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BARGAINING POWER IN MARRIAGE: EARNINGS, WAGE RATES AND HOUSEHOLD PRODUCTION

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ABSTRACT

What determines bargaining power in marriage? This paper argues that wage rates, not earnings, determine well-being at the threat point and, hence, determine bargaining power. Observed earnings at the bargaining equilibrium may differ from earnings at the threat point because hours allocated to market work at the bargaining solution may differ from hours allocated to market work at the threat point. In the divorce threat model, for example, a wife who does not work for pay while married might do so following a divorce; hence, her bargaining power would be related to her wage rate, not to her earnings while married. More generally, a spouse whose earnings are high because he or she chooses to allocate more hours to market work, and correspondingly less to household production and leisure, does not have more bargaining power. But a spouse whose earnings are high because of a high wage rate does have more bargaining power. Household production has received little attention in the family bargaining literature. The output of household production is analogous to earnings, and a spouse's productivity in household production is analogous to his or her wage rate. Thus, in a bargaining model with household production, a spouse's productivity in home production is a source of bargaining power.

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1. Introduction

What determines bargaining power in marriage? This paper examines the roles of nonlabor income, earnings, wage rates, household production, and productivity in household production.

Nonlabor income has played a crucial role in testing the traditional "unitary model" of the family and, for this reason, has received more attention in the bargaining literature than warranted by its importance in family budgets. In the unitary model, married couples maximize a family utility function subject to a family budget constraint. The unitary model implies that husbands and wives "pool" their nonlabor income: that is, a couple's expenditure pattern depends on their total nonlabor income, but not on the fractions of this total controlled by the wife and by the husband. This implication is testable. Empirical evidence shows that couples' expenditure patterns depend not only on their total nonlabor income but also on the fractions controlled by each spouse. This evidence has been crucial in undermining economists' commitment to the traditional unitary model.

Bargaining models explain why control over nonlabor income affects couples' expenditure patterns. Consider a cooperative Nash bargaining model, which is the dominant model in the family bargaining literature. In a Nash bargaining model each spouse's well-being in the cooperative equilibrium is an increasing function of his or her well-being at the "threat point." In virtually all bargaining models of marriage, an increase in a spouse's nonlabor income increases his or her well-being at the threat point and, hence, increases that spouse's well-being at the cooperative equilibrium. Thus, we can identify a spouse's "bargaining power" with his or her well-being at the threat point.

The specification of the threat point differs from one bargaining model to another. For example, in divorce threat models the threat point is the well-being of the spouses in the event of divorce, while in separate spheres models the threat point is the spouses' well-being in a noncooperative equilibrium within marriage. In both divorce threat and separate spheres models, however, an increase in nonlabor income implies an increase in well-being at the threat point and, hence, an increase in bargaining power.

Unlike the connection between nonlabor income and bargaining power, which is clear and certain, the connection between earnings and bargaining power is opaque and ambiguous. Those who treat earnings as an indicator of bargaining power typically make two mistakes. First, they assume that earnings at the observed cooperative equilibrium are a good proxy for earnings at the unobserved threat point. Second, they assume that earnings at the threat point are an indicator of well-being at the threat point.

Wage rates, not earnings, determine well-being at the threat point and, hence, determine bargaining power. A spouse whose earnings are high because he or she chooses to allocate more hours to market work, and correspondingly less hours to household production and leisure, does not have more bargaining power. But a spouse whose earnings are high because of a high wage rate does have more bargaining power.

The logic of this analysis applies to household production as well. The household production model postulates that households "combine time and market goods to produce more basic commodities that directly enter their utility functions" (Becker [1965]). The commodities that are produced within the household are analogous to earnings, while a spouse's productivity

in household production is analogous to a wage rate.[1] Thus, a spouse who produces more commodities because he or she allocates more hours to home production, and correspondingly less hours to market work and leisure, does not have more bargaining power. But a spouse who produces more commodities because he or she is highly productive does have more bargaining power.

Section 2 discusses both unitary and bargaining models of intrafamily allocation. I begin with the Nash bargaining model, which is the solidly-entrenched incumbent in the family bargaining literature. The tractability of the Nash bargaining model is an important advantage, but its assumption that bargaining necessarily leads to a Pareto-efficient outcome is a serious drawback. Some alternative models drawn from noncooperative game theory do not impose Pareto efficiency. Section 3 discusses the meaning of "bargaining power" in Nash bargaining models and in other models of intrafamily allocation. Section 4 is a brief conclusion.

