply of labor. For this model, equation (6) is modified to

$$(6') \qquad \left[\frac{1}{d_i + \sum_{j \neq i}^{N_i} d_j + m} - \frac{\beta}{\lambda_i - d_i}\right] d_i = 0.$$

The provision of time is positive if the square bracket in (6′) equals zero, and it is zero if the square bracket is negative; that is, $d_i = 0$ if $0 > [-\beta(\Sigma_{j \neq i} d_j + m) + \lambda]/(1 - \beta)$ holds, otherwise $d_i = [-\beta(\Sigma_{j \neq i} d_j + m) + \lambda]/(1 - \beta)$. Let the right-hand side of this last equality equal $x_i' \gamma + \varepsilon_i$, where x_i is a vector of characteristics of child i and his or her parent and includes the amount of time provided to the parent of his or her siblings $(\Sigma_{j \neq i} d_j)$, and where ε_i is a standard normal error. Then d_i equals zero if the indicator function $I_i = x_i'\gamma + \varepsilon_i$ is negative and equals I_i if the indicator is positive. But this is the standard Tobit model. Using data on all child respondents and their siblings and taking, for each observation, the time provided by all the other siblings as one of the x's in the Tobit regression appear to be appropriate provided that the error terms, the ε_i's, are uncorrelated across siblings.

Our actual Tobit model is a slight modification of the standard Tobit specification to take account of the 29 percent of children in our sample whose parents live with them. In these cases, it is obvious that the child spends time with the parent, but we are not sure how to assess the amount of time. To accommodate these data, we assume that the time provided by the child is positive, but the exact amount of time is unknown. The standard Tobit has two pieces of the likelihood function corresponding to the probability of no time provided and the probability of a specific amount of time provided. We add to the standard likelihood function a statement for the probability of providing positive time, which is simply one minus the probability of providing zero time.

The time question in the Child Survey that provides the dependent variable for our analysis is, "In the last month, how many hours did you (and your spouse) spend with your parents, visiting, going out together, and/or helping him/her/them?" Of the 1,179 out of 1,650 children in the Tobit sample who indicate they are not living with their respondent parent, 29 percent report (or have had reported) spending zero time per month with their elderly parent. Another 31 percent report spending one to ten hours per month, 18 percent eleven to twenty hours per month, 9 percent twenty-one to thirty hours per month, 5 percent thirty-one to forty hours per month, and 8 percent forty-one or more hours per month.

Excluding children living with their parents, the average number of hours provided per month is fifteen, and the median number is eight. Within this subsample of non-co-resident children, average and median hours provided

by only children are twenty-four and sixteen, respectively; average and median hours (per child) provided by children with one sibling are sixteen and nine, respectively; and average and median hours (per child) provided by children with two or more siblings are twelve and five, respectively.

Tables 4.1–4.3 report results from Tobit regressions. The first regression includes a set of thirty-three regressors (excluding the intercept). It does not, however, include the sum of time provided by siblings as a regressor, which we include in table 4.2. Table 4.3 contains the Tobit results if one excludes observations in which children live with their parents.

Table 4.1 **Result from Tobit Regression of Time Spent by Child with Parent against Child and Parent Characteristics**

Parameter	Coefficient	SE	*t*-Statistic
Intercept	6.08	7.56	.80
MR2	.25	2.19	.11
MR3	3.68	2.99	1.23
MR4	2.52	3.01	.84
PM2	−2.22	3.39	−.65
PM3	5.64	1.52	3.71
EM2	.15	2.12	.07
EM3	−4.06	2.08	−1.95
SEMPL	.98	1.54	.64
NS	−.74	.39	−1.88
SEX	−5.47	1.33	−4.13
PSEX	−.62	1.50	−.41
H14	−13.81	5.69	−2.43
SPH4	1.62	3.16	.51
PH4	4.38	2.71	1.62
PADL	.77	.32	2.40
PLV	−17.72	2.83	−6.27
PHC	−7.45	1.74	−4.29
PWH	−2.38	2.46	−.97
AG	−2.27	4.83	−.47
PAG	15.66	6.09	2.57
MILH4	11.41	3.46	3.30
FILH4	−.83	8.75	−.09
FHLPL	8.23	3.20	2.57
PHLPL	−13.81	5.70	−2.42
PYM	−2.79	1.70	−1.65
PYV	−29.73	17.44	−1.70
KYM	−.24	4.61	−.05
KYV	−17.04	15.48	−1.10
PWLM	−1.16	1.74	−.67
PWLV	1.72	1.89	.91
KWLM	−1.68	3.64	−.46
KWLV	−1.08	1.53	−.71
WAGE	−.55	.14	−4.05
SIG2	615.26	17.23	35.72

Note: Log likelihood function = −4,342.49. No. of observations = 1,650.

