NBER WORKING PAPER SERIES

WHY DON'T THE ELDERLY LIVE WITH THEIR CHILDREN? A NEW LOOK

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Working Paper No. 2734

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
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October 1988

This study was conducted as part of the National Bureau of Economic Research's Project on Aging, which is funded by The National Institute of Aging, grant number 1P01AG05842-01. We thank Jinyong Cai, Jagadeesh Gokhale, and Dan Nash for excellent research assistance. Any opinions expressed are those of the authors not those of the National Bureau of Economic Research.

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ABSTRACT

Perhaps no single statistic raises more concern about post War changes in the U.S. family than the proportion of the elderly living alone. Since 1940 the proportion of elderly living alone and in institutions has risen dramatically. While demographics appear to explain much of the change in the living arrangements of the elderly, the rising income of the elderly is viewed by many as the chief or at least a chief reason why the elderly live alone. The analyses underlying this view have not, however, considered the incomes and preferences of the children of the elderly. This paper presents a model of the joint living arrangement choice of parents and children. It then uses a new set of data to consider how the preferences and income positions of the elderly and their children influence the living arrangements of elderly parents. The findings suggest that the preferences and income levels of children may be important factors in explaining why so many of the elderly live alone.

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Perhaps no single statistic raises more concern about post War changes in the U.S. family than the proportion of the elderly living alone. Since 1940 the proportion of unmarried noninstitutionalized elderly living alone has risen from less than 25 percent to over 60 percent. For the old old, those over 85, the proportion has increased from 13 percent to 57 percent (Sandefur and Tuma, 1987). The proportion of the old old living in institutions has also increased dramatically; in 1940 only 7 percent of those over 85 lived in institutions; today's figure is almost 25 percent. Part of the reason the current elderly are much less likely to live with children is simply that they had relatively few children and that they have outlived some or all of their children. In 1940 for each person age 80 and over there were four people age 60 to 65; in 1985 for each person age 80 and over there were fewer than two people age 60 to 65. And when the baby boomers are in their 80s there will be only one person age 60 to 65 for each baby boomer (Current Population Reports, 1984).

While demographics appear to explain much of the change in the living arrangements of the elderly, the rising income of the elderly is viewed by many as the chief or at least a chief reason why the elderly live alone. This argument has been made by Beresford and Rivlin (1966), Davis and van der Oever (1981), Carliner (1975), Chevan and Korson (1972), Kobrin (1976a, 1976b), Soldo and Lauriat (1976), Michael, Fuchs, and Scott (1980), Tissue and McCoy (1981), and Wolf(1984). One difficulty in interpreting these studies is that they fail to control for characteristics of children. Since incomes of parents and children are correlated, the measured effects of parents' income on living arrangements may be capturing, at least in part, the influence of children's incomes. In contrast to the standard view, it may be that increases in children's incomes have lowered the likelihood of shared living.

The fact that more than half the aged living with their children are themselves the homeowners (Schorr, 1980) suggests that many adult children live with their elderly parents for financial reasons.

This study uses new data on the characteristics of the elderly and their children to study the effects of children's and parents' income as well as other characteristics on the shared living decision. The new data are the 1986 HRCA Survey of the Elderly and the 1986 NBER-HRCA Child Survey. The 1986 HRCA Survey of the Elderly is part of an ongoing panel survey of the Elderly in Massachusetts that is being conducted by The Hebrew Rehabilitation Center for the Aged (HRCA). The 1986 NBER-HRCA Child Survey is an interview of the children of those elderly who participated in the 1986 HRCA Survey of the Elderly.

The research reported here considers 297 cases of elderly parents who have a single living child. Our first approach to studying the living arrangements of these 297 parent-child observations is to estimate reduced form logit and probit models. Estimates of these models indicate that child characteristics such as income and marital status are as important as parent characteristics in explaining living arrangements. The probit and logit results point to the principal determinants of shared living, but understanding the precise role of income and other variables in this decision requires a structural model. Our second approach is thus to develop and estimate a structural model of shared living. The model trades off the economies to scale in shared living against the (potential) disutility of parents and children from living together. Analysis of the model indicates that, regardless of the precise form of preferences, the decision concerning shared living is economically separate from the decision concerning how much housing the parent and children should purchase and how much the parent and

child should each consume; i.e., living arrangements can be studied without simultaneously specifying the precise nature of parent-child bargaining. The model also clarifies how the parent's and child's income jointly affect the shared living decision. In contrast to the logit or probit specifications, in the structural model the effects of increases in income of either the parent or child depend on the parent's and child's preferences toward living together. By introducing error terms in the model, these preferences can be estimated. The error terms in the model are specified quite naturally as unobserved (to the econometrican) taste parameters concerning shared living.

The paper proceeds in Section II with a presentation of the structural model and an analysis of how changes in parent and child incomes affect the decision to live together. Section III demonstrates how the model can be empirically estimated. Section IV describes the HRCA and NBER-HRCA surveys, summarizes some general findings from the two new surveys, and presents cross tabulations from our sample of 297 parents and their single children. Section V presents probit and logit models of the choice of the elderly to live with children, to live in an institution, or to live alone. Section VI reports and interprets maximum likelihood estimates of the structural model. Finally, Section VII summarizes and concludes the paper.

II.A. A Model of Family Living Arrangements

Consider a single surviving parent who has only one child. Let U_p and U_c stand, respectively, for parent and child preferences over goods, housing services, and living arrangements. If the parent and child live alone, the parent maximizes U_p, and the child maximizes U_c. When they choose to live together, they are assumed to maximize U_F (given in (1)), which is a weighted

average of their preferences, where the weight θ that is chosen by the parent and child reflects the outcome of parent-child bargaining.

$$(1) \qquad U_F = \theta U_p + (1 - \theta)U_c$$

This is a general expression for family preferences in the case of shared living since θ can take any value between zero and unity. Formulating the problem in this manner only restricts the solution to be efficient; i.e., the maximization of U_F subject to the collective family (parent and child) budget produces a Pareto efficient solution, and all Pareto efficient solutions to the shared living choice problem can be represented as the maximand of U_F for a particular choice of the utility weight θ.

