November 15, 2004

GENDER AND SAY
A Model of Household Behavior with Endogenously-determined Balance of Power

Kaushik Basu

Department of Economics
Cornell University
Ithaca, NY 14853
and
Department of Economics
Harvard University
Cambridge, MA 02138
Email: kbasu@fas.harvard.edu

Abstract

The evidence that the same total income can lead a household to choose different consumption vectors, depending on who brings in how much of the income, has led to an effort to replace the standard unitary model of the household with the 'collective model', which recognizes that the husband and the wife may have different preferences and depending on the balance of power between them the household may choose differently. One weakness of this new literature is that it fails to recognize that the household's choice could in turn influence the balance of power. Once this two-way relation between choice and power is recognized we are forced to confront some new questions concerning how to model the household. This paper tries to answer these by defining a 'household equilibrium', examining its game-theoretic properties and drawing out its testable implications. It is shown, for instance, that once we allow for dynamic interaction a household can exhibit inefficient behavior, and that (for a certain class of parameters) children will be less likely to work in a household where power is evenly balanced, than one in which all power is concentrated in the hands of either the father or the mother. The paper also draws out the implications for female labor supply.

Keywords: Gender, Power, Household behavior, Female labor supply, Child labor
JEL classification numbers: D13, J22, C70.

Acknowledgements: The author is grateful to Chris Barrett, Alaka Basu, Francois Bourguignon, Nancy Chau, Amanda J. Felkey, Dragan Filipovich, Patrick Francois, Karla Hoff, Ravi Kanbur, Rachel Kranton, Valerie Lechene, Dilip Mookherjee, Omar Robles, and Erik Thorbecke for useful discussions and to three anonymous referees for detailed comments and suggestions. The paper has also benefited from seminar presentations at Columbia University, M.I.T., Cornell University, University of Maryland at College Park, Virginia Tech and Boston University.

GENDER AND SAY

A Model of Household Behavior with Endogenously-determined Balance of Power

1. Introduction

The unitary model of the household, which had served mainstream economics well for a long time, has in recent times given way to a more fractious view of the household. This has been an outcome of theoretical advances, empirical investigations and anthropological insights.[1] It is, for instance, clear that how much say a woman has in the household can vary across households in the same region and with the same total income; and this could depend, for example, on how much income she contributes to the household's total income.

This recognition has enormous implications for the design of policy. It means that 'how' a certain amount of money is injected by government into households can influence the well-being of individuals significantly. Ten dollars given to the male head of the household and the same money given to his wife can have very different implications for not only the amount of tobacco and alcohol purchased by the household but on child labor, education and health (Kanbur and Haddad, 1995). When a series of policy changes in the United Kingdom (see Walker and Zhu, 1999 for description) from 1976 to 1979 caused the household allowance for children to be handed over to the women, instead of men, there was a rise in the expenditure on children's clothings

---

[1] Manser and Brown (1980); McElroy and Horney (1981); Folbre (1986); Mencher (1988); Sen (1983, 1990); Thomas (1990); Bourguignon and Chiappori (1994); Browning, Bourguignon, Chiappori and Lechene (1994); Moehling (1995); Udry (1996); Agarwal (1997); Riley (1997); Haddad, Hoddinott and Alderman (1997); Basu (1999); Ligon, Thomas and Worrall (2000); Haller (2000).

(Lundberg, Pollak and Wales, 1997; for related accounts, see Hoddinott and Haddad, 1995, and Quisumbing and Maluccio, 1999).[2] However to go from this broad recognition to the actual design of policy one needs to understand the relation between household balance of power and household behavior. There is now a substantial literature on this, some of which was cited in footnote 1 above.

It will be argued in this paper that there is one important lacuna in this new theoretical literature. While this literature models successfully the impact of household power balance on household decision making, it tends to ignore the opposite relation – that is, the effect of household decisions on the balance of power.[3] Modeling both these relations, simultaneously, requires some theoretical inventiveness, as we shall show presently. This demonstration forms the core of this paper. The next section recapitulates the received doctrine and develops the central idea of this paper.

Treating this as the core, the paper goes on to allow for the realistic possibility that the decisions that a household takes may influence the household's balance of power with a certain time lag. This is especially so because the story being told here is not one of negotiation and agreement but the natural and maybe even unwitting influence of certain decisions on one's power. The decision taken by a traditional household to send the woman out to work would in all likelihood affect the woman's power, but this

[2] For a survey of how micro credit may have contributed to the empowerment of women in Bangladesh, see Rahman (2000).

[3] There are a few recent exceptions to this, such as Lundberg and Pollak (2003), Adam, Hoddinott and Ligon (2003) and Iyigun (2002). These papers take up specific examples of decisions which have a feedback on the structure of power.

happens gradually. So section 3 goes on to adapt the basic model of the next section to one in which there are time-lags involved.

The remaining sections are best viewed as corollaries – they develop special cases, draw out the implications of this approach for different areas of economics, such as female labor supply and child labor, and suggest new directions for empirical research. It is shown, for instance, that one consequence of endogenizing power is that it can lead to multiple equilibria in female labor supply. Two societal equilibria, one in which women work and one in which they do not, can arise from fundamentals (for example, preferences, technology and wages) which are identical.

2. Household Decision Making: The Main Model

Consider a household with two adults. There may or may not be children in the household. In the standard "unitary model" of the household, either both adults have the same preference or one of them takes all the decisions. In any case the upshot is that the household behaves *as if* it were a single or a unitary agent (Becker, 1981).

One way of capturing the fact that a household may see cooperation among its members but nevertheless be fractious is to adopt the "collective approach" to modeling the household. This begins with the recognition that each agent – the woman (1) and the man (2) – has a distinct utility function and the household maximizes a weighted average of these two functions, with the weights capturing the balance of power in the household.

To develop the model formally, let $u_i : \Re_+^n \to \Re$ be agent i's utility function, where $\Re$ is the set of real numbers. The argument $x \in \Re_+^n$ of the utility function is a vector of n goods consumed by the household. We can think of a 'good' in very general terms. It includes, for instance, leisure consumed by each person. We also have the option to think of apples for person 1 as a separate good from apples for person 2.

The household's maximand, in this "collective approach" is then given by $\Omega \equiv \theta u_1(x) + (1-\theta)u_2(x)$, where $\theta \in [0,1]$ captures the balance of power in the household. As θ increases, the power of the wife increases.[4]

It is recognized in this model that θ may in turn, depend on other variables. If, for instance, the wage rate for female workers rises, θ may rise. If the wife brings a lot of inherited wealth into the household, θ could be higher. In general, we allow **2** to be a function of prices and wage rates. If this were not the case, the collective model would be behaviorally indistinguishable from the unitary model.

