Separate Spheres Bargaining and the Marriage Market
Author(s): Shelly Lundberg and Robert A. Pollak
Source: *Journal of Political Economy*, Vol. 101, No. 6 (Dec., 1993), pp. 988-1010
Published by: The University of Chicago Press
Stable URL: https://www.jstor.org/stable/2138569
Accessed: 04-10-2019 16:36 UTC

Separate Spheres Bargaining and the Marriage Market

Shelly Lundberg and Robert A. Pollak

University of Washington

This paper introduces the "separate spheres" bargaining model, a new model of distribution within marriage. It differs from divorce threat bargaining models (e.g., Manser-Brown, McElroy-Horney) in that the threat point is not divorce but a noncooperative equilibrium within marriage; this noncooperative equilibrium reflects traditional gender roles. The predictions of our model thus differ from those of divorce threat bargaining models; in the separate spheres model, cash transfer payments to the mother and payments to the father can—but need not—imply different equilibrium distributions in existing marriages. In the long run, the distributional effects of transfer policies may be substantially altered by changes in the marriage market equilibrium.

I. Introduction

The expectation that family policies will affect distribution within marriage is implicit in much popular discussion. For example, child care subsidies and child allowances are often regarded as women's issues. Women's groups are outspoken advocates of such programs, and women are expected to be among their primary beneficiaries. This linking of women's and children's welfare with child-based sub-

This paper is a revised and retitled version of "Gender Roles and Intrafamily Distribution." We would like to thank our respective spouses for their cooperation and the Rockefeller Foundation for financial support. Neither our spouses nor the Rockefeller Foundation is responsible for the views expressed here. We are grateful to the anonymous referees, to Laurie Bassi, Gary Becker, David S. Johnson, Andrew Postlewaite, Mark Rosenzweig, Pepper Schwartz, and Amartya Sen, and to seminar participants at Chicago, Georgetown, Harvard, Indiana, Pittsburgh, Penn, Penn State, Texas, and Washington for useful comments.

[*Journal of Political Economy*, 1993, vol. 101, no. 6]

sidies is rooted in the gender assignment of child care: mothers expect and are expected to assume primary responsibility for their children.[1] Yet the distributional implications of these policies are far from clear. Child-conditioned subsidies would certainly transfer resources to the heads of single-parent families, who are predominantly women. But what effect, if any, would such programs have on distribution between women and men in two-parent families?

Using a new model of marital bargaining, we analyze the distributional effect of such programs in two-parent families, focusing on an analytically tractable special case. We compare two child allowance schemes: in the first, a cash transfer is paid to the mother; in the second, it is paid to the father. In the event of divorce, we assume that under both schemes the mother becomes the custodial parent and receives the child allowance. The comparison we propose is simpler than those involving more familiar programs such as child care subsidies because the alternative policies we consider involve neither price effects nor tax incentive effects.

The two leading economic models of intrafamily allocation imply that these alternative child allowance schemes have identical implications for distribution in two-parent families. In the altruist model (Becker 1974*a*, 1981), the equilibrium is the point in the feasible consumption set that maximizes the altruist's utility; that point is independent of which parent receives the child allowance because the feasible consumption set is identical under the two child allowance schemes. In the bargaining models of Manser and Brown (1980) and McElroy and Horney (1981), the equilibrium is determined by the feasible consumption set and a threat point that is interpreted as the utility of remaining single or of getting divorced. The equilibrium is independent of which parent receives the child allowance because the feasible consumption set and the well-being of single and divorced individuals are identical under the two child allowance schemes.

Many participants in the public debate concerning actual government transfers take it for granted that intrafamily distribution will vary systematically with the control of resources. When the British child allowance system was changed in the mid-1970s to make child benefits payable in cash to the mother, it was widely regarded as a redistribution of family income from men to women and was expected to be popular with women: "Indeed so convinced did some Ministers become that a transfer of income 'from the wallet to the

[1] As Crawford and Pollak (1989) point out, it is often asserted that mothers are primarily responsible for child care in three senses: first, it is mothers who find a child care provider and make the arrangements; second, it is mothers who take time off from work when a child is sick or when child care arrangements collapse; and third, it is mothers who "pay" child care expenses from their discretionary incomes.

purse' at a time of wage restraint would be resented by male workers, that they decided at one point in 1977 to defer the whole child benefit scheme" (Brown 1984, p. 64).

In this paper we propose the "separate spheres" bargaining model, a new model of distribution in two-parent families. The separate spheres model differs from the divorce threat model in two ways. First, the threat point is not divorce but a noncooperative equilibrium defined in terms of traditional gender roles and gender role expectations. Second, the noncooperative equilibrium, although it is not Pareto optimal, may be the final equilibrium because of the presence of transaction costs. We show that in the separate spheres bargaining model, cash transfer child allowance schemes that pay the mother and those that pay the father can—but need not—imply different equilibrium distributions in existing marriages. The separate spheres model is thus not inconsistent with the view, popular among noneconomists, that distribution between women and men in two-parent families will depend on which parent receives the child allowance payment.

In the long run, the redistributive effects of child allowances depend on the feasibility of making contractual arrangements in the marriage market. The marriage market will wholly undo any redistributive effects if prospective couples can make binding, costlessly enforceable, prenuptial agreements to transfer resources within the marriage; dowry and bride-price can, under certain circumstances, be interpreted as examples of practices that facilitate such Ricardian equivalence. If binding agreements cannot be made in the marriage market—and we think that this is the relevant case for advanced, industrial societies—child allowances may have long-run distributional effects.

The analysis of alternative cash transfer child allowance schemes is analytically tractable because it does not require us to consider policies that affect prices (e.g., subsidizing child care) or policies that affect the well-being of single or divorced individuals (e.g., Aid to Families with Dependent Children and other welfare programs). Cash transfer schemes such as child allowances are the policies most likely to be undone in the short run by bargaining within existing marriages and in the long run by adjustments in the marriage market. The effects of other policies, such as child care subsidies, on distribution between women and men in two-parent families are thus likely to be greater than our comparison of alternative child allowance schemes suggests.

In Section II we provide an overview of the problem of intrafamily distribution, and in Section III we develop several versions of the separate spheres bargaining model. Section IV shows that in the long run the marriage market can completely undo any redistribution ef-

fects of child allowances if binding, costlessly enforceable, prenuptial agreements can be made. In Section V we consider the case in which individuals cannot make binding, costlessly enforceable agreements in the marriage market; we show that in this case the redistributive effects of child allowances may induce changes in the equilibrium number of marriages, as well as changes in distribution within particular marriages. Section VI is a brief conclusion.