Consider the following Cobb-Douglas characterization of U_p and U_c:

$$(2) \qquad U_p = A \log (C_p H_p)$$

$$U_c = B \log (C_c H_c)$$

In (2), C_p and C_c are the respective levels of consumption of the parent and child, while H_p and H_c are the respective housing services enjoyed by the parent and child. The coefficients A and B describe the parent's and child's preferences for shared living. If the parent and child live apart, A and B both equal unity; if they live together, A or B can be greater than, equal to, or less than unity depending on whether the parent or child enjoy living together, are indifferent to shared housing, or prefer living apart. We are particularly interested in cases in which $A > 1$ and $B < 1$ or vice versa; i.e., when one family member prefers living together and the other prefers living apart.

We first consider the maximization of (1) for given values of θ and then examine the choice of θ as well as the conditions under which the parent and child choose to live together. When the parent and child live together their combined budget is:

$$(3) \qquad C_p + C_c + qH = Y_p + Y_c$$

In (3), q stands for the relative price of housing services; and Y_p and Y_c are the incomes of the parent and child, respectively. H stands for the quantity of housing services jointly consumed by the parent and child; i.e., equation (3) incorporates the assumption that housing services are a public good that can be simultaneously consumed by both the parent and child without congestion. While one could assume some marginal congestion from shared housing, which could be modeled as a higher effective price of H, as long as the effective price of H is less than 2q there is an economic incentive for shared housing. In this study we assume zero marginal congestion.

The economic gain from shared housing, which is modeled here as a lower effective price of housing, is compared with the disutility from shared housing (in which case A and/or B will be less than unity) in determining whether the parent and child will live together. More precisely, the parent and child each compare their utility when they live together with their utility if they live alone. The necessary condition for shared living is that both the parent and child be at least as well off living together as they would be if they lived apart.

Figure 1 illustrates the parent-child utility possibility frontier from shared living. The point Q lies outside the frontier. If the utilities of the parent and child from living apart are given by point Q, the two will

choose to live apart. If, on the other hand, separate living produced utility levels indicated by point R, the parent and child can do better by living together. The assumption that when they live together the child and parent choose efficient and mutually advantageous levels of housing and consumption means that the utility outcome lies on the frontier between and including points R_p and R_c. At one extreme, point R_p, the parent receives all the gains from shared housing, while at the other extreme R_c, all gains go to the child and the parent is no better off than if he or she lived alone. Points on the frontier between R_p and R_c involve both the parent and child sharing the gains from living together. The choice of the weight θ used in maximizing (1) subject to (3) determines the point chosen on the utility possibility frontier.

While the exact point chosen on the frontier requires an explicit specification of the child-parent bargaining process, the decision to live together can be examined without any reference to the specific bargaining solution. Given the assumption that efficient bargaining occurs, one can decide whether or not the parent and child live together simply by determining whether their utility position if they live apart lies inside or outside the utility possibility frontier available if they live together. This is a general proposition that holds regardless of the precise form of preferences. In terms of equations (1) and (3), one need only show that there is a range of values of θ that, when used in (1), imply a Pareto improvement over living apart. Knowledge of the particular value of θ actually chosen is not required. The fact that one can study living arrangements independently from studying nonaltruistic parent-child decision making (bargaining) is a great advantage since estimating this process would place greater demands on the data.

A simple procedure for determining whether the utility position from living apart lies inside or outside of the frontier involves calculating two critical values of θ, θ_p and θ_c. θ_p is the value of θ which if used in maximizing (1) subject to (3) leaves the parent with the same utility from shared living as he or she receives from living alone; θ_c is defined symmetrically for the child. If $\theta_p = \theta_c$, the utility position from living apart lies on the utility frontier available if they live together. If $\theta_c > \theta_p$, then the utility position from living apart lies inside the frontier. If $\theta_p > \theta_c$, the utility position from living apart lies outside the frontier. To see this, note that if $\theta_p > \theta_c$, the choice of $\theta \geq \theta_p$ produces a lower level of utility for the child than he or she enjoys from living alone, while choosing $\theta < \theta_p$ produces a lower level of utility for the parent than is available from living alone.

The conditions under which $\theta_p = \theta_c$ are of interest because they indicate the circumstances in which the parent and child would be just indifferent between living together and living apart. As demonstrated below, given Y_p, Y_c, and q, the condition $\theta_c = \theta_p$ (the utility position from living apart is on the frontier) occurs for combinations of the utility parameters A and B defined by a function $G(A,B) = 0$. Hence, the conditions under which the parent and child choose to live together can be expressed in terms of critical values of the preferences (A and B) of the parent and child toward shared living. While the preference parameters A and B are not observed, their determinants can be estimated.

Maximization of (1) subject to (3) yields the following demand relations when the parent and child live together:

$$(4)\quad H = \frac{Y}{2q}\ ,\quad C_p = \frac{\theta AY}{(\theta A + (1-\theta)B)2}\ ,\quad C_c = (1-\theta)\frac{BY}{(\theta A + (1-\theta)B)2}\ ,$$

where $Y = Y_p + Y_c$.

Note that the demand for housing services, in this formulation, is independent of the bargaining solution, θ. Larger values of θ, the weight applied to the parent's preferences, means more parent consumption (larger C_p) and less consumption of the child (smaller C_c). Without loss of generality we measure H in units such that $q = 1/4$.