The value of θ may also depend on cultural factors. Let z be the variables which determine θ. Hence, we may write the power function as θ(z). In the collective model z consists of variables exogenous to the household. This innocuous assumption will be challenged shortly[5]. But let us go along with it for now.

The household's problem can now be written very simply as follows:

---

[4] This is, of course, a simplifying assumption. The power of a woman, like status, is a multi-dimensional concept and in a larger study there would be a compelling case for distinguishing different varieties of it. A woman may have ‘access’ to resources in the household, without having any ‘control’; a woman may have a lot of power in the kitchen, but little outside (see Mason, 1986, for discussion).

[5] The second National Family Health Survey, 1998-99, in India has a wealth of information on female autonomy. A preliminary look at the data suggests that a sharp rise in female autonomy occurs if the female happens to be self-employed. Since the self-employment is the result of deliberate decision, this fact lends support to the claim, made below, regarding the endogeneity of θ.

$$\text{Max } \theta(z)u_1(x) + (1-\theta(z))u_2(x)$$

$$\text{subject to } x \in \Re^n_+ \text{ and } px \le Y$$

where p is the vector of prices and Y the total potential income of the household[6]. From now on we will refer to the budget set as T. Hence,

$$T = \{x \in \Re^n_+ \mid px \le Y\}$$

With Y and p remaining the same, a household's expenditure pattern can change if z changes, causing a shift in the balance of power.

An important shortcoming of this model is the assumption that z consists of exogenous variables. There is reason to believe that θ may get affected by changes in the household's choice, x. One variable that is widely acknowledged to be a determinant of θ in the woman's earning power. In the existing literature (see, for instance, Bourguignon and Chiappori, 1994; and Moehling, 1995) this is captured by the prevailing market wage for female workers, w_1. Hence θ is taken to be determined by (among other things) w_1.

It is however arguable that what determines the woman's bargaining power is not just the female wage rate but what she actually earns. Thus, if e_1 is the number of hours the woman works, then, according to this view, θ depends on w_1e_1. Since e_1 will typically be a variable the household chooses (that is, it is a part of x), θ gets influenced by the household's decision.[7] This creates some obvious difficulties in modeling

[6] That is, Y is the income that would occur if everybody worked all the time.

[7] In Basu, Narayan and Ravallion (2002) we allowed for a more general kind of endogeneity, whereby a person can share one's literacy with other members of the household to enhance their income and household power, and found corroboration for the theory in the behavior of households in Bangladesh.

household behavior since we need some technique for taking account of this feedback effect.

This theoretical problem cannot be overlooked because it seems eminently reasonable to suppose that whether or not θ depends on the wage rate *per se*, it must also depend on what the woman in the household actually earns. A traditional woman whose social norms prevent her from working surely has less power than a woman who actually works, despite the fact that both may be living in the same region and so confronting the same market wage rate w_1. There is also some anthropological and sociological evidence (see, for example, Mencher, 1988; Riley, 1997) that a woman's actual contribution to the household budget influences how much say she has in household decision making. In other words, even if it is the woman's working in the household or the household farm or her taking responsibility for caring work that enables her husband to go out and earn a wage, she will not have as much power as she would if she did the actual earning herself (see the evidence from Karnataka, India, provided by Desai and Jain, 1994; see also Blumberg and Coleman, 1989).[8] It is worth noting, however, that the general model developed here would remain valid whether a woman's outside work increased her power or *decreased* it. The basic feature of the model that follows is that it allows for feedback from decision to power.

To keep the model as general as possible at this stage, assume that θ depends not just on z but also on x. Hence, we may write $\theta = \theta(z,x)$.

---

[8] As Zelizer (1994, p.140) notes in the context of American labor, "No matter how hard they worked or how much their families depended on their labors, women's housework was defined—and valued—as an emotional task, but hardly of material import."

The household's maximand, as before, is:

$$\Omega(x) = \theta u_1(x) + (1-\theta)u_2(x) \tag{1}$$

The problem now is that θ itself depends on x. So if for a *given* balance of power index, θ, the household maximizes Ω and chooses x, this may in turn cause θ to change. So the household may want to adjust x further.

A natural 'equilibrium' idea (see Basu, 1999), is the stationary point of this process. To define this formally, let us first describe the solution to the household's maximization problem as $x = \eta(p,Y,\theta)$. In other words,

$$\eta(p, Y, \theta) \equiv \arg\max_{x \in T}[\theta u_1(x) + (1-\theta)u_2(x)]$$

Here is our crucial definition of how a household behaves in equilibrium.

Definition. Given (p,Y,z), a *household equilibrium* is an index of power, θ^*, and a vector of goods, x^*, such that $\theta^* = \theta(z, x^*)$, and $x^* = \eta(p,Y,\theta^*)$.

Hence, given the exogenous variables p, Y and z, if we want to predict how a household will behave, we have to identify the household equilibrium (θ^*, x^*). The household's behavior is given by x^* and its balance of power is given by θ^*. Of course, there may be more than one equilibrium. This is discussed in section 4. An alternative, game-theoretic interpretation of household equilibrium occurs in the next section.

The first question that needs to be answered before we venture to examine the properties of household behavior is whether and under what circumstances a household equilibrium exists. It will be shown that some fairly standard assumptions turn out to be sufficient to guarantee existence.

Theorem 1. Assume (i) $\theta(z,x)$ is continuous in x, (ii) u_i is strictly concave, continuous and satisfies vector-dominance (i.e. $x > x' \rightarrow u_i(x) > u_i(x')$) and (iii) $Y > 0$ and $p >> 0$. Given these assumptions there must exist a household equilibrium.

Proof. Assume (i) – (iii) are valid. It will, first, be shown that f is a function (rather than a correspondence).

Let $x, x' \in T = \left\{\hat{x} \in \Re^n_+ \middle| p\hat{x} \leq Y\right\}$; and let $\lambda \in (0,1)$.

$$\begin{aligned}\Omega(\lambda x + (1-\lambda)\, x') &= \theta u_1(\lambda x + (1-\lambda)x') + (1-\theta)u_2(\lambda x + (1-\lambda)x') \\ &> \theta[\lambda u_1(x) + (1-\lambda)u_1(x')] + (1-\theta)[\lambda u_2(x) + (1-\lambda)u_2(x')], \\ &\qquad \text{since } u_i \text{ is strictly concave} \\ &= \lambda\Omega(x) + (1-\lambda)\Omega(x').\end{aligned}$$

This shows that Ω is strictly concave. Since u_1 and u_2 are continuous, Ω is continuous. Hence Ω must achieve a maximum at some unique value of x in the domain T. This establishes that $\eta(p,Y,\theta)$ is a function; and, with p and Y fixed, we can think of it as a function on the domain [0,1].