2. Intrafamily Allocation

Economists' traditional models of family behavior are "unitary" -- families are assumed to maximize a utility function subject to a budget constraint. Samuelson [1956], in a throw-away section in his classic paper on "Social Indifference Curves," identified the problem with unitary models. The "Dr. Jekyll and Mrs. Jekyll" problem, as Samuelson called it, arises because individuals within families have preferences, and aggregating individuals' preferences into family preferences is a social choice problem subject to the difficulties identified and analyzed by Arrow [1950, 1951].

[1] As I explain in section 3.3, this analogy is imperfect because productivity in household production is typically a function of time and other inputs allocated to household production, while the wage rate is typically assumed to be independent of the time allocated to market work.

Intrafamily allocation models can be grouped into four classes, some containing numerous subclasses. The first class consists of three models proposed by Gary Becker, two of which imply that families behave as if they were maximizing a family utility function subject to a family budget constraint. The second class contains Chiappori's "collective model" and its generalizations. Chiappori assumes that family behavior is efficient, but he does not assume that the family maximizes a utility function, nor does he specify a particular model of family bargaining. The third class consists of cooperative bargaining models. Following the pioneering work of Manser and Brown [1980] and of McElroy and Horney [1981] in the early 1980s, cooperative bargaining models have come to play a central role in the analysis of family behavior. The fourth and final class, noncooperative bargaining models, are playing an increasing role in family economics; unlike cooperative bargaining models, noncooperative bargaining models accommodate the possibility that at least some families sometimes behave inefficiently.

2.1. Becker's Models of Intrafamily Allocation

Becker's *Treatise on the Family* [1981; enlarged ed, 1991] offers three distinct models of intrafamily allocation; I provide an abbreviated discussion here and an extended discussion in Pollak [2003]. In Becker's altruist model, one family member -- characterized in Pollak [1988] as the "husband-father-dictator-patriarch" -- maximizes his utility subject to the family's resource constraint and to the participation constraint that no family member be worse off than he or she would be outside the family. Becker assumes that the altruist derives some utility from the utility of other family members, so maximizing the altruist's utility need not drive other family members to their reservation utility levels. The altruist model is observationally equivalent to an

"ultimatum game" in which the altruist is the proposer who can confront other family members with take-it-or-leave-it choices.

Becker's analysis of the marriage market rests on an entirely different model of intrafamily allocation. Becker's marriage market model assumes that prospective spouses can make binding agreements regarding allocation within marriage. Thus, allocation within marriage implements agreements made in the marriage market, leaving no scope for bargaining within marriage. The standard "individual rationality" assumption implies that no prospective spouse would agree to accept less than he or she would receive in the next best marriage. These two assumptions rule out bargaining within marriage, and imply that allocation within marriage is determined in the marriage market, either by competition or by bargaining between prospective spouses. If Becker's marriage market contains a large number of men and women; if men and women meet prospective spouses with high frequency; and if the marriage market is dense in the sense that (i) for each man, there are many similar men and (ii) for each woman, there are many similar women; then competition rather than bargaining in the marriage market determines intrafamily allocation.

Becker's third model assumes that intrafamily allocation is efficient but does not specify a particular model of intrafamily allocation. This Coasian efficiency assumption is especially powerful in conjunction with additional assumptions (e.g., transferrable utility) that allow the separation of household production from consumption. Together, these assumptions enable Becker to analyze household production independently of intrafamily allocation.

2.2. Chiappori's Collective Model

Chiappori's collective model, Chiappori [1988, 1992], characterizes intrafamily allocation by a single-valued, Pareto-efficient "sharing rule" that is assumed to satisfy certain regularity conditions. The sharing rule can be regarded as the reduced form of an unspecified bargaining model. As such, it provides a convenient device for bracketing the discussion of intrafamily allocation in order to focus on other issues. For example, Lundberg and Pollak [2003] use the sharing rule in this way in their discussion of the two-earner couple location problem and Pezzin, Pollak, and Schone [2004] use it in their discussion of the provision of long-term care by adult children for disabled elderly parents. In both cases, intrafamily allocation is modeled as a two-stage game in which the second-stage subgame is not specified, but whose solution is described by a single-valued Pareto-efficient sharing rule.