II. Models of Intrafamily Distribution

Economic models of household behavior have generally ignored distribution within the family. Samuelson's (1956) consensus model provided the first formal justification for this neglect. Samuelson was concerned not with explaining distribution within the family but with identifying the conditions under which consumer demand analysis could proceed without doing so. In the consensus model, each member of the family behaves as though there were a family utility function that all attempt to maximize; this assumption allows the family to be analyzed as a single unit. Because the incomes of individual family members are pooled in the joint budget, the effect of lump-sum payments (e.g., property income or government transfers) is independent of which family member receives the payment. As Samuelson made clear in his original article, as a theory of distribution within the family, the consensus model is a nonstarter.

The economist's standard model of distribution within the family is Becker's (1974*a*, 1981) altruist model. Becker postulates that the family contains one "altruistic" individual—the husband, father, patriarch, dictator—whose preferences reflect his concern for the welfare of other family members. Becker argues that the presence of one altruist who makes positive transfers to each member of the family is sufficient to induce purely selfish but rational family members to maximize family income. The resulting distribution is the one that maximizes the altruist's utility function subject to the family's resource constraint. Becker's "rotten kid theorem" (Becker 1974*b*, 1981) embodies this result; Pollak (1985), Bergstrom (1989), and Johnson (1990) articulate the conditions under which the conclusion of the rotten kid theorem holds. The source of the altruist's power in Becker's model is not his concern with the welfare of others but rather his assumed ability to confront others with "take-it-or-leave-it" choices; altruism in the sense of caring about the welfare of others is required only to explain why the altruist chooses a distribution that allows other members of the family a positive surplus (i.e., more than their reservation levels of utility). The altruist model implies that an increase in family resources, within certain limits, will have the same

effect on intrafamily distribution regardless of which spouse receives the resources. It therefore implies that a government program of child allowances would have identical effects on distribution regardless of whether the payments went to mothers or to fathers. According to both the altruist model and the consensus model, the family behaves as though it were maximizing a single utility function. This implies restrictions on observable outcomes that the data fail to support.[2]

Bargaining models of marriage (Manser and Brown 1980; McElroy and Horney 1981) treat marriage as a cooperative game: spouses with conflicting interests or preferences are assumed to resolve their differences in a manner prescribed by the Nash or some other explicit bargaining solution. A distinguishing feature of bargaining models is that family demand behavior depends not only on total family resources but also on the resources controlled by each spouse individually. Individual control of resources matters because bargaining outcomes depend on threat points as well as on the feasible consumption set. The threat point in a cooperative game is usually described as reflecting the outcome that would obtain in the absence of agreement. Manser and Brown (1980) and McElroy and Horney (1981) specify the threat point as the individuals' maximal levels of utility outside the family, that is, the value of divorce. The more attractive an individual's opportunities outside the family, the more strongly that individual's preferences will be reflected in the intrafamily distribution of resources.[3]

The dependence of intrafamily distribution on the well-being of divorced individuals provides a mechanism through which government policy can affect distribution within marriage in divorce threat bargaining models. An increase in the child allowances paid to *divorced* mothers will increase the expected utility of divorced women and cause a reallocation of family resources in two-parent families toward goods and services more highly valued by wives. An increase in child allowances paid to *all* mothers would affect distribution in two-parent families through the divorce threat effect and through an income effect. Under our assumption that, in the event of divorce, the mother gets the children and the child allowance, both husbands

[2] A survey by McElroy (1981) concludes that there is little empirical support for these restrictions. Lundberg (1988) empirically rejects a simple version of the consensus model as a foundation for the labor supply behavior of husbands and wives.

[3] As McElroy (1990) emphasizes, this dependence of household demands on the external alternatives available to individual family members is a testable implication of the bargaining framework. Empirical evidence consistent with family bargaining has been accumulating. For example, unearned income received by husbands and wives has been shown to have different effects on outcomes such as time allocation and fertility (Schultz 1990) and child health and survival (Thomas 1990).

and wives would be indifferent between a child allowance scheme that paid mothers and one that paid fathers: an increase in child allowances paid to married mothers and a decrease in child allowances paid to married fathers create neither divorce threat effects nor income effects.

While divorce may be the ultimate threat available to both spouses and is a possible destination for marriages in which bargaining has failed, it is not the only possible threat point from which bargaining could proceed.[4] Following a suggestion by Woolley (1988), we consider a noncooperative Cournot-Nash equilibrium within marriage as an alternative threat point.[5] Within an existing marriage, a noncooperative equilibrium corresponds to a utility-maximizing strategy in which each spouse takes the other spouse's strategy as given. Under some circumstances, this equilibrium more accurately represents the outcome of marital noncooperation than does the costly and time-consuming alternative of divorce.

What distinguishes a noncooperative marriage from a pair of independently optimizing individuals? Joint consumption economies are an important source of gains to marriage, and even noncooperative family members enjoy the benefits of household public goods. If individual family members can supply public goods consumed by the entire household, then the noncooperative family equilibrium is analogous to the voluntary provision of public goods model analyzed by Bergstrom, Blume, and Varian (1986). As one might expect, public goods are undersupplied in this noncooperative equilibrium, and there are potential gains to cooperation. Additional gains can be expected if coordination of individual contributions is required for efficient household production. In the absence of cooperation and coordination, the effective quantity of public goods and services such as meals and child care will be less than the amounts that could be produced from the individual contributions. Specialization in the provision of such goods reduces the need for complex patterns of coordination, and traditional gender roles serve as a focal point for tacit division of responsibilities.

Specialization by gender is a pervasive aspect of family life. In the United States, though market work by married women has increased enormously in recent decades, men continue to carry most of the responsibility for earning income in two-parent families, and women continue to carry both the responsibility for and the actual work of

[4] We ignore the threat and the actuality of family violence, although we think that the relationship between family violence and intrafamily distribution deserves more attention. For an interesting discussion, see Tauchen, Witte, and Long (1991).

[5] Because Nash's name is associated with both the cooperative and the noncooperative equilibrium concepts we use, we have tried to avoid the phrase "Nash equilibrium."

supplying household services. Carried to extremes, the traditional division of labor and responsibilities suggests a "separate spheres" equilibrium in the family. When husband and wife each bear the responsibility for a distinct, gender-specific set of household activities, minimal coordination is required because each spouse makes decisions within his or her own sphere, optimizing subject to the constraint of individual resources. If binding, costlessly enforceable agreements regarding transfers can be made prior to marriage, such agreements may involve a "housekeeping allowance" for the wife or "pocket money" for the husband.[6] If binding agreements cannot be made, the level of transfers may be zero, or it may be determined by custom or social norms.