The indirect utility functions of the parent, V_p, and child, V_c, from shared living are given by:

$$(5)\qquad V_p = \log\left(\frac{\theta AY^2}{(\theta A + (1-\theta)B)}\right)^A$$

$$V_c = \log\left(\frac{(1-\theta)BY^2}{(\theta A + (1-\theta)B)}\right)^B$$

The indirect utilities of the parent and child from living alone, V_p' and V_c', respectively, are:

$$(6)\qquad V_p' = \log Y_p^2$$

$$V_c' = \log Y_c^2$$

The critical values of θ, θ_p, such that $V_p = V_p'$ and θ_c, such that $V_c = V_c'$, are given by:

$$(7) \qquad \theta_p = \frac{BY_p^{2/A}}{AY^2 + (B - A)Y_p^{2/A}} \qquad \theta_c = \frac{BY^2 - BY_c^{2/B}}{(A - B)Y_c^{2/B} + BY^2}$$

From (7) one can show that $\delta\theta_p/\delta A < 0$ and $\delta(1-\theta)/\delta B < 0$; the smaller the parent's disutility from shared living, the smaller is the critical weight θ_p that leaves the parent indifferent between living apart and living together. The critical child weight, $(1 - \theta_c)$, is correspondingly negatively related to the child's utility from shared living.

Equating θ_p and θ_c provides the relation $G(A,B) = 0$ given in (8). Values of A and B satisfying $G(A,B) = 0$ leave the parent and the child indifferent between living together and living apart. If $G(A,B) > 0$, the parent and child choose to live together. They choose to live apart if $G(A,B) < 0$. Note that the asymptotes of the $G(\ )$ function occur at $\bar{A} = 2\log Y_p/\log(Y^2-1)$ and $\bar{B} = 2\log Y_c/\log(Y^2-1)$. When Y_p becomes very large relative to Y_c, $\bar{A}$ approaches 1, and $\bar{B}$ approaches 1 when Yc becomes very large relative to Y_p.

$$(8) \qquad G(A,B) = Y^2 - Y_c^{2/B} - Y_p^{2/A} = 0$$

Along the locus defined by $G(A,B) = 0$ we have:

$$(9) \qquad \frac{\delta A}{\delta B} = \frac{-Y_c^{2/B} A^2 \log Y_c^2}{Y_p^{2/A} B^2 \log Y_p^2} < 0$$

Figure 2 graphs the values of A and B satisfying (8). The point D defined by $A = 1$, $B = 1$ lies above the $G(A,B) = 0$ locus and involves shared

living. To see this one need only observe from (7) that when A = 1 and B = 1, $\theta_p/\theta_c = Y_p^2/(Y_p^2 + 2Y_pY_c) < 1$, which is the condition for shared living. Combinations of A and B lying northeast of the G(A,B) = 0 locus satisfy G(A,B) > 0 and entail shared living, while combinations lying southwest of the locus satisfy G(A,B) < 0 and entail separate living. Consider points in which the parent prefers to live together (A > 1) and the child prefers to live alone (B < 1). As Y_p rises relative to Y_c, the G(A,B) curve approaches a verticle line at A=1 leaving all such points in the area for which G(A,B) > 0. Hence, when parents prefer living together, but their children do not, they are able eventually to bride their children if their incomes are sufficiently high relative to their children. The opposite situation in which the child's preferences always dominate arises when Y_c is very very large relative to Y_c.

II.B. Income Effects and Living Arrangements

The G(A,B) function can be used to analyze the impact of increases in the parent's or child's income on the decision to live together. The technique is to consider how income changes shift the G(A,B) = 0 locus. The G*(A,B) = 0 and G**(A,B) = 0 loci in Figure 3 are examples of such shifts. Given a distribution of family pairs of A and B in the population, the G*( ) locus clearly involves less shared living than the G( ) locus since all A,B pairs lying between the two curves now involve living apart.

The G**(A,B) = 0 locus, on the other hand, involves less living together among families in which both the child and parent dislike shared living (A < 1), but possibly more shared living in cases in which either the parent or the child prefers living together (A > 1 or B > 1).

To examine shifts in the G(A,B) locus we consider the implicit function $A = F(B,Y_p,Y_c)$ defined by G(A,B) = 0 and determine how this function changes

with changes in Y_p and Y_c, holding B constant. For example, if changes in the function F( ) arising from a particular income change are positive at each level of B, the G(A,B) curve shifts outward. We first consider the impact of a uniform proportional increase in Y_p and Y_c. Let λ represent a positive factor multiplying Y_p and Y_c. Equation (10) presents the derivative $\delta A/\delta\lambda = \delta F(B, \lambda Y_p, \lambda Y_c)/\delta\lambda$ evaluated at $\lambda = 1$ and values of A and B satisfying $G(A,B) = 0$.

$$(10) \qquad \frac{\partial A}{\partial \lambda} = \frac{\frac{(1-B)}{B} Y_c^{2/B} + \frac{(1-A)}{A} Y_p^{2/A}}{\frac{1}{2A^2} Y_p^{2/A} \log Y_p^2}$$

This derivative is clearly positive for $A < 1$ and $B < 1$. Hence, equal proportional increases in Y_p and Y_c reduces shared living among families in which both the parent and child dislike living together ($A < 1$ and $B < 1$). On the other hand, among families where there is disagreement about shared living ($A > 1$ and $B < 1$ or $B > 1$ and $A < 1$), such income increases may or may not increase shared living.

