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The Joint Determination of Household Membership and Market Work: The Case of Young Men

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Except in special cases, market work and household membership are jointly chosen. A Nash bargaining model of family behavior is used to specify stochastic structural relationships (two indirect utility functions and a market and a reservation wage function) that jointly determine work, consumption, and household membership. The maximum likelihood estimates of the implied trinomial probit model differ sharply from those obtained when either market work or household membership is taken as exogenous. This application to white male youths from the National Longitudinal Surveys shows the insurance function of families: parents insure their sons against poor market opportunities.

I. Introduction and Summary

Labor supply varies systematically with family status: married prime-age males work more hours than their single counterparts; married women are less likely to work, and they work fewer hours than their single counterparts; and virtually all young men who are out of school

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and not working live with their parents (Feldstein and Elwood 1982). In all of these cases, work and family status decisions are jointly determined. In the extant literature work choices are conditioned on family status (e.g., the labor supply of married women), or family status is taken as an exogenous dummy variable, or family status is ignored altogether. Based on the Nash bargaining model of family demand systems of McElroy and Horney (1981), this paper uses a common set of stochastic behavioral relationships and a (nonconvex) constraint set to determine work, consumption, and household membership jointly. The model is used to examine the joint determination of market work and family status for young men.[1]

Maximum likelihood estimates of structural parameters from the implied trinomial probit model are obtained for white, out-of-school, never-married males ages 19–24 from a matched sample of sons and parents from three National Longitudinal Surveys. The estimated model agrees with the predictions of the Nash model and shows a strong interaction between household membership and work behavior of youths. In contrast, at least for these data, if either household membership or work status is treated as exogenous one is led to the false conclusion that household membership and work behavior of youth are unrelated.

These results explain why never-married, out-of-school male youths who do not work live in their parents' households: the option to live in the parental household serves as "nonemployment insurance." The estimated model shows that at a sufficiently low offered wage the youth lives with his parents and does not work. When the offered wage rises above his asking wage, the youth remains in his parents' household and works in the market. Finally, at a sufficiently high offered wage, the youth works in the market and also separates from his parents' household (see Sec. VIC and fig. 1 for a fuller explanation).

Since Nash-bargained family decisions yield Pareto-optimal allocations, the parents as well as the youth gain utility from such a separation. Conversely, the parents as well as the youth suffer a utility loss if the youth's wage falls or if he becomes unemployed and rejoins his parents' household. This has widespread welfare implications. For example, an effective minimum wage would raise the wage rates of some youths while disemploying others. On the one hand, this would raise the utility not only of employed youths whose wages increase but also of their parents. On the other hand, it would decrease the utility not only of the disemployed youths but of their parents as well.

[1] Freeman (1982) is one of the few studies to give serious attention to the effect of family status (including whether or not the youth is the head of a household) on employment, unemployment, and earnings of youths. He is painting a broader picture than the one presented here. Freeman treats heading a household as an exogenous dummy variable.

Several qualifications are in order. First, the logic that leads to the joint determination of work decisions and household membership leads as well to their joint determination with schooling and marriage. The latter have been taken as exogenous in this work but will be tackled in future research. Second, ideally, all these decisions should be imbedded within a dynamic model. Current technology and data, however, seem to preclude estimation of a theoretically based intertemporal maximizing model of four jointly determined event histories. Despite these qualifications, the results presented here are superior to those from simpler techniques and may readily be applied to other jointly determined decisions.

II. Structural Model

The youth is assumed to act as if to maximize an invariant utility function of goods and leisure subject to a nonconvex budget set consisting of two convex subsets: one subset is associated with his own full income, the other with the constraints he faces as a member of his parents' household.[2] The model is adapted from McElroy and Horney (1981).

On his own, his maximum utility is represented by his indirect utility function and is taken as his best alternative to being a member of his parents' household. As a member of his parents' household, the youth's consumption and leisure (market work) are taken as the outcome of a two-person (youth "vs." parents) nonzero-sum game with a Nash (1953) solution. His optimizing procedure may be thought of in two stages. First he calculates his optimum goods and leisure bundle as an individual and compares it to his goods and leisure outcome as a member of his parents' household. He then chooses the goods and leisure combination and associated household membership status that yield the maximum level of utility. In this model, both the youth and his parents are constrained utility maximizers. The interaction of parents' and the youth's utility functions and budget constraints determine the youth's allocation as a member of their household. Consequently, the parents and the youth jointly determine the youth's household membership and work decisions.

The Nash bargaining model was chosen for its ease of application and its ability to deliver a consistent decision model.[3] The reader who is not

[2] This section proceeds as if the youth had a two-parent household and the option to be a member of it. Adaptation for a one-parent household is straightforward. Ideally, one would like data on whether the youth's parents are deceased and other reasons why membership in the parental household is not an option.

[3] Other symmetric bargaining specifications of the youth's outcome as a member of his parents' household may lead to an empirical specification similar to the one presented in Sec. III.

interested in this or is satisfied with the empirical specification in Section III may wish to skim the remainder of this section.

Consider a youth, who acts as if to maximize utility

$$u = u(z, l), \tag{1}$$

subject to a time constraint, $T = h + l$, and budget constraint, $wh + I = pz$, that together determine a full income constraint,

$$wT + I = wl + pz \tag{2}$$

where z is a Hicksian composite commodity with price index p, l is household time or leisure, T is the length of the period (total time), h is hours of work per period, w is the market wage rate, and I is nonwage income. The youth can work in the market at wage rate

$$w = w(\mathbf{x}), \tag{3}$$

where $\mathbf{x}$ is a vector of measures of the youth's human capital and measures of the strength of demand in the relevant labor market. Throughout the following analysis the functions (1), (2), and (3) are invariant. The youth is assumed to choose his household membership and corresponding consumption and hours of work (possibly zero hours) as if to maximize (1).

If the youth is not a member of his parents' household, maximizing (1) subject to (2) yields his optimal consumption level, $z_0 = (wh_0 + I)/p = z_0(I, p, w, T)$, and leisure, $l_0 = T - h_0 = l_0(I, p, w, T)$. Here the subscript zero denotes optimal qualities when he is on his own. Substituting these into (1) yields his indirect utility function

$$v_0 = u[z_0(I, p, w, T), l_0(I, p, w, T)] = v_0(I, p, w, T), \tag{4}$$

where v_0 is homogeneous of degree zero in I, p, and w with signed partial derivatives $(\partial v_0/\partial I) > 0$, $(\partial v_0/\partial p) < 0$, and $(\partial v_0/\partial w) > 0$. With an interior solution the supply function for hours of market work is given by Roy's identity,

$$h = h_0(I, p, w, T) \equiv T - \frac{\partial v_0/\partial w}{\partial v_0/\partial I}(I, p, w, T). \tag{5}$$

With a corner solution the youth's reservation wage is the maximum market wage for which he would choose exactly zero hours of work,

$$w_0^* = \max[w{:}h_0(I, p, w, T) = 0] \equiv R_0(I, p, T). \tag{6}$$

Thus, if the youth is one his own and not working, his maximal utility is given (where the asterisk denotes not working) by

$$v_0^* = v_0[I, p, R_0(I, p, T), T] = v_0^*(I, p, T). \qquad (7)$$

Not working includes both being unemployed and out of the labor force.