In a noncooperative marriage, a division of labor based on socially recognized and sanctioned gender roles emerges without explicit bargaining. In the separate spheres bargaining model, this voluntary contribution equilibrium is the threat point from which bargaining proceeds. Cooperative bargaining is distinguished by the ability of the players to make binding agreements within marriage.[7] The negotiation, monitoring, and enforcement of such agreements give rise to transaction costs, which may vary over husband-wife pairs. The noncooperative default allocation avoids these costs; the voluntary contribution equilibrium is maintained by social enforcement of the obligations corresponding to generally recognized and accepted gender roles.[8] It will be optimal for couples with high transaction costs or low expected gains from cooperation to remain at the stereotypical noncooperative solution.

The distributional implications of the separate spheres bargaining model differ from those of the divorce threat bargaining model. As Warr (1983) and Bergstrom et al. (1986) have shown, the control of resources among the potential contributors to a public good in a

[6] Pahl (1983) describes four types of financial management in husband-wife households, three of which are consistent with the "separate spheres" equilibrium. Under the "whole-wage" system, one partner, usually the wife, manages all family income and is responsible for all expenditures, except for the personal spending money of the other partner. This system is characteristic of low-income families in Britain and other European countries. Under the "allowance" system, the husband pays the wife a set amount, and she is responsible for specific items of expenditure. With "independent management," separate incomes are used to finance expenditures within each partner's "sphere of responsibility." In all empirical studies cited, these three systems are together more prevalent than the fourth—"shared management."

[7] Caution: We are concerned here with the ability of the spouses to make binding agreements *within* marriage. Their ability to make binding agreements *before* marriage plays a crucial role in determining long-run effects.

[8] This is, of course, a cop-out. By appealing to the social enforcement of gender roles, we beg the question of how "norms" of any type are established and maintained. Elster (1989) and Sugden (1989) discuss this issue and provide references to the literature.

voluntary provision model affects neither the equilibrium level of the public good nor the equilibrium utility levels of the potential contributors, provided that each potential contributor makes a strictly positive contribution. These invariance properties do not hold, however, at corner solutions. In the noncooperative, voluntary contribution equilibrium in the family, gender specialization generates corner solutions, and hence the equilibrium distribution may depend not only on total family resources but also on who controls those resources.

III. Household Public Goods and Bargaining

We first consider distribution within a particular marriage. The preferences of the husband, h, and the wife, w, are represented by the von Neumann–Morgenstern utility functions $U^h(x_h, q_1, q_2)$ and $U^w(x_w, q_1, q_2)$, where x_h and x_w are private goods consumed by the husband and wife, and q_1 and q_2 are household public goods jointly consumed by the husband and wife. Thus we assume that interdependence in the marriage operates only through consumption of the public goods: there is no "altruism" in the sense of interdependent preferences, although it would be a straightforward extension to allow i's utility to depend directly on j's private consumption or j's utility.[9] Cooperative solutions to the family's distribution problem have been extensively analyzed elsewhere. With Nash bargaining, the equilibrium values of x_h, x_w, q_1, and q_2 are those that maximize the product of the gains to cooperation; these gains are defined in terms of a threat point representing the utility each spouse would achieve in the absence of agreement. Figure 1 depicts the threat point, the feasible set, and the Nash bargaining solution in the utility space.[10] An alternative characterization of the Nash bargaining solution is as the point in the feasible set that maximizes a "social welfare function" that depends on the threat point. More precisely, the Nash social welfare function is a symmetric Cobb-Douglas function, where the origin has been translated to the threat point: $N = (U^h - T^h)(U^w - T^w)$. It follows immediately that the utility an individual receives in the Nash bar-

[9] Although child allowances may affect fertility, we ignore this complication. Instead we assume that all marriages produce the same number of children, thereby avoiding the issues of endogenous fertility and stochastic fertility.

[10] Nash (1950) shows that a system of four axioms uniquely characterizes the Nash bargaining solution: Pareto optimality, invariance to linear transformations of individual von Neumann–Morgenstern utility functions, symmetry (i.e., interchanging the labels on the players has no effect on the solution), and what Sen (1970) calls "property α." Luce and Raiffa (1957) call this property "independence of irrelevant alternatives" (except the so-called threat point), but Sen points out that this is not equivalent to Arrow's condition of that name.

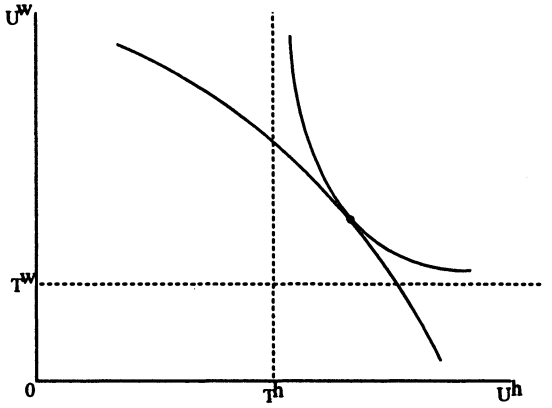

FIG. 1

gaining solution is an increasing function of the utility the individual receives at the threat point: thus, for example, an increase in the threat point utility of h and a decrease in that of w will cause an increase in the Nash bargaining solution utility of h and a decrease in that of w. We write the threat point as $\{T^h(p_1, p_2, I_h, I_w), T^w(p_1, p_2, I_h, I_w)\}$, where $T^i(p_1, p_2, I_h, I_w)$ is the indirect utility function, p_1 and p_2 are the relative prices of the public goods (we assume that the prices of x_h and x_w are equal and we normalize them to one), and I_h and I_w are the exogenous incomes received by husband and wife.[11]

To derive the demand functions for the public and private goods, we maximize the Nash social welfare function

$$N = [U^h(x_h, q_1, q_2) - T^h(p_1, p_2, I_h, I_w)][U^w(x_w, q_1, q_2) - T^w(p_1, p_2, I_h, I_w)]$$

subject to the constraint that joint expenditure equal joint income:

$$x_h + x_w + p_1q_1 + p_2q_2 = I_h + I_w.$$

This yields the demand functions

$$x_i = g^{x_i}(p_1, p_2, I_h, I_w), \quad i = h, w,$$

$$q_k = g^{q_k}(p_1, p_2, I_h, I_w), \quad k = 1, 2.$$

Incomes received by the husband and wife enter these demand functions separately because they affect not only the feasible set but also the threat point. If the threat point depends on other parameters representing the extramarital environment, then these parameters

[11] Instead of treating income as exogenous, we could treat wage rates as exogenous and focus on labor-leisure choices, with leisure as a private good.

will also enter the demand functions of two-parent households. So far we have been silent about the interpretation of the threat point: it could correspond to divorce, to violence or the threat of violence, or to a noncooperative equilibrium within marriage.