We next consider how redistribution from the child to the parent shifts the $G(A,B) = 0$ locus. This derivative, which holds Y constant and raises Y_p by the same amount, ϕ, that Y_c is lowered is given by:

$$(11) \qquad \frac{\partial A}{\partial \phi} = \frac{2(Y_p^{(2/A)-1} - Y_c^{(2/B)-1})}{\frac{1}{A^2} Y_p^{2/A} \log Y_p^2}$$

This derivative is negative if $A > B$ and $Y_p < Y_c$. Hence, among families in which the parent is relatively poor and has a relative preference for living

with the child, redistribution from the child to the parent increases the extent of shared living. In terms of Figure 2, such redistribution leads to a counterclockwise rotation of the G(A,B) = 0 locus.

Finally, we consider changes in the G(A,B) = 0 locus arising from changes in the income of one family member, holding constant the income of the other member. Equation (12) examines the effect of raising Y_p:

$$(12) \qquad \frac{dA}{dY_p} = \frac{-2Y + \frac{2}{A} Y_p^{(2/A)-1}}{\frac{1}{A^2} Y_p^{2/A} \log Y_p^2}$$

This derivative is negative for values of $A \geq 1$ and is positive for sufficiently small values of A. Hence, a rise in the income of the parent produces a counterclockwise rotation in the G(A,B) = 0 locus, thereby raising the frequency of shared living among families whose parents prefer living with their children (A > 1) and reducing the frequency of shared living among families whose parents prefer to live apart (A < 1)). Increases in the child's income, holding the parent's income constant, produce a clockwise rotation in the G(A,B) = 0 curve, giving more weight to child's preferences in determining living arrangements.

To summarize, in the structural model the effects of income changes on living arrangements depend in a nonlinear manner on the relative incomes of parents and children and on both of their preferences. This feature differs greatly from the implicit assumption in logit and probit specifications that the effects of income changes are the same sign regardless of the particular parent-child observation in question.

III. Empirical Specification

Preferences towards living arrangements are likely to differ greatly across as well as within families. Hence, it seems reasonable to model the preference parameters A and B as depending partly on observable characteristics and partly on unobservable (at least to the econometrician) components. Specifically, we assume that A and B can be represented as:

$$(13) \qquad A = \alpha_p X_p + \mu_p$$
$$B = \alpha_c X_c + \mu_c$$

In (13) X_p and X_c are vectors of characteristics determining the parent's and child's preferences, respectively.

The terms μ_p and μ_c in (13) are random errors, which, to simplify the exposition, are assumed here to be independent standard normal deviates. Referring to Figure 2, the likelihood that a parent and child live apart corresponds to the probability that G(A,B) is negative, which is given by:

$$(14) \qquad P(G(A,B) < 0) = \int_{-\infty}^{\infty} P(A=A^*)P(G(A^*,B) < 0)\, dA^*$$

From Figure 2, for values of A below the horizontal asymptote $\bar{A}$, G(A,B) is negative. Hence, we can write (14) as:

$$(15) \qquad P(G(A,B) < 0) = F(\bar{A} - \alpha_p X_p) + \int_{\bar{A}-\alpha_p X_p}^{\infty} f(\mu_p)\, F\left(\frac{2\log Y_c}{\log[Y^2 - Y_p^{2/(\alpha_p X_p + \mu_p)}]} - \alpha_c X_c\right)] d\mu_p$$

In (15) F( ) stands for the standard normal distribution function, and f( ) stands for the standard normal density function. The probability of living

together is simply $1 - P(G(A,B) \leq 0)$. These expressions can be used to form the likelihood of observing a sample of parents some of whom live with their children and some of whom do not. Hence, the parameter vectors α_p and α_c can be estimated by maximum likelihood. Note that this probability statement is quite different from the standard reduced form logit specification that one might posit. For example, parent's income enters in a complex, nonlinear fashion in the probability statement, and its influence on the probability of shared living interacts with the level of the child's income and the parent's and child's preferences for shared living.

IV.A. The Data

As mentioned, this paper uses data from the 1986 HRCA Survey of the Elderly and the 1986 NBER-HRCA Child Survey. The former survey was conducted by the Hebrew Rehabilitation Center for the Aged (HRCA), while the latter was conducted by the authors and HRCA. The 1986 HRCA Survey of the Elderly is part of an ongoing panel survey of Massachusetts elderly which began in 1982. In addition to the 1982 and 1986 surveys, the elderly sample was reinterviewed in 1984, 1985, and 1987. The 1986 NBER-HRCA 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 (her) household, his (her) parents, and his (her) siblings.

The original 1982 stratified sample of 3856 elderly individuals was drawn from two populations. The first population (the community sample), accounting for 2674 of the elderly in the total sample, was drawn from communities in Massachusetts. The second population (the health care sample), which accounts for the remaining 1182 elderly in the 1982 survey, was drawn from elderly

participants of all 27 Massachusetts home health care corporations. Both samples were stratified to produce an over representation of the older old. The sample's selection is described in more detail in Kotlikoff and Morris (1987) and Morris et. al. (1987). The 1982 sample of the elderly included only the non-institutionalized elderly, but each subsequent survey has followed the initial sample as they changed residences, including moving into and out from 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, and locations of all children, frequency of contact and the type of contact with children, and 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 we asked elderly respondents in the community sample for permission to contact one of his/her children to conduct our child survey. While we would have preferred to randomly select the child to be interviewed, we felt we would receive more cooperation if we allowed the parent to make the selection. Like the HRCA Surveys of the Elderly, The NBER-HRCA Child Survey is a telephone interview. The Child Survey is roughly 45 minutes in length. Interviews with the child's spouse were conducted if the child was unavailable. The questions in the Child Survey concerning the respondent's characteristics include age, geographic location, 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 HRC elderly respondent parent, (2) the amount of financial assistance each sibling and his spouse give to or receive from the HRC elderly respondent parent, and (3) the amount of time each sibling and his spouse spends helping the HRC elderly respondent. The child is also asked about his parents' health status as well as his parents' income and net wealth.