Fix the values of z, p and Y.

We shall define the mapping

$$\phi : T \times [0,1] \rightarrow T \times [0,1]$$

to be a *response function* if, for all $(x,\theta) \in T \times [0,1]$, $\phi(x,\theta) \equiv (x', \theta')$ is such that $x' = \eta(p,Y,\theta)$ and $\theta' = \theta(z,x)$.

Given Assumption (iii), $T \neq \phi$. Hence, $T \times [0,1]$ is non-empty and compact. By Assumption (i), θ is continuous. It is obvious that f is continuous in θ. Hence, ϕ is a continuous function. By Brouwer's fixed point theorem, there exists (x^*, θ^*) such that $\phi(x^*,\theta^*) = (x^*, \theta^*)$.

It is easy to verify that a fixed point of the response function constitutes a household equilibrium. ||

With the formal model and results behind us, we are now in a position to explore the implications of our model of household behavior in various special contexts. The purpose of the immediate next section is to consider not just an interesting special case but also to study the game-theoretic foundations of the household equilibrium. It is possible and some readers may prefer to skip directly to section 4.

3. Game-Theoretic Interpretation of Household Equilibria

Two natural modifications worth introducing in the above model are, first, dynamics and, second, some game-theoretic considerations in identifying equilibrium behavior patterns. Both these are attempted in this section and it is shown that equilibrium behavior identified through such an exercise has interesting connections with the 'household equilibrium' discussed in section 2.

It seems reasonable to assume that empowerment is not an instantaneous event. A woman used to being dominated in the household is unlikely to become powerful immediately if the circumstantial conditions change in her favor. The process needs time. This seems more plausible with the collective approach, as distinct from the Nash bargaining model of the household, in which the outcome is a direct consequence of a bargain based on the threat point, and, as such, we would expect the outcome to change as soon as the underlying conditions change. The collective approach, by leaving the exact nature of decision-making in the household fuzzy, has the advantage of permitting power to change gradually in response to changes in its determinants.

Let us capture this by assuming that a households' power index in period t, θ^t, depends on the determinants of power in the previous period, z^{t-1}, and x^{t-1}. We will assume that z^t is unchanged over time and so we may suppress it, without loss of generality. Hence, what we have just assumed may be written as:

$$\theta^t = \theta(x^{t-1}) \tag{2}$$

I shall refer to this as the 'power function.'

Now let us suppose θ^0 denotes a household's index of power in period 0, which may be referred to as the initial period. In period 0, this household chooses a consumption bundle x^0, by doing the kind of maximization described above, with the power index set equal to θ^0. This in turn determines the index of power in period 1, $\theta^1 = \theta(x^0)$. In period 1 the household chooses x^1 by maximizing $\Omega(x)$ in (1), with θ being treated as equal to θ^1. And so on in periods 2, 3 and beyond. How can we predict what a household's profile of power and consumption over time (that is, respectively, θ^0, θ^1,… and x^0, x^1,…) will look like?

The natural way to do this is to think of a household as engaged in playing an extensive-form game. But if we are to take the collective approach to the household, as modeled by Chiappori, Bourguignon (see Chiappori, 1988, 1992; Bourguignon and Chiappori, 1994) and others, seriously *and* want to model it as a game, we face a serious problem: who are the players? Note that in the collective approach the agents are the man and the woman but the decision is taken by a mythical hybrid that is a weighted average of the man and the woman. The line I take is of thinking of this hybrid as the player. Hence, if in period t, the household's index of power is given by θ^t, we will think of the player making a choice in period t as someone endowed with the preference $\theta^t u_1(x) + (1-\theta^t)U_2(x)$. Once this is done there is no loss of generality in referring to θ^t *as* the player in period t.[9]

Admittedly, this is a somewhat unusual approach. A more conventional approach would treat the man and the woman as two players and conceive of this as a standard extensive form game. But that would amount to an outright jettisoning of the collective model of the household. If one wishes to retain the spirit of such models as realistic description of households (as different from, for instance, duopolies), one has to combine cooperative and non-cooperative elements. Ligon (2000) does this by using asymmetric Nash bargaining and combining that with non-cooperative game theory.[10] What I am proposing here is to use the collective model of the household as an apt description of a single period, and then to build this into a dynamic model. What is interesting is that, by

---

[9] Observe that we are using the symbol θ both as a number in [0,1] to denote the index of power and as a function $\theta:T \rightarrow [0,1]$ which, given $x \in T$, computes the index of power (recall T is the budget set, defined in section 2). This is expositionally convenient and should cause no confusion since it will be obvious from the context whether θ is being used as a number or to denote the power function.

[10] In Ligon's analysis the bargain takes the form of a sharing rule for all future periods. Unlike in my description, his model yields outcomes which are *ex post* Pareto optimal (though, interestingly, even in his model the outcome may not be fully Pareto optimal).

pursuing this line of inquiry, one can tell a rigorous game-theoretic story, which is, at the same time, not the standard extensive-form game.

Complication arises from the fact that this player will naturally assess future returns in terms of its own preference. Suppose a household's consumption over time is given by the sequence $\{x^t\}$. Assuming that all agents have a discount factor of $\delta \in [0,1)$, a player θ's aggregate (present value of) payoff is given by

$$A(\theta, \{x^t\}) \equiv \sum_{t=0}^{\infty} \delta^t [\theta u_1(x^t) + (1-\theta) u_2(x^t)] \quad (3)$$

Since $\theta \in [0,1]$, and each such θ is being thought of as a player, the set of potential players in this game is infinite and given by [0,1]. Each player can at most play in one period[11] but of course he looks at the entire future stream of returns in choosing his strategy. The intuitive idea behind the equilibrium strategy that will be formalized is that the household that chooses in period t does so in the awareness that households that will come into existence in the future may not have the same preference as itself. And it evaluates the consumption stream over time that gets generated by the choices in each period *in terms of its (current) preference*. This is in keeping with the literature on rational decision-making by an agent, whose preference changes over time and who is aware of this. As Strotz (1955, p. 173) wrote in his classic paper, “[It is} rational for the man today to try to ensure that he will do tomorrow that which is best from the standpoint of today’s desires” (see Sally, 2000, for critical evaluation of this principle).

---

[11] If the same θ occurs in more than one period, we treat the θ in the various periods as distinct players.