Table 4.2 **Result from Regression of Time Spent by Child with Parent against Child and Parent Characteristics: Includes Time Spent by Siblings as a Regressor**

Parameter	Coefficient	SE	t-Statistic
Intercept	6.21	7.57	.82
MR2	.29	2.19	.13
MR3	3.62	3.01	1.20
MR4	2.52	3.02	.83
PM2	−2.40	3.41	−.70
PM3	5.57	1.53	3.65
EM2	.10	2.12	.05
EM3	−4.15	2.09	−1.99
SEMPL	1.02	1.54	.67
NS	−.63	.41	−1.55
SEX	−5.45	1.33	−4.11
PSEX	−.67	1.51	−.44
H14	−13.86	5.67	−2.44
SPH4	1.71	3.17	.54
PH4	4.54	2.71	1.68
PADL	.78	.32	2.40
PLV	−17.98	2.87	−6.27
PHC	−7.42	1.73	−4.28
PWH	−2.50	2.46	−1.01
AG	−2.14	4.84	−.44
PAG	15.74	6.10	2.58
MILH4	11.38	3.47	3.28
FILH4	−1.17	8.75	−.13
FHLPL	8.19	3.21	2.55
PHLPL	−13.67	5.73	−2.39
PYM	−2.87	1.70	−1.69
PYV	−30.34	17.47	−1.74
KYM	−.40	4.63	−.09
KYV	−17.86	15.52	−1.15
PWLM	−1.12	1.74	−.64
PWLV	1.68	1.89	.89
KWLM	−1.70	3.66	−.47
KWLV	−1.04	1.53	−.68
WAGE	−.56	.14	−4.09
SIBTM	−.01	.01	−.94
SIG2	616.63	17.33	35.59

Note: Log likelihood function = −4,342.10. No. of observations = 1,650.

In considering the results, it is important to keep in mind, first, that time spent with the parent, d, is a censored variable and, second, that the change in expected time spent in response to a unit change in one of the regressor variables is the change in the unconditional expectation $E[d_i]$. Rather than report the simple Tobit coefficients, the reported coefficients corresponding to the product of Tobit coefficients times the probability that time spent is posi-

Table 4.3 **Result from Tobit Regression of Time Spent by Child with Parent against Child and Parent Characteristics: Includes Only Children Not Living with Parent**

Parameter	Coefficient	SE	*t*-Statistic
Intercept	13.13	7.50	1.75
MR2	−1.15	2.19	−.52
MR3	2.82	2.98	.95
MR4	−4.71	3.56	−1.32
PM2	−5.84	3.45	−1.69
PM3	2.31	1.52	1.52
EM2	−.76	2.15	−.36
EM3	−4.62	2.09	−2.21
SEMPL	1.50	1.53	.98
NS	−1.79	.41	−4.37
SEX	−5.13	1.35	−3.81
PSEX	−.93	1.51	−.62
H14	−15.40	7.10	−2.17
SPH4	1.65	3.08	.53
PH4	4.01	2.71	1.48
PADL	.06	.32	.18
PLV	−5.98	2.90	−2.06
PHC	−1.22	1.76	−.69
PWH	−.55	2.50	−.22
AG	−1.21	4.89	−.25
PAG	9.34	6.10	1.53
MILH4	10.77	3.34	3.22
FILH4	−1.03	8.25	−.13
FHLPL	9.91	3.15	3.14
PHLPL	−18.81	6.90	−2.73
PYM	−1.99	1.75	−1.13
PYV	−9.12	17.75	−.51
KYM	−1.67	4.95	−.34
KYV	−20.53	14.89	−1.38
PWLM	−.90	1.77	−.51
PWLV	1.61	1.95	.83
KWLM	−1.92	3.84	−.50
KWLV	−.02	1.45	−.01
WAGE	−.52	.14	−3.84
SIG2	686.34	21.69	31.65

Note: Log likelihood function = −4,197.25. No. of observations = 1,179.

tive. By multiplying the Tobit coefficients by this probability (which, by the way, is evaluated at the sample's mean characteristics), we are simply reporting rescaled Tobit coefficients. The standard errors reported in the tables are those of the original (unscaled) coefficients.

The first set of regressors in table 4.1 (MR2–MR4) are dummies for the child's marital status. Married child is the reference case. As would be expected, separated/divorced, widowed, and never-married children provide

more time to parents. Of these, separated/divorced children provide very little additional time compared to married children. Widowed children provide the most time to parents. The coefficients on all three dummies are, however, insignificant.

The coefficients on parent's marital status indicate that, compared to married parents (the reference case), divorced/separated parents (PM2) receive less time, but the standard error here is very large. In contrast, widowed parents (PM3) receive substantially more time, and the coefficient is quite significant.

The next set of dummies (EM2 and EM3) are coded 1 when the child employment status is part time (960 hours per year) and not working. The dummy for children who have full-time (1,920 hours per year) employment status (EM1) was excluded. As can be expected, children who are working part time provide marginally more time compared to children working full time. However, contrary to expectations, those who are not working provide substantially less time to parents compared to children who are employed full time. The former coefficient is insignificant, while the latter is significant at almost the 5 percent level. The dummy for child's spouse being employed either full time or part time (SEMPL) is positive. The coefficient, however, is insignificant.