The sample size of the initial 1982 Survey of the Elderly is 3856. In contrast, the 1986 completed sample size of elderly was 2889, with most of the attrition since 1982 due to deaths. 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 females. The size of the NBER-HRCA Child Survey is 850. Of these 850 children, 341 have no living siblings. In this study we consider these 341 children with no siblings and their elderly parents who were also interviewed in 1986. Of the 341 single child\parent observations, 297 have complete data. The remaining 45 observations are missing data, typically on the income of either the child, the elderly parent(s), or both.

IV.B. Some Initial Findings from the 1986 HRC Survey of the Elderly and the NBER-HRCA Child Survey

Since the 297 observations examined here represent only a portion of the data, it may be useful to summarize some of the initial findings reported in Kotlikoff and Morris (1987) based on the entire 1986 Elderly and Child Surveys. These data paint a bimodal picture of contact and assistance of the elderly by their children, with a majority of elderly receiving significant attention and care and a significant minority receiving little or no attentio

or care. Clearly, the realities of demographics limit the potential support that children can provide parents. Over a fifth of the HRCA elderly in 1986 had no children, and another fifth have only one child. Elderly couples are more likely to have children than the single elderly; over a quarter of the single elderly have no children. Daughters are often viewed as more important providers of care to the elderly than sons. But in total, 40.5 percent of the elderly have either no daughters or just one daughter. And over one half of the elderly either have no daughters or have no daughters who live within an hour.

Only 13.1 percent of all elderly and only 15.4 percent of vulnerable elderly live with their children. Of those elderly with children, fewer than one fifth live with their children. Indeed, over half of single elderly males and females and over 40 percent of single elderly males and females who were deemed vulnerable based on an ADL ability score live completely alone. The fraction of respondents in institutions in 1986 is 11.8 percent for the entire sample and over 25 percent for the vulnerable elderly. Taken together these figures suggest only modest support of the elderly by children in the form of shared living quarters.

The geographic location of parents obviously limits their access to their children. Over one third of the elderly either have no children or have no children who live within an hour. Despite their health problems, the vulnerable elderly are only slightly more likely to live with or near their children. Of those elderly who have children, but are not living with them, only 44.6 percent have more than one child within an hour. In a typical month over a quarter of children of the elderly do not physically spend time with their children; in contrast, almost a quarter of children, including those

living with the HRCA elderly, spent over 30 hours in the previous month in physical contact.

While physical contact may, in some instances, be limited, most elderly with children have some form of contact, be it telephone contact or visits, during the week. Of the elderly with children, 84 percent either live with their children or have daily or weekly contact with one or more children. The institutionalized, the group with perhaps the greatest need for child contact, sometimes receive the least attention. Almost one third of the institutionalized elderly either have no children or have very little contact with their children over the course of a year. For the noninstitutionalized the corresponding fraction is less than one quarter.

Although many of the elderly in the HRCA sample are quite poor, direct financial support of elderly parents by children is rare. Only 3 percent of the HRCA elderly report receiving regular monthly financial help from their children. Of the elderly that are very poor (annual incomes below $5000), the corresponding percentage is only 4 percent. These figures seem surprising; and what is even more surprising is that there are few transfers to the poor elderly even in cases where there are a large number of middle and upper income children.

IV. C. Characteristics of the Selected Sample - The Elderly

There are 297 elderly respondents in the 1986 HRCA Survey of the Elderly corresponding to the 297 children. Ten percent of these respondents live in nursing homes, 20 percent live with their children, and the rest, 70 percent, live alone, which in this context means either completely alone, with their spouse, or with other individuals who are not their children. The 297 elderly respondents are typically quite old; over half, 150, are age 85 and over. For

those age 85 and older the proportion living in nursing homes is 16 percent, the proportion living with children is 23 percent, and the proportion living alone is 61 percent. Two thirds of the elderly are females; interestingly, only 1 of the 30 institutionalized elderly is a male. The elderly sample is disproportionately white (94 percent), and single (72 percent).

We have created five dummy variables to characterize the elderly respondents' health status. These are Independent (H1), Minor Functional Problems (H2), Requires Assistance with Independent Activities of Daily Living (H3), Requires Some Assistance with Activities of Daily Living (H4), and Requires Substantial Assistance with Activities of Daily Living (H5). Each of the elderly was allocated to one of these categories based on responses to over 30 questions on functional ability, ability to perform independent activities of daily living, and objective information about ongoing diseases and infirmities. We also considered several other health variables including dummies for neurological problems, inability to move from a chair without assistance, and Alzheimer's disease. These variables did not add significantly to the prediction of living arrangements given the dummies H1 - H5. Of the 30 institutionalized elderly, 28 have positive H4 or H5 health indicators. Of the 58 elderly living with their children, 12 (21 percent) have positive H4 or H5 indicators; and of the 209 elderly living alone, 21 (10 percent) have positive H4 or H5 indicators.

The incomes of the elderly are typically fairly low. Slightly over half of the elderly reported income below $7500. Another 39 percent reported incomes between $7500 and $20000. Only 23 of the elderly, 8 percent, report incomes over $20,000. It is interesting to note that none of these 23 higher income elderly live in nursing homes, and only 2 of the 23 live with their children.

IV. C. Characteristics of the Selected Sample - The Children

The ages of the 297 children of the elderly range from 27 to 79. A surprisingly high number, 185, of the 297 children are female. Slightly over half are younger than 55; over two thirds are between ages 45 and 65. Children living with their parents tend to be somewhat older; 19 percent of children living with parents are age 65 or older, compared to 8 percent for children whose parents live alone. Most of the children, 76 percent, are married; but among children living with their parents, the proportion married is only 45 percent. Over half of the children went to college, and only 30 of the 297 children failed to complete high school. There is no clear correlation in the raw data between child's education and the living arrangements of the parents.