Consider the same youth as a member of his parents' household. Assume that the consumption and time allocation decisions of all members of the household are jointly determined in accordance with the McElroy and Horney (1981) generalization of the Nash (1953) solution to a two-person (the youth vs. his parents) nonzero-sum game. Thus, household members act jointly as if to maximize a Nash criterion function subject to a household budget constraint. This criterion function is monotone increasing in the youth's utility level and the parents' utility level and monotone decreasing in the "threat point" of each. The youth's threat point is assumed to be

$$\max[v_0(I, p, w, T), v_0^*(I, p, T)], \qquad (8)$$

the highest level of utility attainable if he is not a member of his parents' household. The household budget constraint is the full income of the youth (2) plus the analogous quantity for each household member. When the Nash criterion function is maximized subject to a household budget constraint, it yields a well-defined system of commodity demands and labor supplies for each member of the household (see McElroy and Horney 1981).[4]

Two important implications of this theory are used here. First, the youth's nonwage income enters his threat point (8). Therefore, his nonwage income is an argument not only of his budget constraint but also of the household's Nash criterion function. Likewise, the parents' nonwage income is a separate argument of the criterion function. Consequently, nonwage income of the household must be disaggregated so that the youth's nonwage income and the parents' nonwage income enter as separate arguments of the system of commodity and leisure demands of the household. Thus, the youth's and the parents' nonwage income are also separate arguments of the youth's labor supply function. Secondly, any other shift parameter of the youth's threat point (8) also enters as an argument in the household commodity demand and labor supply system.

Accordingly, with an interior solution, let the youth's labor supply function be

[4] The existence of this demand and labor supply system and the attendant comparative statistics of the system have been worked out in detail in McElroy and Horney (1981).

$$h = h(I, p, w, T, \mathbf{P}), \tag{9}$$

where I, p, w, and T pertain to the youth and are as previously defined and where $\mathbf{P}$ is a vector of parental variables, including the parents' nonwage income and their market (or reservation) wage rates. Substituting this optimal labor supply and the youth's optimal consumption function into (1) gives the youth's indirect utility function as a member of his parents' household,

$$v = v(I, p, w, T, \mathbf{P}). \tag{10}$$

With a corner solution his reservation wage, w^*, is the maximum wage which would just induce the household decision that the youth work zero hours,

$$w^* = [\max w{:}h(I, p, w, T, \mathbf{P}) = 0] \equiv R(I, p, T, \mathbf{P}). \tag{11}$$

When living with his parents and not working, the youth may be either unemployed or out of the labor force and his maximum utility level is given by

$$v^* = v(I, p, w^*, T, \mathbf{P}) = v_0^*(I, p, T, \mathbf{P}). \tag{12}$$

Summarizing, the youth chooses that market work and household membership combination that maximizes utility. To observe a youth working h hours and on his own implies that

$$\max(v, v^*, v_0, v^*) = v_0 = v_0(I, p, w, T)$$
$$h = h_0(I, p, w, T),$$

and

$$w = w(x).$$

To observe a youth not working and on his own implies that

$$\max(v, v^*, v_0, v_0^*) = v_0^* = v_0^*(I, p, T)$$
$$h = h_0(I, p, w_0^*, T) \equiv 0,$$

and

$$w < R_0(I, p, T).$$

To observe a youth working h hours as a member of his parents' household implies that

$$\max(v, v^*, v_0, v_0^*) = v = v(I, p, w, T, \mathbf{P})$$

$$h = h(I, p, w, T, \mathbf{P}),$$

and

$$w = w(x).$$

Finally, to observe a youth residing with his parents and not working implies that

$$\max(v, v^*, v_0, v_0^*) = v^* = v^*(I, p, T, \mathbf{P})$$

$$h = h(I, p, w^*, T, \mathbf{P}) \equiv 0,$$

and

$$w < R(I, p, T, \mathbf{P}).$$

In what follows it will be assumed that $v_0 > v_0^*$ so that if a youth chooses not to be a member of his parents' household, he also chooses to work in the market.[5]

III. Empirical Specification

The empirical problem is to predict the combination of household membership and work chosen by the youth. In this section the empirical counterparts to the equations in Section II are specified in order to obtain the probability that the youth chooses each of the three relevant states (member of the parents' household and working, member of parents' household but not working, and on his own and working). This leads to maximum likelihood estimation and the identification of structural parameters. For the structure specified below, two structural parameters are identified and most of the remaining structural parameters are identified up to one common scale factor (the exceptions are coefficients of shift variables which enter every equation and the error covariance parameters).

Let i index the observation of the ith youth where $i = 1, \ldots, n$. Then using additive errors and linear-in-parameters approximations, the stochastic structural counterparts of (3), (4), (10) and (11) are given by the youth's market wage,

$$W_i = \mathbf{S}_i \boldsymbol{\delta}_s + \mathbf{X}_i \boldsymbol{\delta} + \varepsilon_i; \tag{3'}$$

[5] Since for a typical youth (with neither independent wealth nor illegal income) living on his own while not in the labor force is not viable in the long term, we assume $v_0^* > v_0$. Statistically, about 3.4% of the sample were in this state.

his indirect utility when not in his parents' household,

$$V_i^0 = \mathbf{S}_i\mathbf{b}_s + \mathbf{I}_i\mathbf{b} + W_i a + v_i^0; \tag{4'}$$

his indirect utility as a member of parents' household,

$$V_i = \mathbf{S}_i\boldsymbol{\beta}_s + \mathbf{I}_i\boldsymbol{\beta}_y + \mathbf{P}_i\boldsymbol{\beta}_p + W_i\alpha + v_i^p; \tag{10'}$$

and his reservation wage as a member of his parents' household,

$$W_i^r = \mathbf{S}_i\boldsymbol{\gamma}_s + \mathbf{I}_i\boldsymbol{\gamma}_y + \mathbf{P}_i\boldsymbol{\gamma}_p + \varepsilon_i^r, \tag{11'}$$

where for the *i*th observation the vectors of right-hand side variables have the indicated dimensions and where W_i is the logarithm of the youth's market wage; $\mathbf{S}_i$ is a $1 \times s$ vector of (transformations of) measures of human capital that are not specific to either market or household production and of shift parameters common to the youth's utility function and market wage equation; $\mathbf{X}_i$ is a $1 \times k$ vector of measures of market specific human capital and the strength of demand in the local labor market; $\mathbf{I}_i$ is a $1 \times y$ vector of measures of the youth's own wealth and other arguments of his maximal indirect utility level when not a member of his parents' household; and $\mathbf{P}_i$ is a $1 \times p$ vector of measures of the parents' income, wealth and value of time as well as all arguments over and above I of the youth's indirect utility function as a member of his parents' household. The $\boldsymbol{\delta}$'s $\mathbf{b}$'s, $\boldsymbol{\beta}$'s, $\boldsymbol{\gamma}$'s, α, and a are the corresponding, conformable vectors (or scalors) of unknown constants to be estimated.