The next variable (NS) indicates the number of siblings. A larger number of siblings may be expected to reduce the amount of time provided by each child since parent dependence on any one child would be lower. Moreover, if siblings free ride on each other's time provision to the parent, a larger number of siblings would provide additional scope for such free riding behavior. The regression shows that, after controlling for other influences, the presence of additional siblings reduces the provision of time to parents by about three-quarter of an hour per month for each additional sibling. The coefficient on this variable is significant at the 10 percent level, but not the 5 percent level.

The dummy for the child's sex (SEX) was set to equal one for male children. The coefficient suggests that male children who spend time spend about 5.5 hours less per month than female children who spend time. The parent's sex dummy (PSEX), which also has a value of one for males, has a negative coefficient of -0.62 hours, but it is not significant.

As expected, the dummy for child's self-reported health being "poor" (H14) shows a large negative effect on time spent with parent, and the coefficient is significant. "Poor" health of spouse (SPH4) may be expected to curtail the amount of time spent by the child with the parent. However, the opposite result is obtained from the regression. The coefficient on SPH4 is positive, but insignificant. The variable (PH4) is a dummy for parent's self-reported health status being "poor" As expected, the time provided by children is higher for parents whose health status is "poor," but the coefficient is not significant.

The variable PADL is a sum of fourteen dummies, each having a value of one if the parent is unable to perform specific tasks and a value of zero other-

wise.[3] A larger value of PADL thus represents a higher degree of parent disability. The coefficient on this variable is positive and significant. Its value is close to one, indicating that for every additional count of disability the child spends an additional hour per month with the parent.

The coefficient on the dummy indicating whether the parent is in a nursing home or similar institution (PLV) is large, negative, and quite significant. The result suggests that such parents receive substantially less time from their children. A large, negative, and significant effect on child's time also arises if the parent receives services from a home care corporation (PHC). Parents receiving "Meals on Wheels" are represented as one in the next dummy variable (PWH). The coefficient is negative, but not significant. These results suggest that children substitute for their own time by using institutions, home care corporations, etc. to care for their elderly parents.

Older children spend less time with parents, but the coefficient on child's age (AG) is not significant. Older parents receive substantially more time, and the coefficient on parent's age (PAG) is significant.

The next two dummies (MILH4 and FILH4) have a value of one if mother-in-law's or father-in-law's health, as reported by the child, is "poor," for children who have either of these parents-in-law. Surprisingly, the coefficient on the former is highly positive and quite significant.[4] The coefficient on father-in-law's health is negative and insignificant.

Do children substitute financial transfers for time transfers to parents, and do parents buy time from children? The variable FHLPL is a dummy that assumes a value of one if the child made positive financial transfers to the parent within the past year. According to the coefficient on FHLPL, children who make such transfers spend about eight hours more per month with parents than children who do not. The coefficient on this variable is significant. The dummy indicating whether the parent made a financial transfer to the child (PHLPL) has a large negative coefficient, and this too is significant. Both parts of the question posed above are thus answered in the negative.

Higher total income of the parent (PYV) when parent income is reported is associated with substantially less time devoted by the child to the parent, but the coefficient is not significant. Higher total income of the child (KYV) is also

3. The variable PADL is the sum of fourteen activity dummies. These dummies had a value of one if parent does not go out of building of residence more than once a week; parent does not prepare own meals; parent thinks he or she does not get enough to eat; parent does not take out garbage himself or herself; parent not healthy enough to do ordinary work around the house; parent has problems dressing by himself or herself; parent unable to prepare bath and dry self; parent unable to get up out of ordinary chair without help; parent has bladder accidents; parent unable to climb up or down stairs without help; parent is confined to bed; parent inclined to wander and/or get lost; parent needs constant supervision; parent uses either walker, four-pronged cane, crutches, or wheelchair at least some of the time to get around.

4. The large positive and significant coefficient on the mother-in-law health dummy does not appear to be due to outliers in the data.

associated with less time spent by the child with the parent, but again the coefficient is insignificant. The signs on both these coefficients are plausible. Parents with larger incomes can afford to buy supervisory and care services and are, therefore, less dependent on their children, and children with higher incomes would be expected to have a higher opportunity cost of time.

If expectations of bequests are important determinants of parent-child relationships, one would expect richer parents to receive more time from their children and richer children to provide less time to parents. The regression indicates that parents with higher net worth (PWLV) receive more time from children and that children with higher net worth (KWLV) spend less time with parents. The coefficients on both these variables are, however, insignificant.

Children with higher wage rates (WAGE) spend somewhat less time with their parents. The coefficient on the wage rate is quite significant. The size of the wage effect seems economically quite large; increasing the child's wage by $10.00 per hour reduces his or her time spent with the parent by 5.5 hours per month.