The assumption that family behavior can be characterized by a Pareto-efficient sharing rule, although it has important advantages, has two significant limitations. First, because the collective model does not specify a particular bargaining model or class of bargaining models, it offers no guidance for choosing which variables to include in the sharing rule as determinants of bargaining power. Second, as Lundberg and Pollak [2003] argue, unless family members can make binding agreements, the assumption that bargaining outcomes are efficient is implausible for major decisions that affect future bargaining power.

2.3. Cooperative Bargaining Models

Cooperative bargaining models in general, and the Nash bargaining model in particular, have become the standard tool for analyzing intrafamily allocation. I begin with a version of the Nash bargaining model with three components: (i) a feasible set in the utility space, (ii)

reservation utilities for each family member, and (iii) a "threat point" that reflects family members' bargaining power. In the original Nash bargaining model, Nash [1950], the reservation utilities and the threat point coincide. In virtually all bargaining models of marriage, reservation utilities are assumed to correspond to divorce. If the reservation utility constraints are not binding, then modified Nash bargaining implies an allocation that maximizes the product of the gains to cooperation, measured in utility, subject to the family's resource constraint. More precisely, the Nash product function is given by: $N = (U^h - U^{*h})(U^w - U^{*w})$, where U^h and U^w denote the utilities of the husband and wife and (U^{*h}, U^{*w}) is the threat point. Figure 1 illustrates the Nash bargaining model when the reservation utility constraints are not binding.

FIGURE 1 GOES ABOUT HERE

In the bargaining models of marriage originally proposed by Manser and Brown [1980] and by McElroy and Horney [1981] the threat point and the reservation utilities coincide with each other and correspond to the utility of divorce. Thus, the threat point in these models is external to the marriage. In contrast, in the "separate spheres" model of Lundberg and Pollak [1993], the threat point is internal to the marriage and corresponds to a "noncooperative marriage." Lundberg and Pollak model the noncooperative marriage as a voluntary contribution game in which spouses allocate some of their resources to provide household public goods.[2] Bergstrom [1996] characterizes the noncooperative marriage as "harsh words and burnt toast."

Compared with divorce threat models, separate spheres models have two advantages. First, even in societies that allow divorce, the threat of divorce may not be credible: everyday issues such as which television program to watch and what to have for dinner seem unlikely to

[2] Woolley [1988] appears to have been first to use a noncooperative Cournot-Nash equilibrium within marriage as the threat point in a bargaining model.

be resolved by divorce threat bargaining. Second, in some societies that allow divorce, it is so rare that it is implausible that the threat of divorce is a primary determinant of allocation within marriage. For example, according to Stone [1990, Table 13.1], even after the 1857 Divorce Act which substantially liberalized divorce law in England and Wales, the number of divorces per year remained under 1000 until the First World War.[3]

In a society that forbids divorce, the divorce threat model provides no insight into allocation in marriage. In a society in which couples have limited access to divorce, such as England and Wales before the First World War, the divorce threat model provides very limited insight into allocation in marriage. Even in a society in which divorce is readily available and the divorce threat model describes allocation in many marriages, alternative models may provide a better description of allocation in other marriages.

Bargaining models of marriage have emphasized Nash bargaining and neglected other cooperative bargaining models and solution concepts. For example, although Manser and Brown considered both the Nash and the Kalai-Smorodinsky [1975] bargaining solutions, subsequent work on bargaining in families has virtually ignored Kalai-Smorodinsky. Gugl [2004] provides an interesting exception, considering both the Nash and Kalai-Smorodinsky bargaining solutions. Her work suggests that the difficulty of doing comparative statics with Kalai-Smorodinsky may account for its eclipse by the Nash bargaining solution. The generalized Nash bargaining solution -- a solution concept that does not impose Nash's symmetry axiom -- has also received

[3]The population of England and Wales in 1911, three years before the First World War, was approximately 36 million.

little attention.[4] The core, despite its prominence in game theory, has received almost no attention as a solution concept in the economics of the family, perhaps because it does not yield a unique solution in two-person games.[5]

2.4. Noncooperative Bargaining Models

Noncooperative bargaining models assume that family members are restricted to self-enforcing agreements -- agreements that self-interested family members would choose to implement. Cooperative bargaining models, in contrast, assume that all agreements are enforceable and thus place no restrictions on the agreements that family members can reach. Cooperative models assume that bargaining always leads to Pareto-efficient outcomes and, hence, cooperative models can shed no light on the conditions that lead to efficiency. Indeed, the most serious drawback of cooperative bargaining models is their inability to investigate the conditions that determine whether bargaining will lead to efficient outcomes. Noncooperative bargaining models, because they can generate inefficient as well as efficient outcomes, enable us to investigate efficiency.