In order to formalize this, let us begin by noting that each player θ's strategy is to choose a consumption vector x from the budget set T.

Hence, the strategies of all players may be denoted by

$$f : [0,1] \to T.$$

Hence, each such mapping denotes a **strategy tuple,** which specifies the strategy of every player.

What I now want to do is to identify an equilibrium strategy for every player. In order to do this define $\Delta(\theta^0, x, f)$ to be the aggregate (present-value of) payoff of a player $\theta^0 \in [0,1]$, who chooses a consumption bundle $x \in T$, and when the other players (from then on) are committed to playing strategy f.

If we start from an initial power index, θ^0, and the household employs a strategy tuple, f, we can generate the household's *consumption path* $\{x^t\}$, in an obvious manner, by repeated application of f and the power function θ as described in (2). Thus $x^0 = f(\theta^0)$ and $x^t = f(\theta(x^{t-1}))$, for all $t \geq 1$. We will use P to denote such a function that converts the pair (θ^0, f) to a consumption path. Thus $P(\theta^0, f) = \{x^t\}$, as described above.

Next given a consumption sequence $\{\hat{x}^t\} = (\hat{x}^0, \hat{x}^1, ...)$, and a consumption vector $x \in T$, define $\langle x, \{\hat{x}^t\}\rangle$ to be the consumption vector $\{x^t\}$ such that $x^0 = x$ and, for all $t \geq 1$, $x^t = \hat{x}^{t-1}$. Now, we can formally define

$$\Delta(\theta^0, x, f) \equiv A(\theta^0, \langle x, P(\theta(x), f)\rangle) \tag{4}$$

To understand this note that if this player θ^0 chooses x now, in the next period the player that comes into existence is θ(x) (by (2)). Since players are committed to playing f, the consumption stream that occurs from then on is given by P(θ(x), f).

The subgame perfect equilibrium of this game is now easy to define.

Definition. $f^*: [0,1] \rightarrow T$ is a **subgame perfect equilibrium** if, for all $\theta \in [0,1]$,

$$\Delta(\theta, f^*(\theta), f^*) \geq \Delta(\theta, x, f^*), \text{ for all } x \in T.$$

The next theorem points to an interesting connection between the idea of a household equilibrium and subgame perfection.

Theorem 2. If (x^*, θ^*) is a household equilibrium, and the dynamic household game has a subgame perfect equilibrium, f^*, then it must be the case that $f^*(\theta^*) = x^*$.

Proof. Let f^* be a subgame perfect equilibrium and (x^*, θ^*) a household equilibrium.

Step 1. Observe that $\Delta(\theta^*, x^*, f^*) \geq \Delta(\theta^*, x, f^*)$, for all $x \in T$.

This may be deduced as follows.

$$\begin{aligned}
\Delta(\theta^*, x^*, f^*) &= \theta^* u_1(x^*) + (1-\theta^*)u_2(x^*) + \delta\Delta(\theta^*, f^*(\theta^*), f^*) \text{ [since } \theta(x^*) = \theta^*] \\
&\geq \theta^* u_1(f^*(\theta^*)) + (1-\theta^*)u_2(f^*(\theta^*)) + \delta\Delta(\theta^*, f^*(\theta^*), f^*)
\end{aligned}$$

$$\text{[since } \theta^* u_1(x^*) + (1-\theta^*)u_2(x^*) \geq \theta^* u_1(x) + (1-\theta^*)u_2(x), \ \forall x \in T.]$$

$$\begin{aligned}
&= \Delta(\theta^*, f^*(\theta^*), f^*). \\
&\geq \Delta(\theta^*, x, f^*), \ \forall x \in T \text{ [since } f^* \text{ is subgame perfect.]}
\end{aligned}$$

Step 2. Step 1, coupled with the fact that f^* is subgame perfect implies

$$\Delta(\theta^*, x^*, f^*) = \Delta(\theta^*, f^*(\theta^*), f^*).$$

Step 3. We will now prove $x^* = f^*(\theta^*)$. Suppose this is not the case. That is, $f^*(\theta^*) \equiv \hat{x} \neq x^*$. Using the equation derived in Step 2, we have

$$\theta^* u_1(x^*) + (1-\theta^*)u_2(x^*) + \delta\Delta(\theta^{*`}, f^*(\theta^*), f^*) = \theta^* u_1(\hat{x}) + (1-\theta^*)u_2(\hat{x}) + \delta\Delta(\theta^*, f^*(\theta(\hat{x})), f^*).$$

Since x^* is the unique optimal for player θ^* in a one-period problem, this equation implies

$$\Delta(\theta^*, f^*(\theta^*), f) < \Delta(\theta^{*`}, f^*(\theta(\hat{x})), f^*).$$

This is a contradiction. Hence $x^* = f^*(\theta^*)$. ||

Let us now turn to the observable outcomes of this game-theoretic analysis. We will, in particular, be interested in consumption paths generated by subgame perfect equilibrium strategies, that is, in $P(\theta^0, f^*)$, where f^* is subgame perfect, and θ^0 is the index of power that occurs at the start.

From theorem 2 it is clear that if f^* is a subgame perfect equilibrium and (x^*, θ^*) is a household equilibrium, then $P(\theta^*, f^*) = \{x^*\}$, where $\{x^*\}$ is a sequence in which for all t, x^t takes the value of x^*.

Let us call $\{x^t\}$ a *stationary consumption path*, if there exists t' such that, for all $t \geq t'$, $x^t = x$, for some x. So what I have just shown is that (θ^*, f^*) generates a stationary consumption path where the household settles down on the household-equilibrium consumption level.

Are there other consumption levels (that is, ones which are not a part of a household equilibrium) on which the household can stabilize in a subgame perfect equilibrium? I shall now show that the answer to this is yes, and this is so in an interesting way. In particular, a household can get trapped in a Pareto sub-optimal consumption level (that is, a consumption level where both the husband and the wife are worse off than some $x \in T$). What is interesting is that this occurs in a model where households are modeled along the 'collective approach', which was ostensibly developed to capture the idea that even if members of the household have differing objectives the household will be efficient. It is here shown that, introducing dynamics can result in strategic maneuvering, which traps the household in inefficient situations. Hence, the present model could be viewed as a way of reconciling the collective household approach of Chiappori, Bourguignon and others with Udry's (1996) finding that households typically fail to achieve Pareto optimality (see also Lundberg and Pollak, 1994, and Ligon, 2000).[12]