Table 4.2 repeats the Tobit of table 4.1 but also includes the total amount of time provided by siblings (SIBTM) as a regressor. The introduction of this extra regressor does not substantially alter the estimated coefficients and standard errors for the rest of the variables. More time provided by siblings (SIBTM) is associated with a very small reduction in the amount of time provided by the child, and the coefficient is insignificant.

Table 4.3 reports Tobit results for the subsample that excludes children who live with their parents. There are few noteworthy differences between the results of tables 4.1 and 4.3. For example, the variable for number of siblings (NS) is significant and larger in absolute value in table 4.3 compared with table 4.1. The coefficient on the dummy for parents receiving home care services is now a much smaller negative number and is insignificant. Table 4.3 shows a much smaller positive coefficient on the index for parent disability (PADL), and the coefficient is now significant. This indicates that, in the subsample of non-co-resident parents and children, children seem to spend very little additional time with parents when the degree of parent disability is higher.

4.3.2 Estimates of the Structural Model

Tables 4.4 and 4.5 present maximum likelihood regression results for the structural model presented in section 4.1. The data used for this estimation are a subsample of 415 respondent children who do not live with their parent and for whom valid data on labor and nonlabor income are available.[5] Table 4.4 presents estimates of the coefficient vectors θ and ψ used to model the parameters α and β of the utility function. For this analysis, total disposable

5. Observations were deleted if data on wage income were positive, but the child's reported employee status indicated whether he or she was working or whether data on wage income were missing.

Table 4.4 Maximum Likelihood Estimation of the Structural Model

	Equation 1 ($\hat{\theta}$)			Equation 2 ($\hat{\varphi}$)		
Parameter	Coefficient	SE	t-Statistic	Coefficient	SE	t-Statistic
Intercept	5.50	2.61	2.11	5.45	2.73	1.99
MR2	−.79	1.03	−.77	.21	1.06	.20
MR3	−1.28	1.29	−.99	−.26	1.02	−.26
MR4	.42	1.39	.30	.98	1.30	.75
PM2	1.25	1.76	.71	1.42	1.84	.77
PM3	−.28	.52	−.54	.02	.55	.03
SEMPL	−.64	.59	−1.09	−.33	.57	−.58
NS	−.34	.17	−1.99	−.26	.17	−1.57
SEX	.23	.46	.51	.89	.48	1.84
PSEX	.09	.49	.18	.38	.54	.71
H14	2.38	6.27	.38	.28	12.39	.02
SPH4	1.26	.83	1.52	−1.12	1.16	−.97
PH4	−.41	.96	−.43	−.10	.95	−.11
PADL	.03	.11	.26	.03	.12	.24
PLV	.33	.80	.41	−.35	1.07	−.32
PHC	.32	.64	.50	.29	.67	.43
PWH	−.28	1.01	−.28	.12	.93	.13
MILH4	.06	.65	.09	−1.05	1.07	−.98
FILH4	−.37	2.68	−.14	−.15	2.62	−.06
FHLPL	−1.29	1.22	−1.06	−.35	1.03	−.34
AG	−.03	1.77	.02	−1.65	1.87	−.88
PAG	−1.46	2.23	−.65	−1.43	2.39	−.60
PYM	.18	.58	.31	.04	.65	.05
PYV	4.38	15.12	.29	3.13	15.39	.20
KWLM	.91	3.27	.28	.92	3.87	.24
KWLV	.58	.33	1.76	.62	.39	1.56
PWLV	1.72	1.89	.91			
PWLM	.22	.64	.34	.07	.73	.10
PWLV	−.28	.60	−.46	−.27	.76	−.36

Note: Log likelihood function = −1,600.03. No. of observations = 415. The variables KNLY, SIBTM, and WAGE are part of the structural specification and have therefore been omitted from x, the vector of characteristics. Work time is endogenous, and therefore EM1 and EM2 have been omitted from vector x. This subsample has no observation with parent making a financial transfer to the child; hence, the variable PHLPL was omitted from vector x.

time available for an individual per year was taken to be 4,380 hours (assuming twelve hours of disposable time per day). The estimation procedure assumes that μ_i and υ_i ($i = 1, N$) are independently and identically distributed. The vector of child and parent characteristics, x, contains a subset of the variables used as regressors in the Tobit model.

The structural estimates are rather disappointing. With the exception of the coefficient on the number of siblings (NS) in column 1, all the coefficients of the structural estimates are insignificant. As a group, however, the coefficients seem rather reasonable with respect to their sign and magnitude. Since the