The errors ε_i, v_i^0, v_i^p, and ε_i^r are unobserved random variates which are, however, assumed known to the youth. In (3′), ε_i is interpreted as the market return to unobserved human capital of the youth (ability, drive, and so forth); in (11′), ε_i^r catches distaste for market work and unobserved productivity and rewards as a member of the parents' household; and finally, in (4′) and (10′), v_i^0 and v_i^p capture the youth's unobserved taste (or productivity) when living on his own or in his parents' household, respectively.

In the choice analysis following (16) below, the latter two random variables always appear as $v_i^p - v_i^0$. Thus, to ease notation, the distribution assumptions are made in terms of $v_i = v_i^p - v_i^0$. Proceeding, to close the model, assume that the errors are identically and independently jointly normally distributed (across the observations) according to

$$\begin{pmatrix} \varepsilon_i^r \\ \varepsilon_i \\ v_i \end{pmatrix} \sim N\left\{ 0_3, \begin{bmatrix} \sigma_r^2 & \sigma_{r\varepsilon} & \sigma_{rv} \\ & \sigma_\varepsilon^2 & \sigma_{\varepsilon v} \\ & & \sigma_v^2 \end{bmatrix} \right\}, \quad i = 1, \ldots, n. \tag{13}$$

Define the following jointly determined dummy variables: $y_{i1} = 1$ if the ith youth lives in his parents' household and works, 0 otherwise; $y_{i2} = 1$ if the ith youth lives in his parents' household and does not work, 0 otherwise; $y_{i3} = 1$ if the ith youth does not live in his parents' household and works, 0 otherwise.

Then if the ith youth chooses $y_{i1} = 1$, his maximal level of utility is obtained by substituting the market wage equation (3′) into the indirect utility function (10′):

$$V_i = \mathbf{S}_i(\boldsymbol{\beta}_s + \alpha\boldsymbol{\delta}_s) + \mathbf{X}_i\alpha\boldsymbol{\delta} + \mathbf{I}_i\boldsymbol{\beta}_y + \mathbf{P}_i\boldsymbol{\beta}_p + (\alpha\varepsilon_i + v_i^p). \tag{14}$$

If he chooses $y_{i2} = 1$, his maximum level of utility is found by substituting the reservation wage (11′) into (10′):

$$V_i^* = \mathbf{S}_i(\boldsymbol{\beta}_s + \alpha\boldsymbol{\gamma}_s) + \mathbf{I}_i(\boldsymbol{\beta}_y + \alpha\boldsymbol{\gamma}_y) + \mathbf{P}_i(\boldsymbol{\beta}_p + \alpha\boldsymbol{\gamma}_p) + (\alpha\varepsilon_i^r + v_i^p). \tag{15}$$

Finally, if he chooses $y_{i3} = 1$, his maximum level of utility is found by substituting the market wage (3′) into the indirect utility function (4′) to obtain

$$V_i^0 = \mathbf{S}_i(\mathbf{b}_s + a\boldsymbol{\delta}_s) + \mathbf{X}_i a\boldsymbol{\delta} + \mathbf{I}_i\mathbf{b} + a\varepsilon_i + \mathrm{v}_i^0. \tag{16}$$

The youth is assumed to choose the maximum of (14), (15) and (16). By definition, $\Sigma_{j=1}^3 y_{ij} = 1$. If $y_{i1} = 1$, then V_i is at least as large as V_i^*, and V_i^0. Consequently, $y_{i1} = 1$ implies

$$V_i > V_i^*, \quad \text{or} \quad \varepsilon_i^r - \varepsilon_i < \mathbf{S}_i\mathbf{s}_a - \mathbf{P}_i\boldsymbol{\gamma}_p - \mathbf{I}_i\boldsymbol{\gamma}_y + \mathbf{X}_i\boldsymbol{\delta}, \quad \text{or} \quad a_i < \mathbf{Z}_i\boldsymbol{\beta}_a; \tag{i}$$

$$V_i > V_i^0, \quad \text{or} \quad (a - \alpha)\varepsilon_i - v_i < \mathbf{S}_i\mathbf{s}_b + \mathbf{P}_i\boldsymbol{\beta}_p + \mathbf{I}_i(\boldsymbol{\beta}_y - \mathbf{b}) + \mathbf{X}_i(\alpha - a)\boldsymbol{\delta}, \quad \text{or} \quad b_i < \mathbf{Z}_i\boldsymbol{\beta}_b. \tag{ii}$$

Here the derived errors, coefficient vectors, and vector of explanatory variables are given by

$$a_i = \varepsilon_i^r - \varepsilon_i, \qquad \boldsymbol{\beta}'_a = (\mathbf{s}_a, -\boldsymbol{\gamma}_p, -\boldsymbol{\gamma}_y, \boldsymbol{\delta}), \qquad Z_i = [\mathbf{S}_i\mathbf{P}_i\mathbf{I}_i\mathbf{X}_i],$$

$$b_i = (a - \alpha)\varepsilon_i - v_i, \qquad \boldsymbol{\beta}'_b = (\mathbf{s}_b, \boldsymbol{\beta}_p, \boldsymbol{\beta}_y - \mathbf{b}, (\alpha - a)\boldsymbol{\delta}),$$

where in turn, $\mathbf{s}_a = \boldsymbol{\delta}_s - \boldsymbol{\gamma}_s$, and $\mathbf{s}_b = \boldsymbol{\beta}_s - \mathbf{b}_s + (\alpha - a)\boldsymbol{\delta}_s$. Similarly, $y_{i2} = 1$ implies that

$$V_i^* \geq V_i, \tag{i′}$$

which is the negation of (i); and

$$V_i^* > V_i^0, \quad \text{or} \quad -\alpha\varepsilon_i^r + a\varepsilon_i - v_i < \mathbf{S}_i(\mathbf{s}_b - \alpha\mathbf{s}_a) + \mathbf{P}_i(\boldsymbol{\beta}_p + \alpha\boldsymbol{\gamma}_p) \qquad \text{(iii)}$$
$$+ \mathbf{I}_i(\boldsymbol{\beta}_y - \mathbf{b} + \alpha\boldsymbol{\gamma}_y) - \mathbf{X}_i a\boldsymbol{\delta},$$
$$\text{or} \quad c_i \leq Z_i\boldsymbol{\beta}_c + \mathbf{I}_i(\boldsymbol{\beta}_y - \mathbf{b} + \alpha\boldsymbol{\gamma}_y) - \mathbf{X}_i a\boldsymbol{\delta}.$$