To demonstrate the Pareto sub-optimality claim, it is useful to reduce the above model to a special case. Consider a case where there are three goods. The number of units of apples consumed by the wife is x_1; the number of units of apples consumed by the husband is x_2; and the amount of work done by the wife is x_3.[13] Let us assume that the husband always works and that gives the household an income of y (> 0); $u_1(x) = u(x_1)$; $u_2(x) = u(x_2)$, where $x = [x_1, x_2, x_3]$. In other words, the wife's (husband's) utility depend solely on the wife's (husband's) consumption. Neither of them care about the wife's leisure in itself. Assume $u(0) = 0$, $u'(x_i) > 0$, $u''(x_i) < 0$, $i = 1,2$; $x_3 \in [0,1]$; the price of apples is 1 and the wage rate for 1 unit of work is 1. In addition, assume

[12] And for a more extreme statement, delivered with a literary flair social science cannot match, here is August Strindberg in his **The Son of a Servant** (translation by E. Sprinchorn, Anchor Books, 1966 edition, p.20), revealing an unexpected grasp of the idea of returns to scale: “But the family was and still is a very imperfect institution. … A restaurant could serve hundreds with hardly any more members on its staff.” And later, going a bit over-board (p. 24): “The Family! Home of all social evils, a charitable institution for indolent women, a prison workshop for family breadwinners, and a hell for children!”

[13] Earlier leisure was used as an argument of the utility function, with work entering indirectly, as one minus leisure. The change of notation in this example is for expositional convenience and harmless.

$$\theta = \theta(x_3) = \begin{cases} 0 & \text{if } x_3 = 0 \\ 1 & \text{if } x_3 > 0 \end{cases} \tag{5}$$

I have chosen a discontinuous function purely for simplicity[14].

In any particular period, for a given θ, the household's welfare is given by

$$\theta u(x_1) + (1-\theta)u(x_2)$$

where

$$x_1 + x_2 \leq y + x_3$$

Given this budget set, the feasible set of utilities of the husband and the wife, in any single period, is shown in Figure 1.

Suppose, to start with, $\theta = \theta^0 = 0$. Hence, in the beginning the household's preference *is* the husband's preference. Now consider the following strategy

$$f^*(1) = x = (y+1, 0, 1)$$

$$f^*(0) = x' = (0, y, 0).$$

That is, if the wife has full power, she chooses to work and spend all the money on her own consumption, whereas if the man is all-powerful he stops the wife from working and spends all the money they have on his own consumption.[15]

If households stick to this strategy, the initial household's lifetime utility is

---

[14] For reasons of consistency with the assumption used in Theorem 1 some may prefer the use of a continuous function. This is not hard to do using the following family of functions: Let **2** = min{**J**x_3, 1}, where **J** is any number in the open interval from 1 to infinity. Note that each of these functions is continuous and, as **J** goes to infinity, the functions converge to (5). It is possible to show that the inefficiency result would be valid for sufficiently large values of **J**.

[15] Strictly, f^* needs to be defined on the entire domain [0, 1]. But since in this example, **2** never takes values in the interval (0,1), we can specify f^* on (0,1), arbitrarily.

$$\frac{u(y)}{1-\delta}.$$

If the initial household deviates, its highest possible lifetime utility is

$$u(y + 1).$$

This is because the best deviation for the man is to make the wife work and spend the entire household income on himself. However, once the wife works, the power shifts entirely to her and from the following period his consumption (that is, the consumption of good 2) goes to zero.

Hence, f^* is a subgame perfect equilibrium if $\frac{u(y)}{1-\delta} > u(y+1)$.

Suppose this is true. Then the household that starts at $\theta^0 = 0$, will in each period choose not to send the wife to work and the husband will consume y units of apples. Hence, the household will in each period be at point A in Figure 1, which is clearly inefficient.

To let the wife work, earn more and consume more in this period, would result in the man relinquishing power in the next period and so being worse off in the future. If δ is sufficiently large so that this is not worth it, then the household prefers to stagnate in an inefficient outcome. It is worth pointing out that this is in keeping with findings in other areas of economics, especially the study of government and other political institutions (see, for instance, Grossman and Helpman, 1994; Milesi-Ferretti and Spolaore, 1994; Acemoglu and Robinson, 2000). As Tim Besley and Steve Coate (1998, p.139) remark, in politics, once you recognize that policy-makers change over time “efficiency issues are then more subtle because preferences extend over the entire future policy sequence, while policy makers can control only what happens in their current term”.

Another kind of inefficiency that is now easy to model is the inefficiency of *over* work. It is possible to construct an example along the lines of the above one in which agents of the household work more than they would ideally like to because of their (justified) apprehension that to work less would amount to a diminished say in future household decisions.

It is easy to see that in the above example the household equilibrium is unique and given by $\mathbf{2}^* = 1$ and $x^* = (y+1, 0, 1)$. Since $f^*(\mathbf{2}^*) = x^*$, this confirms Theorem 2 in the context of this example. This also suggests that under subgame perfection we could also have the outcome $(\mathbf{2}^*, x^*)$. That is, a household that *begins with the woman having full power*, would consume x^* and retain this power structure forever.

Before moving on, a few remarks are in order. Consider the equilibrium illustrated by point A in Figure 1. It may be asked why the all-powerful husband does not ask the wife to work and make her promise that he will get to consume some positive amount of his preferred good in all future times. By such an agreement they can move to an efficient point like B. The answer to this must depend on what view we take of the individual's ability to make binding commitments. Of course, in case the income earning capacities of the man and the woman were stochastic—in one period he may be the bread-winner and in another she (see Kocherlakota, 1996; Ligon, 2000; Ligon, Thomas and Worrall, 2000)—commitments would be easier to maintain. The possibility of your rainy day occurring in the future would make you share now even though in this period you are worse off sharing. This would be an *equilibrium* argument about why commitments bind.

The kind of commitment I am talking about here is, however, ones that does not have any force within a subgame perfect equilibrium. In principle, this kind of a question arises in virtually every game model in which a subgame perfect equilibrium happens to be inefficient. Examples abound in industrial organization theory and political economy. In models of long-run interaction my inclination is to go with formal game theory. To relinquish power and then to expect the newly powerful to make concessions in all future periods seems empirically unrealistic; and to that extent the inefficient outcome described by point A seems realistic.