In contrast to the parents, whose median income is approximately $7000, the median income of children is approximately $30,000. A total of 61 children reported incomes above $50,000, and 21 reported incomes below $10,000. Of the 61 elderly whose children have incomes above $50,000, 53, 87 percent, live alone. This figure contrasts with the 70 percent figure for the overall sample. Most of the children, 85 percent, report their health to be good, 14 percent report their health to be fair, and only 1 percent report their health to be poor.

Section V. Logit and Probit Estimates

Table 1 reports results for a logit model specifying the probability of living alone, living in an institution, and living with children. The independent variables are: the age of the parent, Age; the sex of the parent, Male=1 for a male, 0 otherwise; the marital status of the parent, Marry=1 for

married, 0 otherwise; the income of the parent, Income; four health dummies for the parent, H1, H2, H3, and H4; the age of the child, KAge; the marital status of the child, Kmarry=1 married, 0 otherwise; the sex of the child, Kmale=1 for a male, 0 otherwise; the income of the child, KIncome; the years of education of the child, KEduc; and the self reported health status of the child, KHealth=1 if the child reported excellent or good health, 0 otherwise.

Surprisingly few of the parent coefficients from the logit model are significant, but the signs of the coefficients of parent variables generally accord with previous findings. In particular, higher levels of parent's income increase the probability of living alone, as does being married, and being male. Compared to those elderly with severe health problems (those in the fifth health category), other elderly are more likely to live alone and are less likely to live in a nursing home.

The new child variables in the logit indicate that those elderly whose children have higher incomes, are married, or are male are more likely to liv alone or live in an institution. Both KMarry variables are significant, and the KMale coefficient in determining the probability of living alone. The KIncome variable in the probability of living alone is almost significant.

The probit model presented in Table 2 considers the subsample of 267 elderly who are not in nursing homes. As in the logit results, Table 2 indicates that the probability of living with children rather than living alone decreases with the parent's and child's income. This probability is smaller if the child is male or if the child or parent are married. Surprisingly, the parent health variables are not significant, although they have the expected sign. The child health coefficient is also insignificant; according to the Table parents whose children are in excellent or good health are more likely to live with their children. While neither the age of the

parent nor the child is significant, older parents are more likely to live with their children as are parents with older children. Finally, parents with more educated children are less likely to live with their children, although this coefficient is also insignificant. In sum, the logit and probit coefficients, although often insignificant, generally accord with our priors and suggest that child characteristics are important co-determinants of the living arrangements of the elderly.

Section VI. Results from Estimating the Structural Model

The estimated coefficients from the structural model based on the 267 observations of children and their noninstitutionalized parents are presented in Table 3. A likelihood ratio test indicates that, as a group, the coefficients are highly significant. The variable Health is a dummy that takes on the value 1 if the parent's health indicator is H4 or H5, and zero otherwise. The first five coefficients in the Table multiplied by their respective variables correspond to the term $\alpha_p X_p$ in (13), while the second five coefficients multiplied by their respective variables correspond to the term $\alpha_c X_c$ in (13). Hence, positive coefficients in the Table mean that either the expected value of A or B is larger, as is the probability of shared living. According to the Table, this probability is smaller for married parents or parents with married children. It is also smaller if the child is male. In contrast, the probability of shared living is larger for male parents, older parents, parents with older children, parents with less well educated children, and parents who fall into the worst two health categories.

The estimated coefficients from the structural model can be used to determine values of $\alpha_p X_p$ and $\alpha_c X_c$ for each observation. The mean values of

$\alpha_p X_p$ and $\alpha_c X_c$ across all observations are .848 and .482, respectively. Since both these figures are less than unity, both children and parents prefer, on average, to live apart, but children have a stronger preference toward separate living. Not all parents and children have values of $\alpha_p X_p$ and $\alpha_c X_c$ less than unity. Quite the contrary; 129 of the 267 parents (48 percent) and 64 children (24 percent) have estimated values of $\alpha_p X_p$ and $\alpha_c X_c$, respectively, in excess of unity. Hence, almost half of parents and almost one quarter of children appear to prefer shared living. Figure 4 presents the distribution of pairs of $\alpha_p X_p$ and $\alpha_c X_c$ for each parent-child pair. Points in the southeast and northwest quadrants indicate parent-child pairs in which there is a conflict with respect to preferences toward shared living. Points in the northwest quadrant correspond to cases in which parents prefer to live with their children (assuming $\mu_p=0$), and children prefer to live apart from their parents (assuming $\mu_c=0$). Points in the southeast quadrant correspond to parents who prefer to live apart from their children, but children who prefer to live with their parents. Since 129 of the 267 parents want (assuming $\mu_p=0$) to live with their children, but only 58 do so, it appears that a large number of parents live alone against their will. According to the model, if their incomes were sufficiently high, these parents could persuade their children to live with them.

Another issue that can be explored using the model's estimated coefficients is the effect on the probability of living together of changes in income. In this exercise, reported in Table 4, we evaluate $\alpha_p X_p$ and $\alpha_c X_c$ at the mean values of X_p and X_c and consider different combinations of Y_p and Y_c. The Table indicates that, at the mean values of $\alpha_p X_p$ and $\alpha_c X_c$, significant changes in the probability of living together occur only if the child's or parent's income are fairly low. Stated differently, because the

mean preferences indicate a mutual dislike for shared living, the income of the parent or the child must be quite low to produce a reasonably large probability of shared living.