Here $c_i = -\alpha\varepsilon_i^r + a\varepsilon_i - v_i$, and $\boldsymbol{\beta}_c' = (\mathbf{s}_b - \alpha\mathbf{s}_a, \boldsymbol{\beta}_p + \alpha\boldsymbol{\gamma}_y, \boldsymbol{\beta}_y - b + \alpha\boldsymbol{\gamma}_y, -a\boldsymbol{\delta})$. Finally, $y_{i3} = 1$ implies that

$$V_i^0 \geq V_i, \qquad \text{(ii')}$$

which is the negation of (ii); and

$$V_i^0 \geq V_i^*, \qquad \text{(iii')}$$

which is the negation of (iii). Note the $m = s + p + y + k$ cross-equations restrictions,

$$\boldsymbol{\beta}_c = -\alpha\boldsymbol{\beta}_a + \boldsymbol{\beta}_b. \qquad (17)$$

Likewise, since the random terms are related by

$$c_i = -\alpha a_i + b_i, \qquad (18)$$

there are only two linearly independent errors. Thus by (18), a_i, b_i, and c_i are identically and independently distributed as singular normal,

$$\begin{pmatrix} a_i \\ b_i \\ c_i \end{pmatrix} \sim SN\left\{0_3, \begin{bmatrix} \sigma_a^2 & \sigma_{ab} & \sigma_{ab} - \alpha\sigma_a^2 \\ & \sigma_b^2 & \sigma_b^2 - \alpha\sigma_{ab} \\ & & \alpha^2\sigma_a^2 + \sigma_b^2 - 2\alpha\sigma_{ab} \end{bmatrix}\right\}, \quad i = 1, \ldots, n, \qquad (19)$$

where the covariance matrix is singular and where

$$\begin{aligned} \sigma_a^2 &= \sigma_r^2 + \sigma_\varepsilon^2 - 2\sigma_{\varepsilon r}, \\ \sigma_{ab} &= (\alpha - a)(\sigma_\varepsilon^2 - \sigma_{\varepsilon r}) - \sigma_{rv} + \sigma_{\varepsilon v}, \\ \sigma_b^2 &= (a - \alpha)^2\sigma_\varepsilon^2 - 2(a - \alpha)\sigma_{\varepsilon v} + \sigma_v^2. \end{aligned} \qquad (20)$$

Consequently, the correlation matrix for a_i, b_i, c_i is singular with determinant

$$1 + 2\rho_{ab}\rho_{ac}\rho_{bc} - \rho_{ab}^2 - \rho_{ac}^2 - \rho_{bc}^2 = 0. \qquad (21)$$

Given that an individual is a member of his parents' household, so that his indirect utility function is (4′), the expression (i) is Heckman's (1974) condition that an individual work.

IV. Likelihood Function and Identification of Parameters

Under the specification in Section III, the probabilities that the ith youth is in state j for j = 1, 2, 3 are given by

$$\begin{aligned} P_{i1} &= F\left(\mathbf{Z}_i \frac{\boldsymbol{\beta}_a}{\sigma_a}, \mathbf{Z}_i \frac{\boldsymbol{\beta}_b}{\sigma_b}, \rho_{ab}\right), \\ P_{i2} &= F\left(-\mathbf{Z}_i \frac{\boldsymbol{\beta}_a}{\sigma_a}, \mathbf{Z}_i \frac{\boldsymbol{\beta}_c}{\sigma_c}, -\rho_{ac}\right), \\ P_{i3} &= F\left(-\mathbf{Z}_i \frac{\boldsymbol{\beta}_b}{\sigma_b}, -\mathbf{Z}_i \frac{\boldsymbol{\beta}_c}{\sigma_c}, \rho_{bc}\right), \end{aligned} \tag{22}$$

where $F(\cdot, \cdot, \cdot)$ is the cumulative standardized bivariate normal density function. Using the restriction (18), one can express the variance and correlation parameters in (22) in terms of α, one variance, and two correlation coefficients. For example, via (21),

$$\rho_{ac} = \rho_{ab}\rho_{bc} \pm \sqrt{(1 - \rho_{ab}^2)(1 - \rho_{bc}^2)}; \tag{23}$$

and from Appendix A,

$$\begin{aligned} \sigma_{ab} &= \alpha\eta\rho_{ab}\sigma_a^2, \\ \sigma_b &= \alpha\eta\sigma_a, \\ \sigma_c &= \alpha\Delta\sigma_a; \end{aligned} \tag{24}$$

where η and Δ depend only on ρ_{ac} and ρ_{bc} and are defined as

$$\begin{aligned} \eta &= \frac{\sqrt{1 - \rho_{ac}^2}}{\sqrt{1 - \rho_{bc}^2}}, \\ \Delta &= \eta\rho_{bc} - \rho_{ac}. \end{aligned} \tag{25}$$

Substituting (25) into (24) and substituting (23) and (24), in turn, into (22), reduces the parameters in (22) to those in the $2(s + y + p + k) + 2$ vector

$$\boldsymbol{\theta} = \left(\frac{1}{\alpha\sigma_a}(\alpha\boldsymbol{\beta}'_a, \boldsymbol{\beta}'_b), \rho_{ab}, \rho_{bc}\right)'.$$

As a consequence, the contribution of the ith observation to the likelihood function can be written as

$$\begin{aligned} L_i &= P_{i1}^{y_{i1}} P_{i2}^{y_{i2}} P_{i3}^{y_{i3}} \\ &= L(\mathbf{Z}_i, \mathbf{y}_i, \boldsymbol{\theta}). \end{aligned} \tag{26}$$

Each element of $\boldsymbol{\theta}$ is identified. These, in turn, determine ρ_{ac}, η and Δ. Note that the elements of $\boldsymbol{\beta}_a = (\boldsymbol{\delta}_s - \boldsymbol{\gamma}_s, -\boldsymbol{\gamma}_p, -\boldsymbol{\gamma}_y, \boldsymbol{\delta})'$ are identified up to the common scale factor σ_a^{-1}, while the elements of $\boldsymbol{\beta}_b = (\boldsymbol{\beta}_s - \mathbf{b}_s + (\alpha - a)\boldsymbol{\delta}_s, \boldsymbol{\beta}_p, \boldsymbol{\beta}_y - \mathbf{b}, (\alpha - a)\boldsymbol{\delta})'$ are all identified up to the common scale factor $(\alpha\sigma_a)^{-1}$. Since $[(\alpha - a)\delta/\alpha\sigma_a] \div (\delta/\sigma_a) = 1 - (a/\alpha)$, only the ratio a/α is identified. Finally, using (20) and (24), the six elements of the underlying structural errors, vec $(\Sigma) = (\sigma_\varepsilon^2, \sigma_r^2, \sigma_v^2, \sigma_{\varepsilon r}, \sigma_{\varepsilon v}, \sigma_{rv})$, are restricted by only two relationships,

$$\begin{aligned} \alpha^2\eta^2 &= \frac{\sigma_b^2}{\sigma_a^2} = \frac{(\alpha - a)^2\sigma_\varepsilon^2 - 2(a - \alpha)\sigma_{\varepsilon v} + \sigma_v^2}{\sigma_r^2 + \sigma_\varepsilon^2 - 2\sigma_{\varepsilon r}}, \\ \alpha\eta\rho_{ab} &= \frac{\sigma_{ab}}{\sigma_a^2} = \frac{(\alpha - a)(\sigma_\varepsilon^2 - \sigma_{\varepsilon r}) - \sigma_{rv} + \sigma_{\varepsilon v}}{\sigma_r^2 + \sigma_\varepsilon^2 - 2\sigma_{\varepsilon r}}. \end{aligned} \tag{27}$$