A noncooperative marital equilibrium provides an interesting alternative to divorce as a specification of the threat point. If divorce involves substantial transaction costs or can be dominated by sharing public goods within an intact but noncooperative marriage, then the voluntary contribution equilibrium offers a more plausible alternative to divorce as the threat point from which bargaining may proceed. Replacing an "external" threat point with an "internal" one and introducing transaction costs will affect final household allocation in two ways: it will influence cooperative bargaining outcomes via the threat point for each spouse, and it may be an equilibrium allocation in marriages for which transaction costs outweigh the potential gains to cooperation. Until otherwise noted, we assume that divorce is impossible or prohibitively expensive so that the relevant threat point is the noncooperative, voluntary contribution equilibrium within marriage.

We begin with a simple Cournot equilibrium in the provision of public goods by husband and wife, assuming that socially prescribed gender roles assign primary responsibility for certain activities to the husband and others to the wife. The implications of household separate spheres are straightforward; they generate corner solutions and thus nonneutrality in the provision of public goods. We show below how these results are modified when we allow cash transfers or binding premarital agreements between husband and wife.

Suppose that the public good, q_1, falls within the husband's traditional sphere so that, in the absence of a cooperative agreement, the husband decides unilaterally on the level of q_1 consumed by the household. Similarly, suppose that q_2 falls within the wife's sphere. In a noncooperative marriage, husband and wife decide simultaneously on the levels of q_1 and q_2 they will contribute to the household. This exclusive assignment of public goods reflects a socially sanctioned allocation of marital responsibilities and is independent of preference or productivity differences between husband and wife in a particular marriage.[12]

[12] Household production models, on the other hand, explain specialization by gender as a response to pervasive and persistent differences in home and market productivities of the husband and wife in a particular marriage, while recognizing that these individual productivity differences may reflect past investments in specific human capital. Average differences in preferences or productivities may help to explain the evolution of gender roles, but individuals take gender roles and gender role expectations as given.

The husband chooses x_h and q_1 to maximize $U^h(x_h, q_1, \bar{q}_2)$ subject to $x_h + p_1 q_1 = I_h$, where $\bar{q}_2$ is the level of public good chosen by the wife. This decision leads to a set of "reaction functions,"

$$x_h = f^{x_h}(p_1, I_h, \bar{q}_2),$$
$$q_1 = f^{q_1}(p_1, I_h, \bar{q}_2).$$

Similarly, the wife's demand functions for (x_w, q_2) will depend on $\bar{q}_1$. The Cournot equilibrium is determined by the intersection of the public goods demand functions. For a simple example, consider the Klein-Rubin-Stone-Geary utility functions:

$$U^h = \alpha_h \log(x_h - x'_h) + \beta_h \log(q_1 - q'_{1h}) + (1 - \alpha_h - \beta_h)\log(q_2 - q'_{2h}),$$

$$U^w = \alpha_w \log(x_w - x'_w) + \beta_w \log(q_2 - q'_{2w}) + (1 - \alpha_w - \beta_w)\log(q_1 - q'_{1w}).$$

Because these utility functions are separable, the reaction functions are independent of the quantity of the public good provided by the spouse, and demands take a very simple form:

$$x_h = x'_h + \alpha_h I^*_h, \quad q_1 = q'_{1h} + \frac{\beta_h}{p_1} I^*_h,$$

$$x_w = x'_w + \alpha_w I^*_w, \quad q_2 = q'_{2w} + \frac{\beta_w}{p_2} I^*_w,$$

where I^*_h and I^*_w are the husband's and wife's supernumerary or discretionary expenditures, which are defined as

$$I^*_h = I_h - x'_h - p_1 q'_{1h},$$
$$I^*_w = I_w - x'_w - p_2 q'_{2w}.$$

Substituting the reaction functions into the direct utility functions yields indirect utility functions of the form $V^h_0(p_1, p_2, I^*_h, I^*_w)$ and $V^w_0(p_1, p_2, I^*_h, I^*_w)$. The husband's utility depends on the resources of his wife through his consumption of "her" public good, and vice versa.

In the separate spheres model with a Cournot threat point, the alternative child allowance schemes imply different household allocations: the noncooperative equilibrium depends on the individual resources of husband and wife and, thus, on which parent receives the child allowance payment. A change in child allowance policy that affects the threat point will also affect the cooperative equilibrium. Thus distribution between men and women in two-parent families can be affected by policy changes that have no effect on the relative well-being of divorced men and women.

This nonneutrality result is sensitive to our assumptions. If the model is altered by removing the separate spheres assumption, then

household allocation will be invariant to changes in the child allowance policy whenever positive contributions to each public good are made by both husband and wife. If the model is altered by allowing additional mechanisms for reallocation between spouses, such as cash transfers or binding premarital agreements, then household allocation will be invariant under some conditions. We examine these two modifications in the next version of the model, in which the wife specializes in the provision of a single household public good, q, which we describe as child services, and the husband specializes in the provision of money income, some portion of which he may transfer to his wife.

In the model with transfers, we assume that the process determining the distribution of the marital surplus occurs over two periods. In period 1, marriage contracts are made. When these contracts are made, the parties do not know the actual values of individual incomes, I_h and I_w, though the distributions from which they are drawn are common knowledge to all marriage market participants. We assume that prospective couples can make binding, costlessly enforceable, prenuptial agreements that specify a minimum transfer, t, which will be paid from husband to wife in period 2. The agreed minimum transfer cannot be contingent on future income realizations;[13] it may be voluntarily augmented by the husband in period 2 or may be superseded by cooperative bargaining. If binding agreements are not possible, then all marriages that form will be based on a contractual transfer level of zero, although all marriage market participants recognize that voluntary supplementary transfers may be made in period 2. We discuss marriage market effects in Sections IV and V.