A related experiment is to ask how equalizing the incomes of children and parents, while keeping the total constant, affects the probability of living together. To analyze this question, we used the estimated values of $\alpha_p X_p$ and $\alpha_c X_c$ for each parent and child and computed the probability of shared living given current income positions. We then computed the probability based on equalized income. The differences in probabilities for the 267 observations are quite small. For 173 observations, the probabilities changed by less than 1 percentage point. For 44 observations the probabilities changed by between 1 and 2 percentage points. For 41 observations the probabilities changed by between 2 and 10 percentage points; and for only 2 observations did the probabilities change by more than 10 percentage points.

Taken together these two experiments suggest that the intrinsic preferences of the parent and child toward shared living rather than the relative or absolute incomes of the two are most important in determining the probability of shared living. In terms of Figure 1, the position of curve G(A,B) is not highly sensitive to even substantial variations of Y_p and Y_c around observed values, and the key determinant of the living arrangement is the location of A and B in the axis. This finding that income effects play a rather minor role in determining living arrangements is supported as well by the probit results. Evaluated at the mean levels of income, which are $36,704 for children and $9719 for parents, the probability of shared living is .170. If the child's income is reduced from $36,704 to $12,000, the probability of shared living only increases to .230.

If the child's income is raised to $65,000 the probability only declines to .088. Holding the child's income at the mean, if the parent's income is increased to $20,000, the probability of living together only declines from .170 to .101; lowering the parent's income to $4000 raises the probability to only .191.

Section VI. Summary and Conclusion

This paper uses new data on the characteristics of children and parents to study their decision to live together. Theoretical analysis of this decision indicates that living arrangements can be studied separately from the question of child-parent bargaining. The analysis also points out that income effects with respect to living arrangments are likely to be family-specific; in some families increases in the incomes of children or parents will lead them to live apart, in others to live together.

Empirical findings from logit and probit models as well as the structural model suggest that characteristics of children are important codeterminants of living arrangements. They also support a view that income differences are not as important as may previously have been thought in explaining living arrangements.

Table 1 **Estimates from Logit Model**

Coefficients for the Probability of Living in an Institution

Variable	Coefficient	t-Statistic
Constant	1.468	.290
Marry	NA	NA
Income	.093	.915
Age	-.037	-.545
Male	-.911	-.723
H1	NA	NA
H2	NA	NA
H3	-3.175	-3.129
H4	-.626	-.736
KMarry	1.590	2.067
KIncome	.631E-2	.363
KAge	.664E-2	.142
KMale	1.054	1.564
KHealth	.594	.693
KEd	.531	.774

Coefficients for the Probability of Living Alone

Variable	Coefficient	t-Statistic
Constant	-.167	-.060
Marry	.916	1.686
Income	.456E-1	1.135
Age	-.184E-1	-.500
Male	.102	.233
H1	.651	.910
H2	1.158	1.460
H3	.796	1.029
H4	.568	.654
KMarry	1.608	4.047
KIncome	.211E-1	1.825
KAge	-.483	-.173
KMale	.806	2.039
KHealth	-.226	-.441
KEduc	.273	.722

Table 2 Estimates from Probit Model

Coefficients for the Probability of Living With Children Versus Living Alone

Variable	Coefficient	t-Statistic
Constant	.084	.052
Marry	-.574	-1.899
Income	-.218E-1	-1.176
Age	.956E-2	.446
Male	-.653E-1	-.260
H1	-.390	-.934
H2	-.661	-1.465
H3	-.503	-1.127
H4	-.313	-.600
KMarry	-.989	-4.231
KIncome	-.115E-1	-1.800
KAge	.460E-2	.289
KHealth	.128	.431
KEduc	-.178	-.808
KMale	-.450	-2.028

Table 3 Estimates from the Structural Model

Variable	Coefficient	t-Statistic
α_p Const.	-1.911	-.731
Marry	-.673	-1.424
Age	.353E-1	1.068
Male	.316E-1	.764E-1
Health	.178	.276
α_c Const.	1.356	1.201
KMarry	-1.565	-2.443
Kage	.118E-1	.802
KMale	-.768	-.291
KEduc	-.452E-1	-.165

Table 4 **Probability of Living with Children for Selected Combinations of Parent and Child Incomes**

Yp	Yc	Probability	Yp	Yc	Probability
$1000	$1000	.549	$1000	$1000	.549
5000	1000	.327	1000	5000	.269
10000	1000	.311	1000	10000	.253
20000	1000	.306	1000	20000	.247
50000	1000	.302	1000	50000	.243

Yp	Yc	Probability	Yp	Yc	Probability
$1000	$50000	.244	$50000	$1000	.303
5000	50000	.207	50000	5000	.237
10000	50000	.192	50000	10000	.211
20000	50000	.181	50000	20000	.191
50000	50000	.175	50000	50000	.175