Thus, without further restrictions, these elements are not identified.[6]

V. Data and Estimation Procedure

The sample consisted of observations on families with sons who were out of school, never married, white, and 19–24 years of age (in 1971). The observations are a 1971 cross section created by matching sons with their parents using the National Longitudinal Survey of Young Men (1971), of Mature Women (1971 and 1972) and of Mature Men (1971). Thus, there is information on the parental income and assets not only if the youth lived with his parents in 1971 but also if he no longer did. The sample excluded observations with missing variables, the self-employed, farmers, those who were ever married, and those who were either enrolled in school or reported school as a major activity in the survey week. Each included youth either headed his own household or lived with both his parents.[7]

[6] If $\rho ab = \rho ac = \rho bc = 0$, the contribution of each observation to the likelihood (26) factors into the product of the corresponding contribution to the likelihood for three conditional, independent binary probits. But, by (21) this restriction is ruled out. Therefore, in Sec. VI a test of this restriction serves as a specification test.

[7] In preliminary work the sample included youths who were the sons of the head of a one-parent household. The distinguishing feature of one-parent households was that transfer income accrued almost exclusively to them. In

Table 1
Observed Frequencies (and Percentages) **for White Males Ages 19–24**
A. From the 1971 Matched National Longitudinal Survey Sample

	Working	Not Working	Row Total
Member of parents' household	121 (59.6)	34 (16.8)	155 (76.4)
Not member of parents' household	41 (20.2)	7 (3.4)	48 (23.6)
Column total	162 (79.8)	41 (20.2)	203 (100)

B. From the 1976 Survey of Income and Education

	Working	Not Working	Row Total
Member of parents' household	573 (49.0)	129 (11.0)	702 (60.0)
Not member of parents' household	417 (35.6)	51 (4.4)	468 (40.0)
Column total	990 (84.6)	180 (15.4)	1,170 (100)

In this study, "working" youths are those who either did market work or were "with a job, but not working" in the week before the survey; youths who were either unemployed or out of the labor force are considered to be "not working." For the matched sample of 203 observations from the National Longitudinal Survey, the interrelationship of the work and household membership decisions is clear and can be seen in table 1, which contains observed frequencies of each state. Note that over 76% of these youths were members of their parents' household and nearly 80% worked. Of those who were not working, 83% lived with their parents. Only seven youths (about 3.4%) were neither members of their parents' household nor working. As shown in table 1, part B, a comparable national sample of 1,170 youths from the 1976 survey of Income and Education revealed the same basic pattern: of those who were not working, 72% lived with their parents; 4% were neither members of their parents' household nor working.

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preliminary analysis using a likelihood ratio test and holding transfer income constant, one could not reject the hypothesis that the remaining (slope) coefficients for one-parent households were equal to those for two-parent households. Transfer income appeared to increase the probability that a youth lived with his parent but neither to increase nor to decrease the probability of his working. Thus, dropping youths with one-parent households would not appear to affect the results greatly.

Complete definitions of variables as well as sample means and variances are given in Appendix B. The model calls for four types of variables.

I: The logarithm of youth's net assets, denoted $\ln I_y$.

P: Measures of the parent's income and asset position for this study specified as: the logarithm of the father's hourly wage rate, $\ln w_{pa}$; the logarithm of the youth's family net assets (excluding the youth's assets), $\ln I_p$; and the logarithm of the mother's wage rate if she earned income last year, $D \cdot \ln w_{ma}$, where $D = 1$ if she earned income last year and is zero otherwise.[8] This last variable is referred to as "mother's participation cum wage" variable.

S: Characteristic of the youth common to all structural equations taken as years of schooling completed and a health limitation dummy variable, (health limitation = 1 if limited), and a constant.

X: Variables exclusive to the market wage equation measuring market specific capital and the strength of the local labor market, here taken as the local unemployment rate.

With these specifications for *I*, *P*, *S*, and *X* there are two variance-covariance parameters plus 16 other parameters to estimate. The normalization $\sigma_a^2 = 1$ was used. The likelihood function was maximized using numerical derivatives in conjunction with the Davidon, Fletcher, and Powell hill climber in Goldfeld and Quandt's GQOPT3 package. To evaluate the cumulative binormal distribution, the IMSL MDBNOR routine (based on the method of Owen 1956) was incorporated as a subroutine of the FORTRAN program written to evaluate the likelihood function.

VI. Empirical Results

Under the indicated normalization, maximum likelihood estimates are presented in table 2. Equations ($\hat{3}$) and ($\hat{4}$) in part A report estimated structural coefficients (up to the scale factor $\sigma_a^{-1} = 1.00$); equation ($\hat{10}$) reports structural coefficients estimates (up to the scale factor $\sigma_b^{-1} = [\eta\alpha\sigma_a]^{-1} = .756$). Asymptotic *t*-ratios are given in parentheses; unidentified parameters appear as symbols.[9] All eighteen estimated coefficients are statistically significant at the .01 level or better and the results are in good agreement with the model and a priori expectations.

For the market wage function, equation ($\hat{3}$), a higher local unemploy-

[8] In preliminary work using conditional independent bivariate probits, entering both the mother's market wage and proxied shadow wage (with appropriate slope dummies) appeared to overspecify the model. Using the variable $D \cdot \ln w_{ma}$ was deemed a useful compromise. Using $D \cdot \ln w_{ma}$ is equivalent to setting her reservation wage as \$1.00 if she did not earn income last year.

[9] For 18 parameters the likelihood function based on eq. (26) converged in 54 iterations at a cost of about \$32.