In period 2, husband's and wife's incomes are realized and the husband may voluntarily make a supplementary transfer, $s > 0$, in order to increase his consumption of q. We suppose that the husband acts first, choosing x_h and s to maximize $U^h(x_h, q)$ subject to the budget constraint $x_h = I_h - t - s$ and the wife's reaction function $q(s)$. The wife takes the husband's supplementary transfer as given and chooses x_w and q to maximize $U^w(x_w, q)$ subject to $x_w + pq = I_w + t + s$, where p is the relative price of child services. Consider the case of Klein-Rubin-Stone-Geary utility:

$$U^h = \alpha_h \log(x_h - x_h') + (1 - \alpha_h)\log(q - q_h'),$$

$$U^w = \alpha_w \log(x_w - x_w') + (1 - \alpha_w)\log(q - q_w'),$$

[13] There will be no marital bargaining in period 2 if complete contingent contracts can be made in the marriage market.

where, to simplify the algebra, we assume that $q'_h = q'_w = q'$.[14] The discretionary expenditures of each spouse are given by

$$I^*_h = I_h - x'_h,$$

$$I^*_w = I_w - x'_w - pq'.$$

The supplementary transfer to the wife will be positive when

$$I^*_h - t > \alpha_h(I^*_h + I^*_w).$$

When $s > 0$,

$$x_h = x'_h + \alpha_h(I^*_h + I^*_w),$$

$$x_w = x'_w + \alpha_w(1 - \alpha_h)(I^*_h + I^*_w),$$

$$q = q' + \left[\frac{(1 - \alpha_w)(1 - \alpha_h)}{p}\right](I^*_h + I^*_w),$$

yielding indirect utility functions (and threat points) of the form $V^i(p, I^*_h + I^*_w)$. If the equilibrium is one in which positive supplementary transfers are made from husband to wife, then the value of the noncooperative solution to each spouse depends only on the total resources of the family, and not on the separate sources of income. Redistributions from husband to wife will be offset dollar for dollar by adjustments in the supplementary transfer, s.

If the realizations of I_h and I_w are such that the condition for positive supplementary transfers is not met, however, individual incomes affect the noncooperative equilibrium. If $s = 0$, the husband spends his entire uncommitted income, $I_h - t$, on his private good, x_h, and the wife allocates her total income, $I_w + t$, to her private good and child services. The utilities corresponding to this voluntary contribution equilibrium are

$$V^h_0(p, I^*_h - t, I^*_w + t), \quad V^w_0(p, I^*_w + t).$$

In the separate spheres bargaining model with transfers, the alternative child allowance schemes have identical effects if supplementary transfers are positive when the child allowance is paid to the mother. But if the family is at a corner solution—that is, if $s = 0$ when the child allowance is paid to the mother—then the threat point will be affected by which parent receives the payment.[15]

[14] Allowing q'_h and q'_w to differ complicates the algebra but does not substantially alter the results.

[15] Nonneutrality at corner solutions also occurs in Becker's altruist model, although corner solutions in the two models have different interpretations.

It is straightforward to apply the separate spheres bargaining model in a household production framework and to allow husband and wife to have different productivities in producing the public good. With constant returns to scale and no joint production, this is equivalent to assuming that the husband can purchase the public good at a different (presumably higher) price than the wife. Ignoring coordination problems, let the total amount of child services consumed by the couple be $q = q_h + q_w$, where q_h is purchased by the husband at a price p_h and q_w is purchased by the wife at a price p_w. There are now two ways in which the husband can influence his own consumption of child services in a noncooperative household: he can influence his wife's resources through supplementary transfers and he can purchase child services directly.

Under our assumptions about the wife's utility function, the husband faces a constant "price" of purchasing the public good via supplementary transfers, namely $(1 - \alpha_w)/p_w$. Hence, except in a razor's edge case the husband will not simultaneously make positive supplementary transfers and direct purchases of the public good, but will choose the method with the lower price. If the noncooperative equilibrium is such that $q_h > 0$ and $q_w > 0$, redistribution between husband and wife will be neutral only if they face the same price for the public good. In a cooperative household, all child services will be purchased by the wife at the lower price.

We can relax our earlier assumption that divorce is impossible or prohibitively expensive and modify our analysis to recognize that, for some marriages, divorce is the relevant threat point. When both divorce and noncooperative marriage are possible outcomes, the relevant threat point will depend on the utility possibilities associated with these states and on the institutional rules governing divorce.[16] The separate spheres model can be interpreted as the case in which the voluntary contribution marriage is Pareto superior to divorce, so that neither spouse can convincingly threaten divorce; hence, the voluntary contribution equilibrium is the relevant threat point for the bargaining game. On the other hand, if both spouses prefer divorce

[16] One approach would be to assume that, at the beginning of the cooperative bargaining game, both spouses recognize that if they fail to reach an agreement, they will play a noncooperative game. Institutional rules must specify the outcome of the noncooperative game when one spouse prefers the voluntary contribution equilibrium within marriage. If unilateral, no-fault divorce is permitted, then divorce is the outcome unless both parties choose a voluntary contribution marriage. If, on the other hand, the rules permit divorce only with the consent of both spouses, then a voluntary contribution marriage will eventuate unless both spouses choose divorce. The expected utility for each spouse in this noncooperative postgame is the threat point for cooperative bargaining.

to any noncooperative marriage, then divorce is the relevant threat point. In general, the recognition that divorce is the relevant alternative for some marriages attenuates the link between child allowances and intrafamily distribution. When divorce is the threat point, the two child allowance schemes we consider have identical distributional effects.

IV. Marriage Markets with Binding Agreements

As Becker has emphasized, the marriage market is an important determinant of intrahousehold distribution. Bargaining within a marriage is limited to the "surplus" generated by that marriage and thus depends on the alternatives available outside the marriage. If there are no information, search, or contracting problems, then a continuous distribution of preferences and traits in the population implies that distribution within marriage will be completely determined in the marriage market; there is no surplus to be bargained over in any particular marriage, because the next-best marriage is just as good. Stapleton (1990) provides a careful analysis of this extreme case.

If marriage market participants are heterogeneous, surpluses depend on the matching of men and women. Matching models (see Mortensen 1988; Roth and Sotomayor 1990) provide an analytical framework for investigating equilibrium or stable assignments of men to women in the marriage market, and such models typically possess multiple equilibria. Search costs further complicate the analysis of marriage market equilibria (see Mortensen 1982*a*, 1982*b*, 1988). Becker (1973, 1974*a*, 1974*b*, 1981) was among the first to recognize the relationship between distribution within marriage and "assortative mating" in marriage markets. Lam (1988) analyzes the effect of household public goods on marriage patterns and shows how different assumptions yield results very different from those predicted by Becker.