4. Female Labor Supply

In some economies, at certain times, women participate in the labor market in large numbers. Elsewhere they do not. Given that the feminization of the labor force has major implications for an economy's efficiency and progress, it is not surprising that there is a large body of writing that investigates the determinants of female labor supply. What this literature has not addressed but is germane to this model is the fact that female labor supply is both a matter of household decision and a determinant of the household balance of power, which in turn, influences the supply of female labor.[16]

---

[16] And, of course, it may have independent exogenous determinants as well. A woman's status in the household and the local labor market can be influenced by her rights as enshrined in the nation's laws and even by the state of the world economy. And certain global and society-wide institutions that may otherwise "appear to be gender neutral [can] bear and transmit gender biases" (Grown, Elson and Cagatay, 2000, p. 1148). Some of these effects can be unexpected. As Dasgupta (2000) has demonstrated in a theoretical model, household bargaining coupled with market feedbacks can cause greater market opportunity to have perverse feedbacks on women's power in the household.

The model of Section 2 is well-suited to analyze this problem. It will be shown here that, once the two-way causality is recognized, the female labor market can be shown to have multiple equilibria. Hence, two societies which are innately identical can have very different levels of female labor market participation. It will also be shown that changes in female labor supply participation in response to shifts in exogenous variables can be sudden and discontinuous. Hence, a society in which women do not work can remain that way for a long time, with some exogenous variable shifting all the time. Then as the exogenous variable crosses some threshold level, society can rapidly change with lots of women coming out of their homes to be active participants in the labor market. Of course, in reality the speed of these responses will be tempered by the force of habit and custom. So it is worth keeping in mind that our model, based, as it is, on pure rationality calculus, may give a somewhat exaggerated picture of the quickness of adjustment. Nevertheless, it points to certain directions of household behavior which have been neglected by the existing literature. It is also possible to construct—though I desist from doing so here—a more complex model in which the threshold itself gets affected by habit and custom.

In order to focus on the problem of female labor supply, let us in this section assume that the man always works, the household consumes only one good and the amount of work the woman does, e, is a variable.[17] The amount of leisure, ℓ, consumed by the woman is given by 1-e. Let us assume, further, purely for reasons of algebraic

---

[17] If there is open unemployment in the economy and a positive probability of the man losing his job, this can have interesting effects on e (Basu, Genicot, and Stiglitz, 2003). By assuming that the market always clears we stay away from such complications.

simplicity, that each person's utility function is separable. In particular $u_i(x, \ell) = x - c_i(e)$, $i = 1, 2$, where $c_i' > 0$, $c_i'' > 0$. We will also here confine attention to the one-period model of section 2.

In other words, both the man and the woman value the good the same way, and both consider the woman's work onerous, though they give different weights to this. Admittedly, we are losing some important and interesting details by virtue of these simplifying assumptions, but for our present purpose the sacrifice seems worth it.

The amount of say that a woman has in household decision making will be assumed to depend on the amount of income she contributes to the household, that is, on ew, where w is the female wage rate prevailing on the market; and as ew increases, the woman's power increases.[18] In brief,

$$\theta = \theta(ew), \quad \theta' \geq 0.$$

Given these assumptions the household's problem reduces to the following.

$$\begin{aligned} &\underset{\{x,e\}}{\text{Max}}\ \Omega = x - [\theta c_1(e) + (1-\theta) c_2(e)] \\ &\text{subject to } px \leq ew + Y \end{aligned}$$

Remember that in this section p and x are scalers. Since the man *always* works, there is no loss of generality in assuming that the income from the man's work is subsumed in Y.

---

[18] Citing the work of Blood and Wolfe (1960), Blumberg and Coleman (1989, p.226) observe, "Wives who worked for wages have more [power] than their housewife counterparts had. Further, the more hours a woman worked, the greater her decision-making power." For formal evidence on how household consumption decisions are not separable from the labor supply decision of the man and the woman, see Browning and Meghir (1991).

Substituting for x from the constraint (it is easy to see that the constraint will always be binding) we have the following first-order condition:

$$\frac{w}{p} = \theta c_1'(e) + (1 - \theta)c_2'(e) \tag{6}$$

Following the definition in Section 2, (θ^*, e^*) is a household equilibrium if it is the solution of (6) and (7):

$$\theta = \theta(ew) \tag{7}$$

Combining these two, we can say that e^* is *part* of a household equilibrium if

$$\frac{w}{p} = \theta(e^* w)c'(e^*) + (1 - \theta(e^* w))c_2'(e^*) \tag{8}$$

In analyzing female labor supply response to changes in different exogenous variables it is important to distinguish two different cases

Case I: $c_1'(e) > c_2'(e), \quad \text{for all } e.$

Case II: $c_1'(e) < c_2'(e), \quad \text{for all } e.$

I am ignoring the non-generic special case, where the two marginal costs are equal.

Case I is the 'normal case' where the woman's work is more onerous to the woman herself than to her husband[19].

Case II describes a situation that often prevails in traditional, conservative societies where a man, for instance, may consider his 'pride' hurt if his wife goes out to

---

[19] Of course, inequality concerning total values does not necessarily translate into similar inequalities concerning marginal values. But it is possible to argue that, in the normal textbook, model $c_2(e) = 0$, for all e, whereas $c_1(e) > 0$, for all $e > 0$, and its first-derivative is positive, since it is person 1 who does the work. Since this means that $c_2'(e) = 0, \textit{for all } e,$ the normal textbook model is a special instance of Case I.

work. Since c_i consists of not just the cost of being tired out by work but also social and psychological costs, $c_2'(e)$ can exceed $c_1'(e)$. Another reason why $c_1'(e) < c_2'(e)$ is because a woman who works longer hours outside will have less time for work at home and this could contribute towards a feeling of diminished well-being on the part of the husband. If this feeling is sufficiently strong it could make $c_2'(e)$ very large. We shall refer to Case II as the 'conservative' case.

In Figure 2, first consider equation (7). With w constant, as e increases, θ will increase. We shall call this the 'power-earnings curve', since it relates to the woman's earnings to her power. In the same figure draw the curve representing equation (6). We shall call this the 'effort-supply curve', since this represents the amount of effort that the wife will supply. Let us begin with Case I – the normal case. Since $c_1'(e) > c_2'(e)$, an increase in θ, raises the right-hand side of (6). Hence, for (6) to hold, e must fall (recall $c_i'' > 0$). Hence, in the normal case the effort-supply curve is downward-sloping, as shown in Figure 2. The point of intersection of these two curves represents the household equilibrium. The woman supplies e^* units of labor and the household balance of power is given by θ^* in equilibrium. The equilibrium is unique. Through an easy exercise of shifting curves the reader can check that in the normal case

(i) a rise in p causes θ and e to decline, and

(ii) a rise in w causes θ to rise while the impact on e is uncertain

Let us now turn to Case II. It is easy to check that the effort-supply curve is now upward-sloping. As a consequence, the equilibrium need no longer be unique.