Table 4.5 Choices of *d* and *l* Implied by Estimated Parameters

	Time Spent with Parents		Leisure	
	New Value	Diff.	New Value	Diff.
At mean values	50	0	3,368	0
MR2 = 1	134	84	2,303	−1,065
MR3 = 1	295	245	2,152	−1,216
MR4 = 1	0	−50	2,822	−546
PM2 = 1	0	−50	3,242	−126
PM3 = 1	65	15	3,245	−123
SEMPL = 1	93	43	3,225	−143
NS = 1	17	−33	3,432	64
NS = 2	78	28	3,318	−50
NS = 3	159	109	3,190	−178
NS = 4	265	215	3,045	−323
NS = 5	402	352	2,883	−485
NS = 6	575	525	2,699	−669
NS = 7	789	739	2,495	−873
SEX = 1	3	−47	2,984	−384
PSEX = 1	28	−22	3,185	−183
H14 = 1	0	−50	4,380	1,012
SPH4 = 1	0	−50	4,380	1,012
PH4 = 1	115	65	3,030	−338
PADL = 0	66	16	3,357	−11
PADL = 3	49	−1	3,369	1
PADL = 6	32	−18	3,380	12
PADL = 9	17	−33	3,390	22
PADL = 12	3	−47	3,400	32
PLV = 1	24	−26	3,875	507
PHC = 1	5	−45	3,426	58
PWH = 1	79	29	2947	−421
MILH4 = 1	84	34	4,143	775
FILH4 = 1	117	67	3,103	−265
FHLPL = 1	313	263	2,232	−1,136
child's age = mean age + 10	66	16	3,663	295
child's age = mean age − 10	30	−20	3,028	−340
parent age = mean age + 10	115	65	3,317	−51
parent age = mean age − 10	0	−50	3,409	41
parent income = mean income + 2,000	47	−3	3,376	8
parent income = mean income − 2,000	53	3	3,361	−7
child's wealth = mean wealth + 10,000	39	−11	3,373	5
child's wealth = mean wealth − 10,000	62	12	3,363	−5
parent wealth = mean wealth + 10,000	51	1	3,368	0
parent wealth = mean wealth − 10,000	49	−1	3,369	1
WAGE = mean wage + 5	46	−4	3,311	−57

Table 4.5 (continued)

	Time Spent with Parents		Leisure	
	New Value	Diff.	New Value	Diff.
WAGE = mean wage − 5	56	6	3,464	96
SIBTM = SIBTM + 20	31	−19	3,382	14
SIBTM = SIBTM − 20	69	19	3,355	−13
KNLY = KNLY + 2,000	54	4	3,435	67
KNLY = KNLY − 2,000	46	−4	3,302	−66

Note: Standard errors in this table are proportional to those of table 5.

coefficients in table 4.4 are hard to interpret, we consider how changes in the exogenous variables affect the mean amount of time spent with parents and the mean amount of leisure predicted by the structural model. To do this, we use the estimated values $\hat{\theta}$ and $\hat{\psi}$ and the mean values of the vector x to obtain an estimate (at the mean of the x's) of the preference parameters α and β.[6] The optimal choices of the time transfer to parent (d) and the amount of leisure (ℓ) can then be inferred by setting the terms within the square brackets of (5) and (6) equal to zero and simultaneously solving the two resultant equations. If the optimal choice of d turns out to be negative, a corner solution is imposed by setting d equal to zero and recomputing the optimum amount of leisure.

The first row of table 4.5 presents the choices of time spent with the parent and leisure for, again, a hypothetical child with a characteristic vector x equal to the mean of x computed over the 415 observations. Out of a total of 4,380 hours per year, a hypothetical individual with mean characteristics spends 50 hours per year with the parent, consumes 3,368 hours of leisure per year, and works for the remaining 962 hours. Subsequent rows of table 4.5 present the amount of time spent with parents and the amount of leisure of the hypothetical child that result from changing the value of one of the elements in vector x while maintaining the others at their mean values. The columns labeled "Diff." indicate the change in time spent with parents and leisure from the respective values in the first row of the table.

6. The mean values of the vector of characteristics x for the subsample of 415 observations as follows:

MR2,	.089	H14,	.007	FHLPL,	.041
MR3,	.036	SPH4,	.019	child's age,	50.424
MR4,	.046	PH4,	.063	parent age,	75.328
PM2,	.048	PADL,	2.769	parent income,	9,873.494
PM3,	.624	PLV,	.169	child's wealth,	196,710.843
SEMPL,	.634	PHC,	.178	parent income,	85,924.699
NS,	1.569	PWH,	.048	WAGE,	20.283
SEX,	.402	MILH4,	.031	SIBTM,	154.207
PSEX,	.342	FILH4,	.014	KNLY,	8,728.207

Many of the results found in the Tobit analysis carry over to the structural estimates. For example, male children spend less time; divorced, separated, or widowed children spend substantially more time; children in poor health provide less time; parents in nursing homes receive less time; parents in poor health receive more time; and older parents receive more time. Surprisingly, and in contradiction to earlier results, table 4.5 shows that the time spent by children declines, and the amount of leisure consumed increases, with increasing degree of disability (PADL) of the parent.

The negative effect of time spent by siblings on the time spent by the child reflects the structural model's assumption that siblings play noncooperative Nash in providing time to their parents and respond to increased time by their siblings by cutting back on their own time.