The threshold difficulty in using noncooperative game theory to model family interactions is the absence of formal rules. In contrast to tightly-structured interactions such as auctions or alternating-offer games, family bargaining exemplifies the class of "...complex, loosely-structured social interaction," a phrase I have borrowed from Shubik [1989]. Shubik's concern is the general problem of using noncooperative game theory to model interactions that

[4] Nash's axioms are Pareto efficiency, invariance to linear transformation of individuals' von Neumann-Morgenstern utility functions, symmetry (i.e., interchanging the labels on the players has no effect on the solution), and a contraction consistency condition.

[5] A further difficulty with the core is that in games with more than two players it may be empty.

lack formal structure, not the specific problem of modeling family interactions. Shubik's point is that we can avoid the need to specify the rules by modeling complex, loosely-structured social interactions as cooperative games. A major objection to using cooperative game theory to sidestep the difficulty of specifying the rules of the game -- an objection Shubik ignores -- is that cooperative game theory assumes Pareto efficiency.

Noncooperative game theory also leads to difficulties. The threshold difficulty is specifying family interactions as a particular game from the lengthy menu offered by noncooperative game theory. One-shot games are familiar and easy to analyze: some have only inefficient equilibria, others have only efficient equilibria, and still others have both inefficient and efficient equilibria. Multiple equilibria raise the issue of equilibrium selection. But apart from illustrating these well-known possibilities, one-shot games teach us little about ongoing family interactions.

Repeated games -- games in which the same "stage game" is played over and over again -- are more promising. The folk theorem asserts that if the players are sufficiently patient, then all feasible, individually-rational allocations are subgame perfect equilibria of the repeated game. That is, repeated games typically have very large solution sets and, if players are sufficiently patient, such games have many Pareto-efficient equilibria as well as many Pareto-inefficient equilibria. Thus, unless we are willing to tolerate very large solution sets, equilibrium selection becomes the crucial issue. If we accept the Coasian assumption that bargaining leads to Pareto-efficient outcomes and if we assume that the Pareto-efficient equilibrium is unique, we are close to Chiappori's single-valued, Pareto-efficient sharing rule. Alternatively, we might argue that cooperative bargaining models provide a framework for analyzing which efficient outcome will

be selected. But even this does not argue for a particular solution concept such as the Nash bargaining solution. In the context of bargaining in marriage, Lundberg and Pollak [1994] consider a repeated game in a stationary environment -- the voluntary contribution game is the stage game which is played over and over. For many everyday issues -- which television program to watch, what to have for dinner -- repeated games provide plausible models. Repeated games, however, do not provide satisfactory models for major issues whose resolution will affect future bargaining power.

For big, up-front decisions that affect future bargaining power, two-stage models are both plausible and tractable. For example, Lundberg and Pollak [2003] analyze the "two-earner couple location game." The first stage determines whether the couple remains together and, if they do, determines their location; the second stage determines allocation within marriage. This second-stage allocation is assumed to be "conditionally efficient," that is, efficient given the location determined in the first stage. Distribution in the second stage depends on bargaining power, and bargaining power depends on the location chosen in the first stage. The crucial assumption is that at the first stage family members cannot commit themselves to refrain from exploiting bargaining advantages they gain from the first-stage decision. Lundberg and Pollak show that, when the spouses cannot make binding commitments, the first-stage decision may be an inefficient location or an inefficient divorce.

Two-stage games are not necessarily two period games. For example, the two-earner couple location game analyzed by Lundberg and Pollak consists of a first-stage noncooperative game that, for some first-stage moves, leads to a repeated game. More specifically, the repeated game arises if the husband and wife decide to remain together, either at the original location or at

a new location. Although the second-stage game can be interpreted as the reduced form of a repeated game, Lundberg and Pollak finesse the specification of the second-stage game by assuming that it has a unique, Pareto-efficient solution and invoking a Chiappori sharing rule.