The noncooperative distribution of household resources described in the previous section will depend on the value of the transfer, t, determined in the marriage market. To analyze the short-run effects of a new child allowance scheme (i.e., its effect on distribution in existing marriages), it was appropriate to take the value of this transfer as predetermined. In the long run, however, new marriages will form taking the new policy into account. In this section we show that, when prospective couples can make binding, costlessly enforceable prenuptial agreements about the minimum level of transfers, a "Ricardian equivalence" result emerges: new marriages will completely offset the effects of any change in the child allowance scheme.

In our model, a marriage contract specifies a transfer that is not

contingent on the realized values of income. We denote the marriage of female i to male j by the pair (i, j) and the transfer that the male is obliged to make to the female by t_{ij}; a negative value of t_{ij} thus implies a transfer from female i to male j. We denote a marriage contract by (i, j, t_{ij}).

A marriage market structure is a set of marriage contracts: $S = \{(i, j, t_{ij})\}$. Both female i and male j evaluate a prospective marriage contract (i, j, t_{ij}) in terms of the expected utility associated with it; this utility can depend on attributes of the spouse as well as on consumption of the private good and the public good. To calculate expected utility, the expectation is taken over the joint distribution of incomes and transaction costs facing the pair (i, j). The reduced-form expected utility functions can be written as $V^i(i, j, I_{0i} + t_{ij}, I_{0j} - t_{ij})$ and $V^j(i, j, I_{0i} + t_{ij}, I_{0j} - t_{ij})$, where I_{0i} and I_{0j} are the noncontingent components of female and male income.

Child allowances can be easily introduced into the model. If a child allowance, a, is paid to the husband, then the reduced-form utility functions are $V^i(i, j, I_{0i} + t_{ij}, I_{0j} + a - t_{ij})$ and $V^j(i, j, I_{0i} + t_{ij}, I_{0j} + a - t_{ij})$. If the child allowance is paid to the wife, then the reduced-form utility functions are $V^i(i, j, I_{0i} + a + t^*_{ij}, I_{0j} - t^*_{ij})$ and $V^j(i, j, I_{0i} + a + t^*_{ij}, I_{0j} - t^*_{ij})$, where t^*_{ij} is the transfer from the husband to the wife when the wife receives the child allowance.

In the long run the marriage market can undo any short-run distributional effects achieved by paying child allowances to wives rather than to husbands. That is, the set of equilibrium marriage market structures is independent of the child allowance scheme. When the child allowance is paid to wives rather than to husbands, the marriage market structure with the same pairing of women and men, but with transfers from men to women reduced by the amount of the child allowance, is an equilibrium. With binding transfers, therefore, the distributional effect of a policy changing the recipient of child allowances will persist only within marriages in existence at the time of the policy change. For subsequent generations of marriages, adjustments in prenuptial transfers will exactly offset the shift in child allowances. This Ricardian equivalence result, of course, depends on the assumption that prospective couples in the marriage market can make binding, costlessly enforceable agreements.

V. Marriage Markets without Binding Agreements

Even without binding agreements, the requirements of equilibrium in the marriage market can generate substantial differences between the short-run and the long-run effects of child allowances. In this

section we focus on a simple special case to illustrate the range of long-run outcomes that are consistent with our model. We assume that all individuals live as adults for two periods. In the first period everyone participates in the marriage market. Those who do not marry in the first period remain unmarried in the second period. Those who marry in the first period remain married in the second period; divorce is impossible or prohibitively costly. We assume that the only differences among individuals are differences in the utility associated with remaining unmarried: all men have identical (nonstochastic) incomes, and all women have identical (nonstochastic) incomes. Distribution within marriage is determined by bargaining, and since divorce is ruled out, the threat point is a noncooperative marriage. We assume that the representative marriage is at a corner solution with respect to supplementary transfers, so that a change from the child allowance scheme that pays fathers to the scheme that pays mothers will increase the utility of married women and decrease the utility of married men.

Under our assumptions that all women are identical except in the utility of remaining unmarried and that all men are identical except in the utility of remaining unmarried, the utilities associated with a particular marriage—say (i, j)—are independent of i and j. Individuals contemplating marriage can compare the utility of the representative marriage with the utility of remaining unmarried. Since all marriages are identical, the only function of the marriage market is to determine which individuals marry and which individuals remain unmarried.

To analyze equilibrium in the marriage market, we introduce a function $G^w(U^w)$ showing the number of women for whom the utility of being unmarried is less than or equal to the utility of being married, U^w; $G^h(U^h)$ is the corresponding function for men. The value of the function $G^w(U^w)$ is, of course, the number of women willing to marry when the utility of married women is U^w.

Instead of focusing on just two child allowance schemes—one paying fathers and the other paying mothers—we can consider a continuum of child allowance schemes in which a portion of the child allowance is paid to mothers and the remainder to fathers. We denote the child allowance payment to mothers by γa and the payment to fathers by $(1 - \gamma)a$. Thus if $\gamma = 0$, the entire child allowance, a, is paid to the father; if $\gamma = \frac{1}{2}$, the child allowance is divided equally between the parents; and if $\gamma = 1$, the entire child allowance is paid to the mother.[17]

[17] Values of γ outside the interval [0, 1] correspond to imposing a lump-sum tax on one spouse and paying the child allowance plus the lump-sum tax to the other spouse. To avoid invoking lump-sum taxes, we confine ourselves to values of γ in the interval [0, 1].

We now use γ to reparameterize the "willingness to marry" functions, $G^w(U^w)$ and $G^h(U^h)$. Because U^w is an increasing function of γ, we can define a new function $G^{*w}(\gamma)$ by $G^{*w}(\gamma) = G^w(U^w(\gamma))$; $G^{*w}(\cdot)$ is an increasing function of γ (more precisely, a nondecreasing function of γ). Similarly, $G^{*h}(\cdot)$ is a decreasing (more precisely, nonincreasing) function of γ. The number of marriages corresponding to various values of γ is given by $N = \min\{G^{*w}(\gamma), G^{*h}(\gamma)\}$.