One particular sub-case is illustrated in Figure 3. The effort-supply curve is given by OABC. Clearly, there are three equilibria at points E_1, E_2 and E_3. Of these, let us focus on the two stable equilibria, E_1 and E_3. At E_1 the wife does not work, at E_3 she works a lot. Interestingly, both outcomes are possible as equilibria. In other words, two households or two societies, one in which women do not work (or work very little) and one in which they do regular, full-time work, can be *ex ante* identical households or societies. Hence, the working and not-working of women *need not be* reflections of fundamental differences.[20] It is worth emphasizing that what has just been demonstrated is the multiplicity of equilibria *within* a household. Hence, it is possible for a society to exhibit variation *across* households, unless there are homogenizing norms at work, which tend to make all households select the same equilibrium. Since in the normal case there is a unique equilibrium, it may be interesting to check empirically whether in more traditional societies there is greater variation in women's labor force participation.

An implication of this is that women's work can respond discontinuously to changes in exogenous variables. Consider increases in the female wage rate, w. This will cause the power-earnings curve to move left and the effort-supply curve to move right. Hence, if the household was originally at E_1, for some time nothing will happen. Then suddenly the low-work equilibrium will cease to exist, at which point there is a sudden sharp rise in the woman's labor market participation. There can also be a small rise in women's participation, initially, and then a sharp rise. This would happen if the effort supply curve at E_1 has a positive slope, instead of the infinite slope, as in the case illustrated in the figure. Of course the sharpness of the changes will, in the aggregate, be tempered by the heterogeneity of households that one encounters in the real world.

---

[20] Similar results can be obtained by assuming that women's work is, in part, a matter of social norm that can meet with dissonance and psychological costs (Vendrik, 2000).

This analysis of woman's work and the feminization of the labor market was conducted, deliberately, with no reference to biological or innate psychological differences between men and women. This is not to deny such differences but to demonstrate the enormous consequences that market processes and equilibrating forces can have. These can overwhelm biology and create the impression of much larger innate differences than what is actually the case[21]. The above model may be viewed as a demonstration of this.

5. A Comment on Child Labor

There are important links between the status of children and the structure of household decision-making and, not surprisingly, this has been analyzed (see Browning, 1992; Basu and Van, 1998; and Bardhan and Udry, 1999). However, relatively little has been written about the link between the structure of power in the household and the status of children. Analyzing data from early twentieth-century urban America, Moehling (1995) has shown that households, where children contribute a larger share of the aggregate household income, are also the households in which children are likely to get more to consume. Moehling explains this along the lines of the model constructed in this paper. She argues that if one of the agents in the household happens to be a child, the logic of the model remains unchanged and a greater income contributed by the child enhances the child's power (in the same way that a woman's power gets enhanced in our

---

[21] As Sen, George and Ostlin (2002) point out, even in matters of health, where biology does play a differentiating role, women's lower social autonomy and *constructed* disadvantage can exacerbate and overwhelm the biological differences.

model by a rise in the share of the woman's income). And this, in turn, leads to a greater consumption by the child.

Browning, Bourguignon, Chiappori and Lechene (1994), on the other hand, argue that children are unlikely to have much to say in household decisions. One way of reconciling Moehling's empirical finding with this is to argue that (i) a woman tends to internalize her children's preference (that is, her utility function reflects the child's interest); and (ii) as the share of the husband's income in the household decreases the woman's power rises. If (i) and (ii) are true then the fact of a child working could well lead to a higher consumption on the part of the child without the mediating fact of empowerment of the child.

The aim of this section is not, however, to join this debate but to study the relation between a household's power structure and its propensity to send its children to work. It will be shown that the connection between the household power structure and the incidence of child labor is much more intricate than it appears at first.[22]

Let me begin by adding some special assumptions to the model of Section 2, so as to pare the focus down to the essentials. An important assumption that seems to be realistic and will be maintained here is that both the husband and the wife feel that their

---

[22] This is particularly interesting because in other dimensions (i.e. other than labor), the connections are believed to be interesting but straight-forward. It has been seen in developing countries, for instance, that when the woman has greater say in household matters, the children's nutrition improves (see, Thomas, 1990). I would conjecture, though, that even in some of these other areas, such as child nutrition, careful theoretical analysis will lead to predictions of a non-monotonic response to changes in household balance of power. It would then be interesting to check these empirically.

child's labor is painful and undesirable. However, they have differences when it comes to deciding on what to spend the additional household income that their child's labor may bring[23]. A simple algebra for capturing this assumption is as follows. Both the man and the woman consider the cost of child labor to be

$$c_i = c(h), \quad c' > 0, \; c'' > 0, \tag{9}$$

where h is the amount of work done by the child. On the other hand, the woman is only interested in spending money on good 1 and the man's sole interest is good 2. We could, for instance, think of 1 as milk and 2 as alcohol. (This is, admittedly, an insulting and stereotypical depiction of gender difference, though it is not evident who should feel more insulted by this characterization, the man or the woman.) Hence, using x_i to denote the number of units of good i consumed by the household, we can write agent i's utility function as:

$$u_i = \phi(x_i) - c(h), \tag{10}$$

where $\phi' > 0$, $\phi'' \leq 0$. It is being assumed that the amount of work done by the adults is fixed. Hence, the household's maximand, following the model of Section 2, is given by:

$$\Omega = \theta\phi(x_1) + (1-\theta)\phi(x_2) - c(h) \tag{11}$$

Taking the price of each good to be 1 and the wage rate of child labor to be w, the budget constraint is given by

$$x_1 + x_2 = hw + w_1 + w_2 \tag{12}$$

The extent of child labor that the household supplies can now be determined by solving the problem of maximizing (11) subject to (12).

[23] I adopt the language of there being one child in each household purely for algebraic simplicity.

An intuitively interesting result emerges in the special case where $\phi(.)$ belongs to the following class of functions:

$$\phi(x_i) = x_i^{\alpha}, \quad \text{where } 0 < \alpha \leq 1. \tag{13}$$

Note that (13) consists of a class of concave functions, including the linear special case (when α = 0).

Theorem 3. In the model described above, with $\phi(.)$ belonging to the class defined by (13), as the woman's power, θ, increases (starting from 0), child labor declines; but as θ continues to rise (beyond ½), child labor rises.