Two-stage games are also analyzed by Konrad and Lommerud [2000], by Lundberg [2002], and by Pezzin, Pollak, and Schone [2004]. In Konrad and Lommerud, potential spouses overinvest in education at first stage to gain a bargaining advantage in the second stage. Lundberg [2002] analyzes a game in which earnings in the first stage determine bargaining power in the second. In the context of bargaining in families, in contrast to bargaining in marriage, Pezzin, Pollak, and Schone [2004] model interactions among adult children who bargain about caring for a disabled elderly parent. The first stage determines living arrangements (e.g., which child coresides with the parent, or whether the parent lives in a nursing home). The second stage determines intrafamily transfers. Pezzin, Pollak, and Schone assume it is common knowledge that the second-stage allocation is conditionally Pareto efficient (i.e., Pareto efficient given the living arrangement determined in the first stage). Even with this assumption, however, the equilibrium of the two-stage game need not be Pareto efficient: the living arrangement is a big up-front decision that affects future bargaining power (e.g., of the child who lives with the parent vis-à-vis the other children), and the children cannot (or will not) make binding agreements. For example, if the child who coresides with the disabled elderly parent will be disadvantaged in future bargaining with her siblings, then no child may be willing to co-reside with the parent. As a result, the parent may move into a nursing home, even though she and all of the children would prefer that she live with one of the children with all of the other children making side payments to support that living arrangement. In the absence of binding

agreements, however, coresidence with an adult child may not be an equilibrium -- indeed, the nursing home may be the unique equilibrium of the two-stage game even though it is Pareto inefficient.

Three examples illustrate the wide range of potential applications of two-stage games when binding agreements are not feasible and big up-front decisions affect future bargaining power. (i) Human capital investments, whether made before or during marriage, increase wage rates and thus affect bargaining power within marriage. Under a wide range of assumptions, this can lead to inefficient investment in human capital. (ii) Marriage itself is a big, up-front decision that affects future bargaining power. Unless we follow Becker's marriage market model and assume that prospective spouses can make binding agreements regarding allocation within marriage, inefficient matching or inefficient nonmatching may occur in the marriage market equilibrium. Lundberg and Pollak [1993] analyze a simple marriage-market model that illustrates this possibility. (iii) Fertility is also a big, up-front decision that affects future bargaining power. A husband's promise to share equally in child care is unenforceable and, recognizing this, a couple may have fewer children than both spouses would prefer.

In dynamic games, actions in each period affect bargaining power in subsequent periods.[6] Thus, two-stage games are the simplest dynamic games.[7] In repeated games, actions in one period have no effect on bargaining power in subsequent periods, so repeated games are not dynamic games. A human capital example clarifies the distinction between two-stage games and other dynamic games. A dynamic game is required to model the continuing effect of on-the-job skill accumulation on wage rates and future bargaining power. A two-stage game adequately

[6] Aura [2003] and Lich-Tyler [2003] analyze family bargaining as a dynamic game.
[7] We treat games that take the form of a noncooperative game followed by a repeated game as two-stage games.

models the once-and-for-all "sheepskin" effect of a college degree on future wage rates and bargaining power.

3. Bargaining Power

To operationalize bargaining models requires specifying the empirical counterpart of "bargaining power." For example, in the Nash bargaining model we must specify the variables that determine the threat point. This section discusses three important components of bargaining power: exogenous nonlabor income, wage rates, and productivity in household production.

3.1. Exogenous Nonlabor Income

The family bargaining literature has emphasized nonlabor income far beyond its importance in family budgets because of its importance in testing the unitary model. The key insight is that maximizing a family utility function subject to a family budget constraint implies that all family nonlabor income is pooled: lump-sum transfers between spouses that leave a couple's total nonlabor income unchanged have no effect on expenditure patterns or, more generally, on behavior. Tests of the hypothesis that married couples pool their nonlabor income have provided compelling evidence against the unitary model.

The earliest attempts to test the unitary model were not based on pooling, but emerged from traditional demand analysis and were based on the Slutsky conditions. Because the Slutsky conditions are restrictions on the partial derivatives of demand functions, tests based on Slutsky conditions depend critically on functional form specification. Hence, any rejection of the unitary model can be attributed to misspecification of the functional form of the demand system rather than to the failure of the unitary model. Revealed preference tests avoid this difficulty because they do not require the specification of a particular functional form, but revealed preference tests

lack statistical power.