Table 2
Maximum Likelihood Estimates (MLEs)
A. Structural Equations

$$(\hat{3})\ \hat{W}_i = \mathbf{S}_i\boldsymbol{\delta}_s - \underset{(2.40)}{.016}\ \mathbf{X}_i$$

$$(\hat{4})\ \hat{W}_i^r = \mathbf{S}_i\boldsymbol{\gamma}_s - \underset{(3.23)}{.011} \ln I_y + \underset{(2.82)}{.012} \ln I_p + \underset{(21.97)}{.066} \ln w_{pa} - \underset{(3.29)}{.120}\ D \cdot \ln w_{ma}$$

$$(\hat{10})\ \hat{V}_i = \mathbf{S}_i\boldsymbol{\beta}_s + \alpha \ln w + \boldsymbol{\beta}_y \ln I_y + \underset{(5.58)}{.318} \ln I_p - \underset{(2.61)}{.037} \ln w_{pa} - \underset{(20.95)}{.235}\ D \cdot \ln w_{ma}$$

$$(\hat{11})\ \hat{V}_i^o = \mathbf{S}_i\mathbf{b}_s + a \ln w + b_y \ln I_y$$

B. Combinations of Structural Coefficients

Parameter Vector	Component	MLE	t-ratio
	Education	.013	3.50
$s_a = \delta_s - \gamma_s$	Health limitation	−.681	4.15
	Constant	.722	10.48
	Education	−.365	7.24
$s_b = (\alpha - a)\delta_s + (\beta_s - b_s)$	Health limitation	−.206	5.92
	Constant	1.706	8.67
$\frac{a}{\alpha}$	$\ln w$	1.510	7.70
$\beta_y - b_y$	Youth's nonwage income	.157	2.90

Derived correlations (Ω): $\hat{\rho}_{ab} = .577$, $\hat{\rho}_{ac} = -.461$ (3.94), $\hat{\rho}_{bc} = .459$ (6.01)

ment rate was associated with a lower wage. In ($\hat{4}$), the youth's reservation wage as a member of his parents' household varies inversely with his own asset level and with his mother's participation cum market wage ($-.011 \ln I_y - .120D \cdot \ln w_{ma}$). Finally (since $W_i - W_i^r = \mathbf{S}_i \times [\boldsymbol{\delta}_s - \boldsymbol{\gamma}_s]$ + other terms, and since σ_a is positive), we can use the estimated components of $s_a = (\boldsymbol{\delta}_s - \boldsymbol{\gamma}_s)$ to compare the ceteris paribus effects of the shift variables on the offered and asking wage rates. On the assumption that more education increases both market and reservation wage rates, years of schooling are estimated to increase the market wage more than the reservation wage (the MLE of the education component of $\boldsymbol{\delta}_s - \boldsymbol{\gamma}_s$ is .013). Likewise, assuming that health limitations decrease both the market and reservation wage rates, then health limitations decrease the market wage more than the reservation wage (the MLE of the health limitations component of $\boldsymbol{\delta}_s - \boldsymbol{\gamma}_s$ is −.681).[10]

The estimated indirect utility functions have intuitive appeal. In ($\hat{10}$),

[10] This is consistent with the intent of the health-limitations variable: to measure limitations on the kind or amount of market work. Limitations on housework were recorded in a separate question. It is also consistent with, e.g., Heckman's (1974) finding that for married women, education raised their offered wage more than their asking wage.

as a member of his parents' household the youth's (maximum) utility increases with his parents' assets but decreases with their opportunity cost of time (as measured by his father's wage rate and his mother's participation cum market wage). To the youth, the marginal utility of a 1% increase in his own wage is greater when he is on his own than it is when he is a member of his parents' household ($a/\alpha = 1.510$). Finally, the marginal utility of a 1% increase in his own nonwage income is estimated to be less when he is on his own ($\boldsymbol{\beta}_y - b_y = .157$). This is the only parameter with the "wrong" sign and is one of the least significant of those estimated. In view of this result, and in view of the estimated inverse relationship of the youth's reservation wage as a member of his parents household to his asset level, it seems likely that the youth's asset variable reflects cumulated earnings of the youth. An F-test reveals that the effect of the youth's assets and his parents' assets on the youth's reservation wage are significantly different.

Putting these results together indicates that, on the whole, a rise in his parents' assets increases the youth's reservation wage and increases his maximum utility from living with his parents, thereby increasing the probability that he lives with them and does not work. An increase in his mother's wage (cum participation), however, works in the opposite direction, decreasing his reservation wage and decreasing his maximum utility level as a member of his parents' household. Consequently, increases in her wage decrease the probability that he lives with his parents but, if he does live with them, increase the probability that he works. Finally, increases in the father's wage also decrease the son's maximum utility but increase the son's reservation wage when he is living with his parents. Therefore, other things equal, higher-wage fathers are less likely to have their sons living with them and less likely to have sons who work while living with them.

The education component of s_a is positive (.013) and the education component of $s_c = -\alpha s_a + s_b$ is negative (−.382). Thus, in view of inequalities (i), (ii), and (iii) in Section III, increases in education unambiguously decrease the probability that the youth lives at home and does not work. In contrast, since the health limitations component of s_a is negative (−.681), and the health limitations component of $s_c = -\alpha s_a + s_b$ is positive (.696), having a health limitation increases the probability that a son lives at home and does not work. These results also agree with a priori expectations.

Finally, we note that the two estimated correlations are well determined and not close to either zero or to (plus or minus) unity.

A. Specification Checks

Within the sample, the model predicts well, as shown by the close agreement between observed and predicted and relative frequencies reported in table 3.

Table 3
Observed and Predicted Frequencies and Relative Frequencies

	Event			
	$y_1 = 1$	$y_2 = 1$	$y_3 = 1$	Row Total
Frequency:				
Observed	121	34	41	196
Predicted	121.216	34.811	39.972	195.999
Relative frequency:				
Observed	.617	.173	.209	.999
Predicted	.618	.177	.204	.999

A specification test based on the following three models was conducted, and the results appear in figure 1. Model A is totally unrestricted—it corresponds to the likelihood function based on (26), but without the imposition of the $m + 1$ restrictions (17) and (21). Here, $m = s + y + p + k$ is the number of explanatory variables in the system. Model B is the model estimated in table 2 and based on the theory presented in Section II—that is, the likelihood based on (26) with the $m + 1$ restrictions (17) and (21) imposed. Model C is model A, but with the three restrictions $\rho_{ab} = \rho_{ac} = \rho_{bc} = 0$ imposed.[11] For these data, as in table 2, there are $m = 8$ explanatory variables. The nesting scheme for these models as well as the estimated log likelihoods are given in figure 1. Model A was not estimated and is included only for pedagogical reasons. Note that model B also has the higher likelihood ($-153.75 > -182.07$). Thus, any information criterion (e.g., Akaike's minimizing the number of parameters minus the log likelihood)[12] will reject model C in favor of B. This is strong evidence that the joint determination of household membership and work decisions is of empirical as well as theoretical importance and that the model underlying the estimated parameters in table 2 is superior to one that ignores the jointness of work and household membership decisions.