4.4 Conclusion

This paper uses matched data on the elderly and their children to study the provision of time by children to the elderly. It develops a Tobit model as well as a structural model to analyze the determinants of this decision. The data reveal some clear patterns of time transfers from children to their elderly parents. Children appear to use institutions and home care as a substitute for their own provision of time. Parents who reside in nursing homes or are enrolled in home care programs receive, ceteris paribus, less than half the amount of time received by those in the community. The provision of time is strongly correlated with the age of the elderly parent; other things being equal, the old old receive over twice the time of the young old.

The sex, age, and health status of children are additional important determinants of time provided to the elderly. Male children and younger children spend relatively little time with their parents. Children with poor health spend almost no time with their parents. If the spouse of the child is in poor health, the child also gives very little time, at least according to the structural model's results.

Other things being equal, those elderly who report their health to be "poor" appear to receive over twice the amount of time received by elderly with better self-reports of health. Surprisingly, the degree of elderly disability does not appear to affect the amount of time provided to those elderly not living with their children, although it is a significant determinant in the larger sample that includes elderly living with their children.

The Tobit results for the entire sample of children, including those living with their elderly parents, indicate that more time is provided by single children and more time is received by single elderly, at least those who are widowed. In the structural model, the effects of the child's and parent's marital status on time provided to the elderly are less clear, but there is strong evidence that widowed children spend substantially more time with their elderly parents.

The structural model predicts that more time provided by siblings will lead to substantially less time provided by the child in question. However, this prediction is, to a large extent, simply the implication of the form of the structural model we have adopted. In the less constrained Tobit estimation, there is no evidence that siblings free ride on each others' provision of time.

Both the Tobit and the structural estimates indicate a small effect associated with higher children's wage rates; children with higher wage rates provide somewhat less time to their elderly parents than other children. In contrast to the modest effect of higher wage rates, the effect of larger values of children's wealth is quite sizable. Wealthier children and children with higher incomes appear to provide less time than poorer children, but the standard errors around these effects are quite large.

The standard errors on the effects of parent's wealth and income are also sizable. One might summarize the findings here by saying that there is certainly no strong evidence that richer parents receive more time than poorer parents; that is, the paper provides little, if any, support for Bernheim, Shleifer, and Summers's (1986) view that richer parents, in effect, purchase more time from their children.

To summarize, the results indicate that the main determinants of the amount of time given to parents are demographic. Economic variables, such as wage rate and income levels, appear to play an insignificant role in the provision of time by children to their elderly parents.

Appendix

Key to Variables Used in Tobit Regressions

MR2 = 1 if child is separated/divorced;
MR3 = 1 if child is widowed;
MR4 = 1 if child is never married;
PM2 = 1 if parent is divorced/separated;
PM3 = 1 if parent is widowed;
EM2 = 1 if child is employed part time;
EM3 = 1 if child is not working
SEMP1 = 1 if child's spouse is employed full or part time;
NS = number of siblings;
SEX = 1 if child is male;
PSEX = 1 if parent is male;
H14 = 1 if child rates his or her health as "poor";
SPH4 = 1 if child's spouse's health is "poor";
PH4 = 1 if parent rates his or her health as "poor";
PADL = index of disability (see text);
PLV = 1 if parent lives in nursing home or similar institution;
PHC = 1 if parent receives home care services;
PWH = 1 if parent receives "Meals on Wheels";
AG = child's age divided by 50;

PAG = parent's age divided by 50;
MILH4 = 1 if mother-in-law's health is reported "poor";
FILH4 = 1 if father-in-law's health is reported "poor";
FHLPL = 1 if child made financial transfers to parent within the last year;
PHLPL = 1 if parent made financial transfers to child within the last year;
PYM = 1 if data on parent's total income are missing;
PYV = parent's total income times one minus PYM (in $100,000);
KYM = 1 if data on child's total income are missing;
KYV = child's total income times one minus KYM (in $100,000);
PWLM = 1 if data on net worth of parent are missing;
PWLV = parent's net worth times one minus PWLM (in $500,000);
KWLM = 1 if data on net worth of child are missing;
KWLV = child's net worth times one minus KWLM (in $500,000);
WAGE = child's wage rate (unit = $10.00 per hour);
SIBTM = total time provided by siblings of child;
KNLY = nonlabor income of child;
SIG2 = estimated variance coefficient.

References

Andrews, Emily, and Michael Hurd. 1990. Employee Benefits and Retirement Income Adequacy: Data, Research and Policy Issues. Stony Brook: State University of New York at Stony Brook, March. Manuscript.

Bernheim, B. Douglas, Andrei Shleifer, and Lawrence Summers. 1985. Bequests as a Means of Payment. *Journal of Political Economy* 93:1045–76.

Boskin, Michael J., Laurence J. Kotlikoff, and Michael Knetter. 1985. Changes in the Age Distribution of Income in the United States, 1968–1984. NBER Working Paper no. 1766. Cambridge, Mass.: National Bureau of Economic Research, October.