There are three interesting cases, illustrated in figure 2*A*, *B*, and *C*, distinguished by whether women or men are in short supply in the marriage market at various values of γ. In case *A*, $G^{*w}(\ )$ is less than $G^{*h}(\ )$ for all γ in the interval [0, 1], so that more men than women wish to marry. A change from the child allowance scheme that pays fathers to one that pays mothers will increase the utility of married women and decrease the utility of married men; such a change will also increase the number of marriages, because the number of women willing to marry is the binding constraint under both child allowance schemes. Individuals who were unmarried under the old scheme and marry under the new scheme experience a welfare gain.

In case *B*, $G^{*h}(\ )$ is less than $G^{*w}(\ )$ for all γ in the interval [0, 1]. In this case, the number of men willing to marry is the binding constraint at both endpoints of the interval. Shifting the child allowance payment toward mothers will increase the utility of married women and decrease the utility of married men; such a shift will also decrease the number of marriages. Individuals who were married under the old scheme but remain unmarried under the new scheme will experience a welfare loss.

In case *C*, the curves $G^{*h}(\ )$ and $G^{*w}(\ )$ intersect at some value γ^* in the interval [0, 1]. There is, however, no mechanism to drive γ to γ^* because individuals cannot make binding agreements in the marriage market. In case *C*, the effect on the number of marriages of a change from the child allowance scheme that pays fathers to the one that pays mothers is indeterminate: as we have drawn the curves, the number of marriages is the same under both child allowance schemes.

This section has analyzed long-run implications for distribution between spouses when binding agreements cannot be made in the marriage market in a very restrictive special case. Even when all individuals of the same gender are perfect substitutes in the marriage market and differ only in the reservation utility for marriage, the range of possible outcomes is very wide. This suggests to us the impossibility of obtaining strong general results. Although there is much to be said for models that allow additional heterogeneity among individuals and, hence, assortative mating, such models are likely to be consistent with an even wider range of possible outcomes.

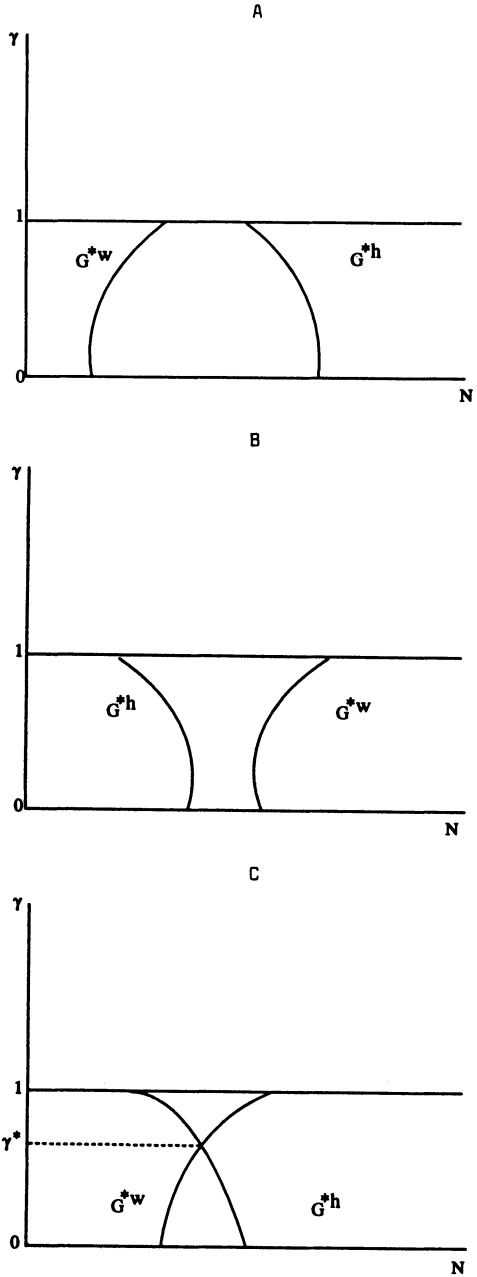

FIG. 2

VI. Conclusion

In this paper we have introduced the separate spheres bargaining model, a new model of distribution within marriage. To compare the separate spheres model with the leading economic models of distribution within marriage—Becker's altruist model and the Manser-Brown/McElroy-Horney divorce threat bargaining model—we have emphasized the distributional implications of alternative child allowance schemes that differ only in their treatment of two-parent families. Under one scheme, payments go to the father; under the other, they go to the mother; under both schemes, in the event of divorce, the mother gets the children and the child allowance. In the altruist model and the divorce threat bargaining model, these alternative child allowance schemes imply identical distributions between mothers and fathers in two-parent families. In the separate spheres bargaining model, these schemes can imply different distributions.

The separate spheres bargaining model, like the divorce threat bargaining model, views marriage as a cooperative game. The separate spheres model differs from the divorce threat model in its specification of the threat point. In the separate spheres model, the threat point is a noncooperative equilibrium within marriage defined in terms of traditional gender roles and gender role expectations. Because the child allowance schemes can imply different noncooperative equilibria, they can imply different distributions in two-parent families.

Any redistribution between women and men resulting from the choice of one child allowance scheme rather than the other may be transitory. If binding, costlessly enforceable, prenuptial agreements can be used to specify transfers within marriage, then the marriage market will undo any redistribution. If, on the other hand, binding prenuptial agreements are impossible, then the choice of one child allowance scheme rather than the other can have long-run effects on distribution in two-parent families. We show, however, that even without binding agreements, the requirements of equilibrium in the marriage market can generate long-run results that differ substantially from short-run results.

Bargaining models of marriage have almost invariably treated marriage as a cooperative game, and our separate spheres bargaining model follows this tradition. Recent advances in noncooperative bargaining theory provide an alternative approach: specifying the bargaining process as a sequence of moves and a corresponding information structure, and analyzing it as a game in extensive form. Rubinstein (1982) analyzes a bargaining game in which the players take turns making offers and shows that a class of alternating offer

games have unique, subgame perfect equilibria. Binmore, Rubinstein, and Wolinsky (1986) show that the Nash bargaining solution, a standard axiomatic solution concept for cooperative games, can be reinterpreted as the solution to a noncooperative alternating offer game if the threat point is suitably interpreted. On the basis of these results, we might reinterpret the Nash bargaining solution to our separate spheres bargaining model as the solution to a specific noncooperative bargaining game.[18]

We have two reservations regarding this approach. First, we doubt that marriage is best formulated as an alternating offer game. Solutions to extensive form games are sensitive to the details of their specifications, and this particular extensive form game does not seem to capture the essential features of marital bargaining. Second, we have doubts about whether marriage is best formulated as a noncooperative game: cooperative game theory may provide a more fruitful framework for analyzing distribution between spouses. Discussing cooperative games, Shubik (1989, p. 103) writes as follows:

> The game in extensive form provides a process account of the detail of individual moves and information structure; the tree structure often employed in its description enables the researcher to keep track of the full history of any play of the game. This is useful for the analysis of reasonably well-structured formal process models where the beginning, end and sequencing of moves is well-defined, but is generally not so useful to describe complex, loosely structured social interaction.