B. Comparison of MLEs and Single Equation Probits

Past research on market work and unemployment of youth either ignored family membership status altogether or else treated it as exoge-

[11] If the correlations of the reduced-form errors are also zero ($\rho_{ab} = \rho_{bc} = \rho_{ac} = 0$), then the (unrestricted) likelihood based on eq. (26) splits apart into the product of three likelihoods for three conditional binary probits for the three possible pairs of states (i) work vs. no work, conditional on living in the parents' household; (ii) living vs. not living in the parents' household, conditional on working; and (iii) living in the parents' household and not working vs. not living in their household and working, conditional on being in one of these last two states.

[12] This criterion is biased in favor of C over B (see Atkinson 1981).

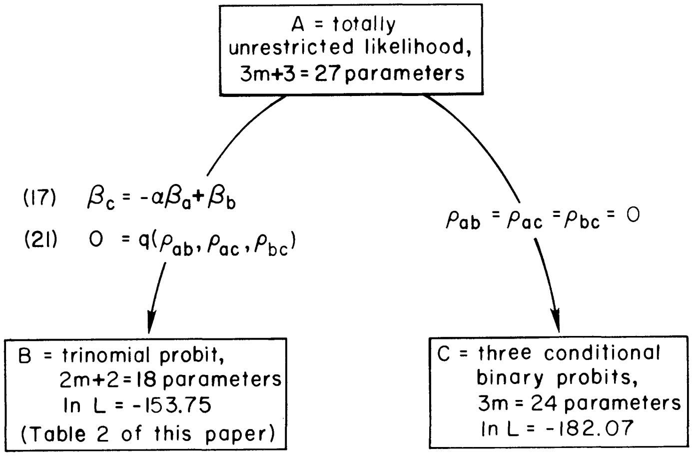

FIG. 1

nous. In this vein, for the ith youth market work and family membership, dummy variables are defined as follows:

$$H_i \equiv y_{i1} + y_{i3} = 1, \quad \text{if hours of work are greater than zero,}$$
$$0 \quad \text{otherwise;}$$
$$M_i \equiv y_{i1} + y_{i2} = 1, \quad \text{if member of parents' household,}$$
$$0 \quad \text{otherwise.}$$

In a study of work behavior, one might run a binary probit with H_i as the dependent variable and M_i as an exogenous variable. For these data, the resulting estimated coefficient on M_i (and the associated asymptotic t-ratio) are reported in column one of table 4. Conversely, if interested in family membership status, one might reverse the roles of these dummies run a binary probit with M_i the dependent variable and H_i taken as exogenous. The corresponding estimated coefficient on H (and asymptotic t-ratio) are reported in column two of table 4.[13] Taken at face value, these asymptotic t-ratios would indicate that household membership (M) does not affect work behavior (H) and vice versa. Of course, both of these probit models are misspecified in that either M or H is taken as exogenous, whereas in any theory-based model they are jointly determined. The statistical results here indicate that taking one of these variables to be predetermined would have serious empirical consequences: it would lead one to the false conclusion that work and household membership are unrelated.

[13] In the probit with H (work vs. nonwork) as the dependent variable, ln $L = -73.53$ and the only significant independent variable was the dummy variable on health limitations (the coefficient was $-.333$ with $t = -2.89$). Similarly, in the second probit where M (member vs. nonmember of parents' household) was the dependent variable, ln $L = -72.40$ and only two independent variables were significant (years of schooling completed and the parents' asset level).

Table 4
Coefficients for Two Common Probit Specifications

	Dependent Variable	
Independent Variable	*H*	*M*
H		−5.136 (−.11)
M	−4.540 (−.11)	

C. Discussion of Empirical Results

Figure 2 shows the impact of an increase, ceteris paribus, in the youth's offered wage rate on work and family membership. For a typical son living in his parents' household, the solid-line graphs the youth's estimated indirect utility, V, as a function of his logarithmic offered wage, W; the kink is at his reservation wage, W^r. For the same typical son who is separated from his parents' household, the dashed line graphs his indirect utility (V^0) as a function of W; the kink is at his corresponding reservation wage rate, W_0^r (which is unobserved). Thus, as his offered wage increases, the youth's maximum utility follows the upper envelope *ABCD*. For wages less than W^r, the youth lives at home and does not work in the market; for offered wages greater than W^r but less than W^0, he remains in his parents' household but works in the market; and finally, for wages greater than W^0, the youth lives apart from his parents and works in the market. Note that W_0^r is unobservable since the youth would never choose utility level E.

Thus, the family provides a type of low wage or nonemployment insurance.[14] If for example, a youth worked and lived on his own at point D, but lost that job and was offered only some $W < W^r$, he would return to his parents' household and not work, thereby falling only to utility level A rather than to level E.[15] In effect, his parents insure that no matter how low his market wage falls, his utility will not fall below A. Because of the new low offered wage, the parents as well as the youth lose utility, but by the Nash criterion function, as a family they are better off than if the youth optimized his work choice but continued to live separately from his parents.

[14] Before the empirical work was done, Robert A. Pollak suggested that notion that families serve an unemployment insurance function for their offspring.

[15] This reasoning is similar to Becker's (1981), by which an altruistically headed family serves an insurance function. This argument also assumes zero fixed costs of returning to the parental household. Fixed costs of returning lower the curve *ABC* and lower W^r, thus also lowering W^0, the wage below which the youth returns to the parental household. In fact, sufficiently large fixed costs could preclude this insurance function altogether. If fixed costs lower the curve *ABC* to lie everywhere below *EFD* and hence $W^0 = 0$, the utility-maximizing strategy is never to move back. A full treatment of this issue requires a dynamic model.

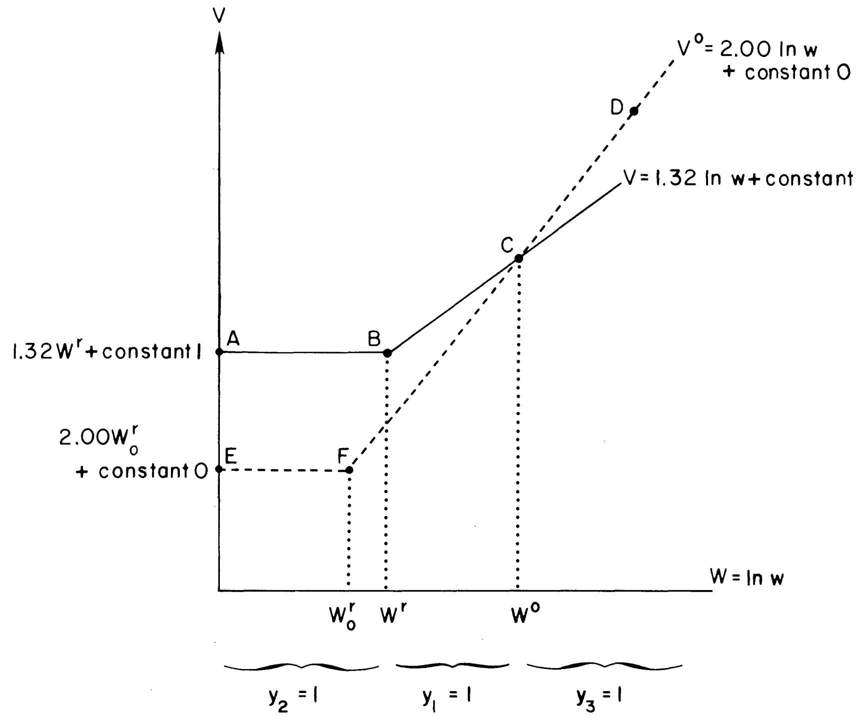

FIG. 2.—The effect of the offered wage on work and family status.