Kotlikoff, Laurence J., and John N. Morris. 1989. How Much Care Do the Aged Receive from Their Children? A Bimodal Picture of Contact and Assistance. In *The Economics of Aging*, ed. David A. Wise, 151–75. Chicago: University of Chicago Press.

———. 1990. Why Don't the Elderly Live with Their Children? A New Look. In *Issues in the Economics of Aging*, ed. David A. Wise, 149–69. Chicago: University of Chicago Press.

Michael, R. T., V. R. Fuchs, and S. R. Scott. 1980. Changes in the Propensity to Live Alone, 1950–1976. *Demography* 17:39–56.

Morgan, James N. 1984. The Role of Time in the Measurement of Transfers and Well-Being. In *Economic Transfers in the United States*, ed. Marilyn Moon. Chicago: NBER Studies in Income and Wealth, vol. 49. University of Chicago Press.

Morris, John N. Claire E. Gutkin, Clarence C. Sherwood, and Ellen Bernstein. 1987. Interest in Long Term Care Insurance. Final Report in connection with HCFA Cooperative Agreement no. 18-C-98375/1. Washington, D.C.: HCFA, June.

Sandefur, Gary D., and Nancy Brandon Tuma. 1987. Social and Economic Trends

among the Aged in the United States, 1940–1985. Discussion Paper no. 849-87. Institute for Research on Poverty, February.

Comment

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Recent research on transfers between the elderly and their offspring has concentrated almost exclusively on bequests.[1] By contrast, research on inter vivos intergenerational transfers has been scanty, probably largely because of lack of adequate data. Such transfers may take place in terms of income and assets or of time provided by children (and their dependents) to their parents (or grandparents), and vice versa. Axel Börsch-Supan, Jagadeesh Gokhale, Laurence J. Kotlikoff, and John N. Morris concentrate on a component of these transfers important from both a strictly economic and a social policy point of view, namely, transfers in the form of time provided by children in taking care of their parents. The 1986 HRCA Survey of the Elderly combined with the 1986 HRC-NBER Child Survey provides a unique opportunity for such an analysis within a cross-sectional framework.

The empirical analysis, which is the focus of the paper, is based on a compact cross-sectional structural model of a child's decision-making behavior with the following key features. First, the shares of time apportioned to both labor/leisure and parent care are endogenous. Second, these shares may be subject to corner solutions: the child may choose not to work or devote time to the parent. By assumption, financial transfers to the parent(s) are excluded from the child's choices, as are all choices on the parent side.

These assumptions are partially motivated by observations from the data set: the financial transfers found therein are rather small.[2] Nevertheless, truncating these choices may result in simultaneity biases of several kinds. First, any substitution between children's time transfers and monetary transfers to finance nursing home or home care services is assumed away. Second, trading, on the part of the parents, inter vivos financial transfers for the provision of time by their children is not possible. However, while these transfers are excluded in the theoretical model, they are included in all estimates, even the one based on the structural model. At any rate, a final aspect of the model specification worth emphasizing is that the simultaneity in several siblings' choice of time provided to parents is rather parsimoniously accounted for. So much for the theoretical model.

The first part of the empirical results is on Tobit estimates on the allocation

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1. The pertinent literature is competently reviewed by Michael D. Hurd, "Research on the Elderly: Economic Status, Retirement, and Consumption and Saving," *Journal of Economic Literature* 28, no. 2 (1990): 565–637.

2. It is well known, however, that inter vivo transfers are heavily misrepresented in surveys.

of children's nonwork time between leisure and time spent with the parent, with an exogenous specification of time worked. Here, the authors are confronted with the problem that in almost one-third of their sample the parents live with their children, in which case the assessment of time provided by them is difficult. They elegantly resolve this problem by adding to the standard Tobit likelihood function a statement on the probability of the child providing positive time, equaling one minus the probability of providing zero time.

The basic estimate including this subsample is presented in table 4.1. With twenty-nine independent variables (excluding the intercept and dummies controlling for missing values), that estimate is not quite parsimonious. Its interpretation is not transparent and does not sufficiently account for the (in)significance associated with the individual variables. I therefore summarize the results before commenting on them.

The set of independent variables may be organized into four groups, namely, nine variables related to parent's and child's economic status, two variables on intergenerational financial transfer decisions taken by both parent and child, ten variables reporting demographic aspects, six on health status, and finally three reporting substitutes to child's time and are consumed by the parent(s).

Of the nine economic status variables, only one, the child's opportunity cost of devoting time to the parent approximated by the wage rate, is significant with the expected negative sign. In particular, both intergenerational transfer variables are significant but with the wrong sign. Of the ten demographic variables, four are significant with the expected sign: "parent widowed" and "parent age" exercise a positive effect, and "child male" a negative effect. The negative effect of the number of siblings is also weakly significant, with only a small effect on child's time devoted to parent care.

Two out of the six health variables, "child's health status" and "parent's degree of disability," show, respectively, the significant negative and positive sign. The large difference in the magnitude of effect remains unexplained. Two of the three variables on the consumption of substitute services, "parent living in nursing home" and "parent receiving home care services," are significant with the expected negative sign, with a much stronger effect of the former variable.