Recent attempts to test the unitary model have focused on the pooling of nonlabor income. For example, using Brazilian data, Thomas [1990] found that children did better in terms of mortality and morbidity when their mothers controlled a larger fraction of the couple's nonlabor income. Schultz [1990] found that female labor supply in Malaysia was sensitive to which spouse controlled nonlabor income. Both of these studies provide evidence that control over nonlabor income affects behavior -- that is, both studies reject pooling and, hence, reject the unitary model. The Achilles heel of these studies and others that use observed differences across couples in control of nonlabor income is the assumption that nonlabor income is exogenous. For example, if brighter or more energetic wives or wives with a greater labor force attachment are likely to control a larger fraction of the couple's nonlabor income, then the test is confounded. A controlled experiment providing additional resources to husbands in some families and to wives in others would avoid these difficulties. In the absence of controlled experiments, we turn first to a thought experiment and then to a natural experiment.

Lundberg and Pollak [1993] describe a thought experiment that highlights the pooling implications of the unitary model. They consider a child allowance -- a government transfer payment to families with children that is independent of family earnings and income. The thought experiment begins by assuming that initially the child allowance is paid to fathers in two-parent families, and then considers the effect of a policy change that switches the payment to mothers. The child allowance provides a transparent example of an exogenous change in control over resources.

Changes in the British child allowance program in the late 1970s provide a natural

experiment. The changes, introduced in stages over a two year period, had the effect of transferring substantial resources from husbands to wives in two-parent families. Lundberg, Pollak, and Wales [1997] analyze the effects of these changes on the expenditure patterns of British households, and find that the changes caused a substantial and significant increase in expenditure on children's clothing relative to men's clothing, and on women's clothing relative to men's clothing. Ward-Batts [2003], using disaggregated expenditure data, found that the changes caused a substantial and significant change in the composition of tobacco expenditure: an increase in expenditure on cigarettes, and a decrease in expenditure on cigars and pipe tobacco, which she calls "men's tobacco." The results of the changes in the British child allowance provide evidence against the unitary model by providing convincing evidence against what economists have come to call the "pooling hypothesis."

Because the meaning of "pooling" differs across disciplines, economists, sociologists, and taxation experts sometimes misunderstand one another. For economists pooling is a property of demand functions or demand systems. In nonunitary models, we can write a couple's demand for a particular good as a function of the nonlabor income of the husband, the nonlabor income of the wife, and a vector of wages and other prices. Unitary models are a special case of nonunitary models in which the husband's nonlabor income and the wife's nonlabor income enter only as a sum, so that a transfer of a dollar from the husband to the wife does not alter the couple's expenditure pattern. Economists describe such couples as "pooling" their nonlabor income.

For sociologists pooling refers to the way couples manage their money -- for example, whether a couple has one bank account (theirs), two bank accounts (his and hers), or three bank

accounts (his, hers, and theirs). Sociologists such as Pahl [1983], Treas [1993] and Zelizer [1989, 1994] find considerable heterogeneity in families' money management practices. It is unclear, however, whether economists should regard such practices as independent variables that can be used to explain differences in expenditure patterns, or as dependent variables that require explanation. Woolley [2003] discusses money management practices and related issues and provides references to the literature.

For academic lawyers who study taxation, pooling refers to the equitable sharing of resources within marriage. McIntyre [1980, 1997] uses the assumption that spouses pool resources in this sense as a rationale for joint taxation (i.e., taxing couples on their total earnings rather than taxing the husband on his earnings and the wife on her earnings). McIntyre's argument appears to require interpreting pooling to mean equal sharing of money income and ignoring leisure, household production, and economies of scale in consumption. Under these assumptions, horizonal equity requires equal taxes for a two-earner couple in which both spouses earn $X and a one-earner couple in which one spouse earns $2X and the other $0.

Nonlabor income provides a good starting point for discussing the components of bargaining power, but earnings is a far larger fraction of the resources of most couples. Nonlabor income and earnings play very different roles in family bargaining, and the differences are not econometric quibbles. I now turn to the roles of earnings and wage rates.