It is difficult to think of many better examples of a "complex, loosely structured social interaction" than marriage.

References

Becker, Gary S. "A Theory of Marriage: Part I." *J.P.E.* 81 (July/August 1973): 813–46.

———. "A Theory of Marriage: Part II." *J.P.E.* 82, no. 2, pt. 2 (March/April 1974): S11–S26. (*a*)

———. "A Theory of Social Interactions." *J.P.E.* 82 (November/December 1974): 1063–93. (*b*)

———. *A Treatise on the Family.* Cambridge, Mass.: Harvard Univ. Press, 1981; enl. ed., 1991.

Bergstrom, Theodore C. "A Fresh Look at the Rotten Kid Theorem—and Other Household Mysteries." *J.P.E.* 97 (October 1989): 1138–59.

[18] Kanbur and Haddad (1994) apply the results of Binmore et al. (1986) to the analysis of intrahousehold allocation.

Bergstrom, Theodore C.; Blume, Lawrence; and Varian, Hal. "On the Private Provision of Public Goods." *J. Public Econ.* 29 (February 1986): 25–49.

Binmore, Ken; Rubinstein, Ariel; and Wolinsky, Asher. "The Nash Bargaining Solution in Economic Modelling." *Rand J. Econ.* 17 (Summer 1986): 176–88.

Brown, Joan C. *Family Income Support Part 2: Children in Social Security.* Studies of the Social Security System, no. 3. London: Policy Studies Inst., 1984.

Crawford, David L., and Pollak, Robert A. "Child Care Policy." Manuscript. Philadelphia: Univ. Pennsylvania, 1989.

Elster, Jon. "Social Norms and Economic Theory." *J. Econ. Perspectives* 3 (Fall 1989): 99–117.

Johnson, David S. "Team Behavior in the Family: An Analysis of the Rotten Kid Theorem." Manuscript. Washington: Bur. Labor Statis., 1990.

Kanbur, Ravi, and Haddad, Lawrence. "Are Better off Households More Unequal or Less Unequal: A Bargaining Theoretic Approach to 'Kuznets Effects' at the Micro Level." *Oxford Econ. Papers* (1994), in press.

Lam, David. "Marriage Markets and Assortative Mating with Household Public Goods: Theoretical Results and Empirical Implications." *J. Human Resources* 23 (Fall 1988): 462–87.

Luce, R. Duncan, and Raiffa, Howard. *Games and Decisions: Introduction and Critical Survey.* New York: Wiley, 1957.

Lundberg, Shelly. "Labor Supply of Husbands and Wives: A Simultaneous Equations Approach." *Rev. Econ. and Statis.* 70 (May 1988): 224–35.

McElroy, Marjorie B. "Appendix: Empirical Results from Estimates of Joint Labor Supply Functions of Husbands and Wives." In *Research in Labor Economics,* vol. 4, edited by Ronald G. Ehrenberg. Greenwich, Conn.: JAI, 1981.

———. "The Empirical Content of Nash-Bargained Household Behavior." *J. Human Resources* 25 (Fall 1990): 559–83.

McElroy, Marjorie B., and Horney, Mary Jean. "Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand." *Internat. Econ. Rev.* 22 (June 1981): 333–49.

Manser, Marilyn, and Brown, Murray. "Marriage and Household Decision-making: A Bargaining Analysis." *Internat. Econ. Rev.* 21 (February 1980): 31–44.

Mortensen, Dale T. "The Matching Process as a Noncooperative Bargaining Game." In *The Economics of Information and Uncertainty,* edited by John J. McCall. Chicago: Univ. Chicago Press (for NBER), 1982. (*a*)

———. "Property Rights and Efficiency in Mating, Racing, and Related Games." *A.E.R.* 72 (December 1982): 968–79. (*b*)

———. "Matching: Finding a Partner for Life or Otherwise." *American J. Sociology* 94 (suppl., 1988): S215–S240.

Nash, John F. "The Bargaining Problem." *Econometrica* 18 (April 1950): 155–62.

Pahl, Jan. "The Allocation of Money and the Structuring of Inequality within Marriage." *Sociological Rev.* 31 (May 1983): 237–62.

Pollak, Robert A. "A Transaction Cost Approach to Families and Households." *J. Econ. Literature* 23 (June 1985): 581–608.

Roth, Alvin E., and Sotomayor, Marilda A. Oliveira. *Two-sided Matching: A Study in Game-Theoretic Modeling and Analysis.* Cambridge: Cambridge Univ. Press, 1990.

Rubinstein, Ariel. "Perfect Equilibrium in a Bargaining Model." *Econometrica* 50 (January 1982): 97–109.

Samuelson, Paul A. "Social Indifference Curves." *Q.J.E.* 70 (February 1956): 1–22.

Schultz, T. Paul. "Testing the Neoclassical Model of Family Labor Supply and Fertility." *J. Human Resources* 25 (Fall 1990): 599–634.

Sen, Amartya. *Collective Choice and Social Welfare.* San Francisco: Holden-Day, 1970.

Shubik, Martin. "Cooperative Games." In *The New Palgrave, Game Theory,* edited by John Eatwell, Murray Milgate, and Peter Newman. New York: Norton, 1989.

Stapleton, David C. "Implicit Marriage Markets with Collective Goods." Manuscript. College Park: Univ. Maryland, 1990.

Sugden, Robert. "Spontaneous Order." *J. Econ. Perspectives* 3 (Fall 1989): 85–97.

Tauchen, Helen V.; Witte, Ann D.; and Long, Sharon K. "Domestic Violence: A Nonrandom Affair." *Internat. Econ. Rev.* 32 (May 1991): 491–511.

Thomas, Duncan. "Intra-Household Resource Allocation: An Inferential Approach." *J. Human Resources* 25 (Fall 1990): 635–64.

Warr, Peter G. "The Private Provision of a Public Good Is Independent of the Distribution of Income." *Econ. Letters* 13, nos. 2–3 (1983): 207–11.

Woolley, F. "A Non-cooperative Model of Family Decision Making." Manuscript. London: London School Econ., 1988.