Figure 1

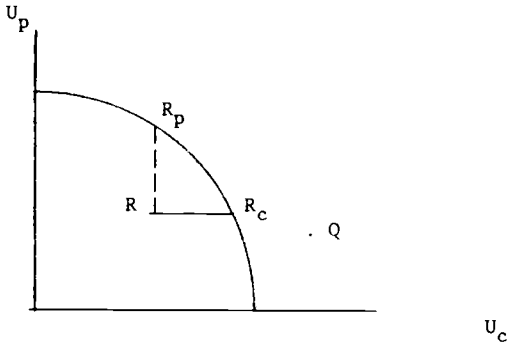


Figure 2

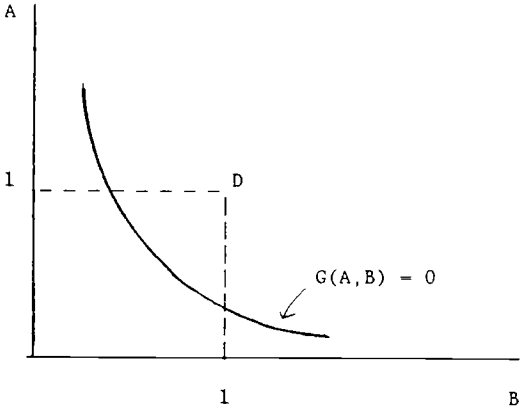


Figure 3

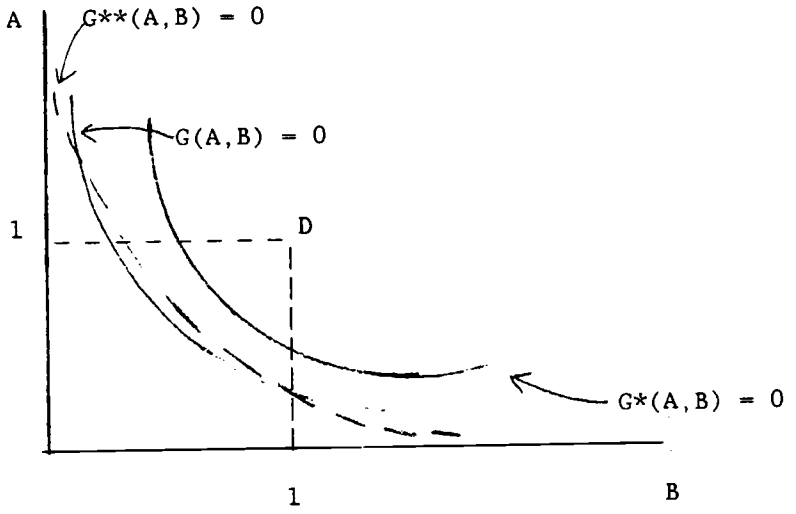
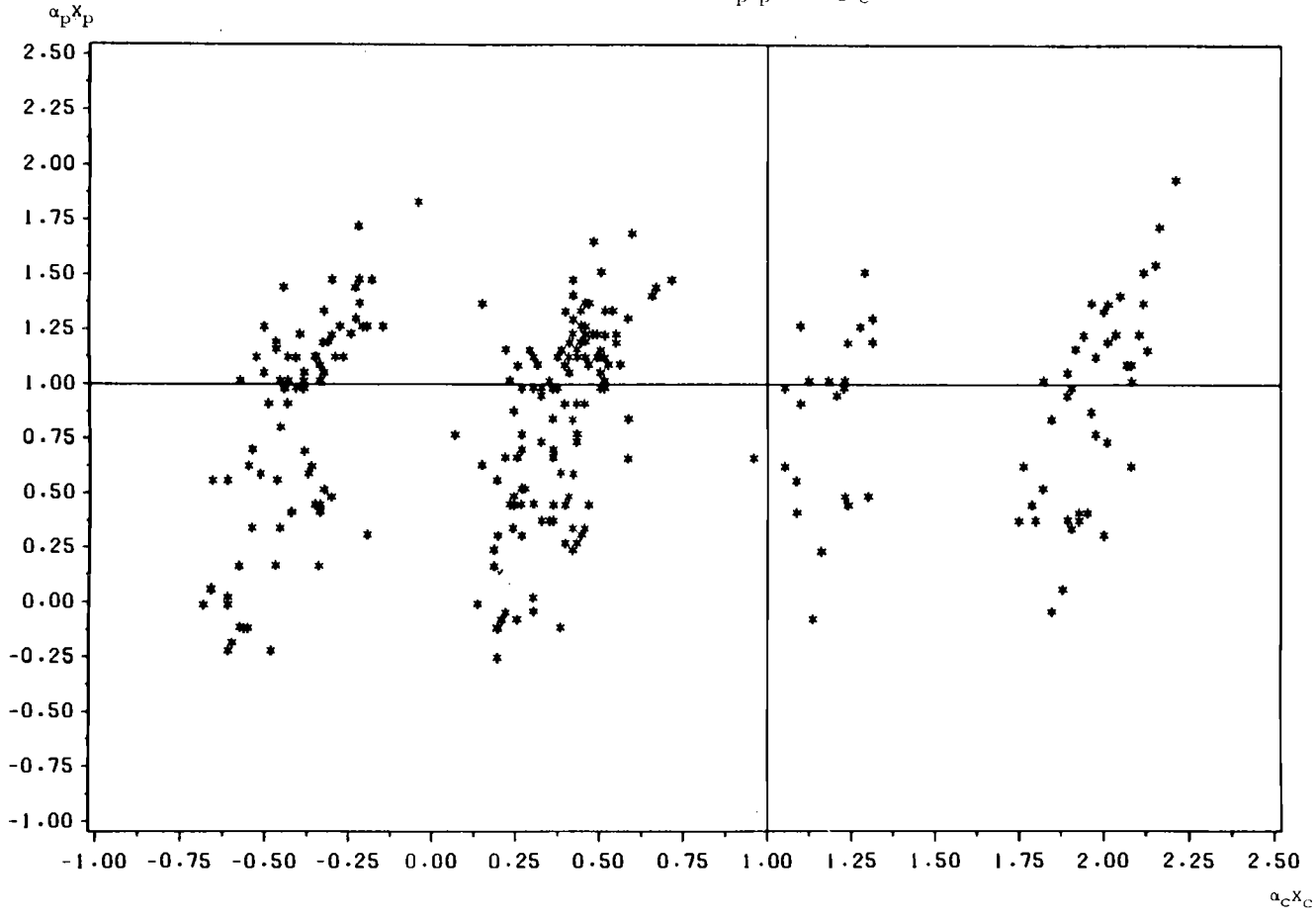


Figure 4: Distribution of $\alpha_p X_p$ and $\alpha_c X_c$



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