In all, noneconomic, that is, demographic health and real consumption–related variables exercise a much stronger effect than economic ones, a finding not uncommon in research on aging.[3]

The current model specification contains no interactions; not even obvious ones such as those between child's sex, age, and employment status. One also

3. Compare, e.g., Börsch-Supan, Hajivassiliou, Kotlikoff, and Morris (in this volume); and Laurence J. Kotlikoff and John N. Morris, "Why Don't the Elderly Live with Their Children: A New Look," *Issues in the Economics of Aging*, ed. David A. Wise (Chicago: University of Chicago Press, 1990), 149–69.

expects a combined effect—if both parents are alive—of parents' health status; indeed, it remains unclear in this case whose health status is reported in the data.

It is furthermore puzzling that several variables referring to economic status are significant with the wrong sign. For instance, we expect a significantly increased amount of time spent with the parent if the child is not working (in particular if the child is female) or if the child made financial transfers to the parent, thus providing the financial means to purchase substitutes for personal care. We may also expect substitution away from parent's care to the care of in-laws, while the signs of these variables are conflicting. Finally, one would expect effects from important variables that are insignificant in the present estimate, such as "child widowed," "poor health of child's spouse," and the other substitute variables for child's care taking.

How do the results given by the authors relate to the sparse literature on intergenerational transfers of time? The closest paper to the present one is by Bernheim, Shleifer, and Summers.[4] These authors consider the strategic use of bequests by parents in order to extract services from their children. They show a significantly positive relation between bequeathable wealth and children's attention, especially if there are several children. On the basis of empirical observations, they also reject the use of inter vivos transfers for the same purpose. The latter result contradicts the present estimate, as this shows a strong positive effect of parent-child transfers.

However, a strategic bequest motive does not show up at all in the present estimate. Neither parent total income (as a proxy for lifetime earnings) nor parent net worth exercise the positive influence on child's time spent, as emphasized by Bernheim et al. Furthermore, while only weakly significant, the negative coefficient on the number of siblings in the present estimate indicates a negative effect on the individual child's time spent with the parent, rather than the strong positive one derived by Bernheim et al. rationalized by competition for bequests. It remains open whether the results presented here carry more the flavor of the altruistic rather than the strategic bequest motivation for intergenerational time transfers.

As the inclusion of the cases where parents live with their children is econometrically more appealing, it is not too surprising that the estimates excluding these cases perform worse. Table 4.3, corresponding to table 4.1, exhibits that a mere four out of the eleven variables significant in the first estimate remain so. One of them, "number of siblings," now turns out to have a strongly significant negative effect, while it was only weakly significant before. Several variables, such as "child not working," and transfers from and to parent, now show up significant with the wrong sign.

It is surprising and unfortunate that the results are even weaker in the theo-

4. See B. Douglas Bernheim, Andrei Shleifer, and Lawrence H. Summers, "The Strategic Bequest Motive," *Journal of Political Economy* 93, no. 6 (1985): 1045–76.

retically more satisfying second part of the estimates based on the structural model. They are presented in table 4.4. Essentially none of the independent variables remains significant. In fact, only one single parameter, "number of siblings," has the expected sign while obtaining a t-value above unity. Therefore, the numerical estimates on the effect of the exogenous variables on the child's choice of leisure time and time devoted to parents presented in table 4.5 lack statistical foundation and can be considered preliminary at best. Of course, the same holds for the comparisons of the estimates from the structural model with the (many) insignificant ones from the Tobit model.

It remains to speculate about the reasons for the weakness, especially of the structural estimate, despite an attractively simple specification of the underlying theoretical model. The Tobit estimate could possibly be improved by introducing interaction variables as discussed before, by adding explanatory variables such as the geographical distance between child's and parent's living quarters, or by respecifying the opportunity costs of physical contact, especially for the nonworking child, for whom at present no variable reflecting opportunity costs enters the estimation. For instance, there may be other demands on personal time transfers, in particular by the child's dependents.

Without further insight into the technicalities of the estimation beyond those given in the paper, it remains unclear why the estimate of the structural model performs so drastically worse than that of the Tobit model. It is conceptually not difficult, as usual, to suggest the endogenization of further variables. In particular, the parents' choices of substitutes to the child's time and care are rather obvious candidates, possibly including the choice of living arrangements. The results of the Tobit estimate already indicate a strong interaction. This is not the case for the monetary transfers chosen by the child. This inconclusive result may well be due to the notorious paucity of survey data in recording such transfers. Nevertheless, the choice of time versus money transfers is logically a simultaneous one. At any rate, it remains to be shown whether respecifications of the model along these lines will lead to a substantial improvement of its estimate. The quality of the data may put effective limits on the estimation for such a relatively delicate structural model.

In conclusion, I would like to emphasize again that the authors have chosen to concentrate on an important component of intergenerational transfers but that substantially more work is needed to achieve satisfactory results on the topic.