3.2. Earnings and Wage Rates

Although some researchers have attempted to test the pooling hypothesis using measures

of income that include earnings, such tests are inappropriate for two reasons.[8] Both reasons are best illustrated in a Nash bargaining framework where the threat point is a noncooperative equilibrium, either divorce or a noncooperative equilibrium within marriage. First, observed earnings -- that is, earnings at the observed cooperative equilibrium -- are a poor proxy for earnings at the unobserved noncooperative equilibrium. The difficulty is exemplified by the stay-at-home spouse. Suppose, for example, a wife does not work in the market at the cooperative equilibrium, but would work in the market at the noncooperative equilibrium; her lack of earnings at the cooperative equilibrium fails to predict her earnings at the noncooperative equilibrium. Hence, even if bargaining power depended on earnings at the noncooperative equilibrium, the wife's earnings at the cooperative equilibrium would fail to predict her bargaining power.[9]

Second, bargaining power does not depend on earnings at the noncooperative equilibrium. In the standard neoclassical model, earnings are the product of hours worked and an individual's wage rate. A decision to allocate more hours to market work (as opposed to leisure) at the noncooperative equilibrium has no determinate effect on bargaining power, but a higher wage rate does translate into greater bargaining power.

Two further complications require acknowledgment. First, if an individual's hourly wage rate depends on the number of hours worked, then well-being at the threat point and, hence, bargaining power, depend on the entire wage schedule. That is, suppose an individual's earnings, Y, are a function of hours worked in the market, t_m: $Y = Y(t_m)$. If the earnings function shifts

[8]Lundberg and Pollak [1996] discuss some of these attempts and provide references to the literature.

[9] Instead of using the hourly wage rate, we could equally well use "full-time earnings" -- that is, the hourly wage rate multiplied by a standard number of hours (e.g., 40). But using full earnings is essentially equivalent to using the hourly wage rate and very different from using actual earnings.

out, so that earnings are greater for every choice of hours worked, $Y^*(t_m) \geq Y(t_m)$, for all $t_m > 0$, then well-being at the threat point and, hence, bargaining power will be greater.[10] Second, if workers acquire human capital on the job, so that hours worked today affect the wage rate tomorrow or, more generally, affect the wage schedule tomorrow, then these human capital effects require a dynamic model. Both of these complications have analogues in the context of household production.

The original divorce threat models of Manser-Brown and McElroy-Horney emphasized the role of market wage rates. The more recent literature on intrafamily allocation has emphasized nonlabor income and child allowances, both as expositional devices and because they lead to empirical tests of the unitary model. An unintended and unfortunate byproduct of this emphasis on nonlabor income and child allowances has been neglect of wage rates and confusion about their role. Having dispelled that confusion, I now consider a richer class of household models in which individuals allocate their time among market work, leisure, and household production.

3.3. Household Production

Household production affects the threat point in divorce threat and separate spheres bargaining through different mechanisms. In both divorce threat and separate spheres bargaining models, however, once the threat point is specified the calculation of the cooperative equilibrium and the corresponding allocation of goods and time is conceptually straightforward.

[10]Neoclassical economics focuses on the special case in which $Y(t_m) = w\, t_m$, where the individual's market wage rate, w, is independent of hours worked. In the neoclassical case, the market wage rate is a sufficient statistic for the earnings function and an increase in w implies that $Y^*(t_m) \geq Y(t_m)$ for all $t_m > 0$.

In divorce threat bargaining, the threat point depends on the technologies available to the spouses individually following divorce. Thus, a spouse who has low productivity in household production (e.g., because he or she lacks the requisite human capital) will be disadvantaged in bargaining within marriage unless (a) the goods market offers satisfactory substitutes for the outputs of household production or (b) the economic and psychological costs of divorce are small, and remarriage offers the prospect of readily finding a new spouse whose household production skills replace those of the previous spouse.

In separate spheres bargaining, the threat point depends on the technologies available to the spouses in a noncooperative marriage. Separate spheres bargaining is more complicated than the divorce threat bargaining in two respects. First, in separate spheres bargaining to calculate the threat point requires specifying not only the technology available to the couple in a noncooperative marriage but also specifying the noncooperative game they play. In that noncooperative game, each spouse presumably allocates his or her own time among three activities, {market labor, household production, and leisure}, and allocates his or her own resources, {nonlabor income + earnings}, between private consumption and expenditures on inputs into household production. Second, in separate spheres bargaining the reservation utilities and the threat point are distinct. The reservation utilities require no additional discussion because they coincide with the threat point in divorce threat bargaining.