VII. Conclusion

Except in special cases, market work and household membership are jointly determined. The interactions of these decisions are especially important for (1) youths of both sexes, (2) women (where marital status replaces household membership), and (3) even prime-age males who, when facing temporarily low wage rates, are ceteris paribus in a better position to substitute "leisure" for income when married to a worker. The maximizing model and statistical procedure used in this paper can be extended to analyze all of these cases.

This application is to white male youths from a matched sample of sons and their parents from the National Longitudinal Surveys of Young Men, Mature Women, and Mature Men. Maximum likelihood estimates (MLEs) of parameters (or combinations of parameters) are obtained for the following functions: the youth's indirect utility function as a member of his parents' household, his reservation wage function as a member of their household, his indirect utility function on his own, and his market wage function (which is assumed to be invariant with respect to household membership). These structural relationships, in turn, clearly show the insurance role of families. In this case, the family provides nonemployment insurance to the son: parents insure their son a minimal level of utility when he faces poor market opportunities.

Appendix A

Simplification of the Covariance Matrix

This Appendix uses the restriction (18) to write the covariance matrix for (a_i, b_i, c_i) in terms of α, ρ_{ab}, ρ_{bc} and σ_a^2. By definition,

$$\sigma_{ab} = \sigma_a \sigma_b \rho_{ab} \tag{A1}$$

$$\sigma_{ac} = \sigma_a \sigma_c \rho_{ac} \tag{A2}$$

$$\sigma_{bc} = \sigma_b \sigma_c \rho_{bc}. \tag{A3}$$

Solving the last two of these for σ_c and equating, and using (19) to eliminate σ_{ac} and σ_{bc} yields

$$\frac{\sigma_{ab} - \alpha\sigma_a^2}{\sigma_a \rho_{ac}} = \frac{\sigma_b^2 - \alpha\sigma_{ab}}{\sigma_b \rho_{bc}}.$$

Substituting in (A1) yields

$$\sigma_b = \alpha\eta\sigma_a, \tag{A4}$$

where

$$\eta = \frac{\rho_{ab}\rho_{ac} - \rho_{bc}}{\rho_{ac} - \rho_{bc}\rho_{ab}};$$

and substituting out ρ_{ab} via (21) reduces η to the expression in (25) found in the text. Further, substituting (A4) into (A1) yields

$$\sigma_{ab} = \alpha\eta\rho_{ab}\sigma_a^2. \tag{A5}$$

From (19) in the text, $\sigma_c^2 = \alpha^2\sigma_a^2 + \sigma_b^2 - 2\alpha\sigma_{ab}$. Substituting in (A4) and (A5) yields

$$\begin{aligned} \sigma_c &= \sigma_b\rho_{bc} - \alpha\sigma_a\rho_{ac} \\ &= \alpha\Delta\sigma_a, \end{aligned} \tag{A6}$$

where the last equality uses (A4) and the definition of Δ given by (25) in the text. With a few more substitutions of this sort one can collect results as

$$\operatorname{cov}\begin{pmatrix} \alpha a_i \\ b_i \\ c_i \end{pmatrix} = \alpha^2\sigma_a^2 \begin{bmatrix} 1 & \eta\rho_{ab} & (\eta\rho_{ab} - 1) \\ & \eta^2 & \eta(\eta - \sigma_{ab}) \\ & & \Delta^2 \end{bmatrix} = \alpha^2\sigma_a^2 M,$$

where, via (21) in the text, M is a matrix that depends only on two correlation parameters. Equation (24) in the text follows directly.

Appendix B
Means (and Standard Deviations) **and Definitions of Variables for N = 196 Observations**

Variable Type	Variable	Transformed Variable	Definitions
I	Son's net assets: $1,625 ($3,268)	$\ln I_y$ = ln(son's assets + $3,009) 8.298 (.712)	(Natural) logarithm of son's translated net assets in 1971; translation adds the absolute value of sample minimum asset level (−$3,008) plus $1.00 to son's assets: including equity value of his house (owned by him, not by parents); savings and checking accounts; value of stocks, bonds, and mutual funds; net value of real estate investments; equity value of automobile; minus debts not included elsewhere; only sons who did not live with their parents had nonzero assets in housing
P	Parents' net assets: $22,418 ($32,176)	$\ln I_p$ = ln(parents' assets + $2,851) 9.6868 (.9545)	(Natural) logarithm of parents' translated net assets in 1971; translation adds the absolute value of the sample minimum asset level (−$2,850) plus $1.00 to parents' assets: equity value of house; savings and checking accounts; value of stocks, bonds, and mutual funds; net value of real estate investments; equity value of automobile(s); net value of any business or professional practice; minus debts not included elsewhere; matched sample provides observations on the parents' assets whether or not the son lived with them in 1971; if son resided with parents, parents' assets equals the family net assets minus the son's net assets

	Father's wage: $4.41 ($2.18)	$\ln(w_{pa})$ 1.2752 (.6231)	(Natural) logarithm of father's wage rate taken from the 1972 Mature Women's tape; it was calculated as his 1971 earnings divided by his 1971 hours, if available, otherwise (to match time intervals) taken as the "key variable" from the 1971 Mature Men's tape, if father was retired (in about eight cases), $\ln w_{pa} = 0$
	Mother's wage: $2.79* ($1.51)	$D \cdot \ln(w_{ma})$ .4384 (.5518)	This variable is assigned a zero if mother did not work in 1971, otherwise the natural logarithm of her hourly rate of pay, a few mothers' wages were obtained from the father's tape, calculated as their 1970 earnings divided by 1970 hours, and then inflated by 1.05 (the increase in the CPI between 1970 and 1971)
S	Education: 12.46 years (2.54 years)		Son's years of schooling completed as of 1971
	Health limitation: 14.29% yes (3.51%)		Health limitation = 1 if the son's health limited kind or amount of work he could do as of 1971, if son reported that health limited his schooling activity, then the health-limits-work question was not asked, in these few cases, health limitation was assigned a one
X	Local unemployment rate: 6.132% (2.174%)		Local area unemployment rate from the 1971 son's survey

* This is the sample mean for the 93 mothers with positive wage rates. The mean for $D \cdot \ln(w_{ma})$ includes those observations where the mother did not work.

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