Greater productivity in household production gives an individual greater bargaining power. More precisely, an outward shift in the production frontier, indicating that greater output is obtainable from every combination of inputs, implies greater bargaining power. An outward

shift in the production frontier is analogous to an outward shift in the earnings function.

The repeated game in which spouse play a one-shot household production game over and over as a stage game allows punishment much as the repeated voluntary contribution game of Lundberg and Pollak [1994] allows punishment. Embedding household production in a repeated game provides a Coasian rationale for the belief that family bargaining leads to efficient outcomes. The folk theorem guarantees that, provided family members are sufficiently patient, every individually-rational allocation is a subgame perfect equilibrium. The folk theorem, however, does not address the problem of equilibrium selection or imply that the equilibrium will be Pareto efficient. The assumption that the stage game remains unchanged from one period to the next is also problematic. Time allocation in one period may affect human capital in subsequent periods: just as the wage rate may depend on past labor supply, productivity in household production may depend on past household production.

Punishment always raises issues of credibility. At the threat point in separate spheres bargaining with household production, each spouse is likely to hold back inputs into the production of household public goods and private goods that enter the utility function of the other spouse. Such behavior is analogous to holding back voluntary contributions to the purchase of household public goods in separate spheres bargaining without household production. The scope for a "slow down" or "strike" in the production of private goods that enter the utility function of the other spouse may be greater than in the production of household public goods because the spouse producing the public goods also consumes them. That is, withholding private goods that benefit only the other spouse (e.g., toast) is more credible than withholding public goods (e.g., neglecting the child). Nancy Folbre [2001], in her book, *The Invisible Heart*,

makes this point, suggesting that a spouse who engages in "caring labor" may become a "prisoner of love" unwilling to withhold household production.[11]

4. Conclusion

The recent family bargaining literature has emphasized exogenous nonlabor income (e.g., child allowances) because it provides a straightforward test of the unitary model. But that literature has deemphasized, indeed virtually ignored, earnings and wage rates. In this paper I have argued that bargaining power depends not on earnings but on wage rates. I have also argued that, in a bargaining model with household production, bargaining power depends on a spouse's productivity in household production.

To illustrate why wages affect bargaining power and earnings do not, consider a cooperative Nash bargaining model such as the divorce threat or separate spheres model. There are two difficulties with earnings. First, earnings at the observed cooperative equilibrium may be a poor indicator of earnings at the unobserved threat point. Earnings, after all, are the product of hours allocated to market work and a wage rate, and hours allocated to market work at the threat point may differ from hours allocated to market work at the cooperative equilibrium. For example, in the divorce threat model, a stay-at-home spouse may seek market work. Second, earnings at the threat point may be a poor indicator of well-being at the threat point which, after all, is the basis of bargaining power.

Behavioral economics does provide a rationale for recognizing a role for actual earnings in family bargaining, either instead of or in addition to wage rates. Perhaps spouses maintain "mental accounts" that relate consumption by each spouse to that spouse's actual earnings. Such

[11] Medea, to revenge herself on her husband Jason, killed their joint children, but she is generally regarded as a poor role model.

mental accounts might be associated with and reinforced by money management systems in which spouses maintain separate credit cards or bank accounts.[12] If actual earnings affect bargaining power, then the allocation of time to market work presumably reflects the effect of earnings on bargaining power as well as the familiar trade-offs among market work, leisure, and household production. Thus, whatever the behavioral economics case for treating actual earnings as a determinant of bargaining power, analytical simplicity is not among them.

The role of household production in family bargaining has received little attention. I have argued that household production is analogous to earnings, and a spouse's productivity in household production is analogous to a wage rate. In separate spheres bargaining, household production raises one additional complication: the credibility of the threat to refuse to engage in household production. As Folbre [2001] suggests, spouses who are "prisoners of love" may be unwilling to withhold the household public and private goods they produce from a spouse or a child.

[12]On behavioral economics, see Kahneman [2003]; on mental accounting, see Thaler [1985, 1999]; on money management, see Woolley [2003].

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Figure 1

The Nash Bargaining Solution