Proof. Using (12) to substitute for x_2, the household's problem reduces to

$$\underset{\{x_1,h\}}{\text{Max}}\, \theta\phi(x_1) + (1-\theta)\phi(hw + w_1 + w_2 - x_1) - c(h).$$

The first order-conditions are given by:

$$\theta\phi'(x_1) = (1-\theta)\phi'(hw + w_1 + w_2 - x_1) \tag{14}$$

$$w(1-\theta)\phi'(hw + w_1 + w_2 - x_1) = c'(h). \tag{15}$$

Using (14) and (15) we get

$$w\theta\phi'(x_1) = c'(h) \tag{16}$$

Hence, we can treat (15) and (16) as the first-order conditions. To see the effect on h of changes in θ, let us take total differentials of (15) and (16):

$$w(1-\theta)\phi''(hw + w_1 + w_2 - x_1)(wdh - dx_1) - d\theta w\phi'(hw + w_1 + w_2 - x_1) = c''(h)dh$$
$$w\theta\phi''(x_1)dx_1 + w\phi'(x_1)d\theta = c''(h)dh$$

Solving these two equations for $dh/d\theta$ we get:

$$\frac{dh}{d\theta} = \frac{(1-\theta)\phi''(x_2)\phi'(x_1)w - \theta\phi'(x_2)\phi''(x_1)w}{(1-\theta)\phi''(x_2)c''(h) + \theta\phi''(x_1)c''(h) - \theta(1-\theta)w^2\phi''(x_1)\phi''(x_2)}$$

where $x_2 = hw + w_1 + w_2 - x_1$.

At this point, we need to consider separately the case where $\alpha < 1$ and the case where $\alpha = 1$ (which leads to a corner solution).

First consider the case where $\alpha < 1$. Since $\phi(.)$ is strictly concave and c(.) strictly convex, the denominator is always negative. Hence the sign of $dh/d\theta$ is the same as the sign of the term

$$X \;/\; \theta\phi'(x_2)\phi''(x_1) - (1-\theta)\phi''(x_2)\phi'(x_1). \tag{17}$$

Using (13), (17) can be rewritten as:

$$X \equiv \alpha^2(\alpha-1)\theta x_1^{\alpha-2}x_2^{\alpha-1} - \alpha^2(\alpha-1)(1-\theta)x_1^{\alpha-1}x_2^{\alpha-2}.$$

Clearly, this has the same sign as the term $(1-\theta)/x_2 - \theta/x_1$ / Z.

Next note that (13) and (14) imply $\theta / x_1 = (1-\theta)x_2^{\alpha-1} / x_1^{\alpha}$. Substituting this into the expression Z we can see that Z (and, therefore, X) has the same sign as $1 - [x_2/x_1]^{\alpha}$.

From (14) we know that, if $\theta < ½$, then $x_1 < x_2$ and, hence, $X < 0$. And, if $\theta > ½$, then $x_1 > x_2$, and, hence, $X > 0$.

Now consider the case where $\alpha = 1$. Then (11) may be rewritten as

$$\Omega = \theta x_1 + (1-\theta)x_2 - c(h) \tag{18}$$

Hence, if $\theta > ½$, the household will spend all its income on good 1. Hence, in that case the household will choose h so as to maximize $\Omega = \theta(hw + w_1 + w_2) - c(h)$. This is obtained by inserting (12) into (18), after setting $x_2 = 0$. Hence, from the first-order condition we have $\theta w = c'(h)$. It follows that, as θ increases, h will increase (recall $c''(h) > 0$). Likewise, if $\theta < ½$, a rise in θ causes h to fall. ||

The theorem implies that the relation between a woman's power and the amount of child labor is U-shaped, as illustrated in Figure 4. This is interesting because of its counter-intuitive nature. Given that an all-powerful husband and an all powerful wife lead to the same amount of child labor, one would expect that power-sharing would make no difference to the incidence of child labor. But, as the theorem shows, that is not true. A household that has reasonable gender-symmetry (in terms of household power) out-performs (in using this term I am obviously treating child labor as a 'bad') asymmetric households.

The intuition, at least in the linear case, is straightforward. Recall that both the man and the woman find it painful to send the children to work; but they have different preferences concerning what to spend any additional household income on. Consider now the special case in which the powers of the man and the woman are fairly well-matched, that is, θ is close to half. Since both the man and the woman are averse to sending their child to work, changes in θ will have little effect on the calculation concerning the cost of child labor. On the other hand, the benefits of the additional income generated by sending the child to work will not be fully reaped by any agent, since θ being close to half will mean a tussle between milk and alcohol. Hence, neither the man nor the woman will get the full benefit of the additional income generated by a working child. Therefore, the child will be less likely to work. On the other hand, if θ goes to 1 or to 0, one agent becomes powerful and so he will reap the full benefits of child labor and he will therefore also be more inclined to make the child work.

In closing it is worth emphasizing that the result of the U-shape could be violated if the utility function and the labor cost functions lie outside the class described here. If, for instance, we assume what is often *presumed* to be true, namely, that women are more sensitive to the pain of child labor, then the amount of child labor will be less when $\theta = 1$ than when $\theta = 0$. In that case the incidence of child labor curve, instead of being U-shaped, as in Figure 4, would be *tau*-shaped, that is, a U, with the right-hand upturn being less sharp than the left-hand downturn. Moreover, if we go beyond the class defined by (13) and assume, for instance, $\mathbf{N}''' < 0$, then the child labor graph can be shown to be an inverted-U.

In other words, while it is interesting to recognize that the response of child labor to changes in the balance of power may be not merely nonlinear but non-monotonic, the theory does not give us an unequivocal prediction of the nature of this relation, but merely ‘conditional’ propositions. This underlines the importance of empirical work in this area. If we are to design policies that control child labor by influencing the balance of power in the household, then it is important to conduct empirical research to get a finer view of the broad and conditional hypotheses that theory gives us.

6. Conclusion

The paper was motivated by the recognition of the fact that while a household’s balance of power influences its choices, the choices can in turn affect the household’s balance of power. While this feature of households is well-recognized in the descriptive and sociological literature, it has been formally modeled relatively rarely, and usually for special contexts. Much of the present paper was devoted to modeling this two-way relation generally and in deriving its implications for female labor supply, child labor and other aspects of household behavior. This paper may be viewed as spadework for further work in modeling household behavior.

First of all, we could try to build a Nash bargaining model of the household, which allows for asymmetric power and recognizes that not only does the extent of asymmetry and the threat point affect household decisions but they themselves get affected by the decisions.

A more radical direction of research would be as follows. A study of the sociological and anthropological literature draws our attention to another lacuna of the theoretical models of the household, that, at a subliminal level, we all know but our models ignore, namely, that the balance of power within households often manifests itself in the *domains* of control. In other words, a woman's say, captured in our model by **2**, is recognized to vary depending on the domain of decision-making. She could have all the power when it comes to choosing the children's clothing and food, but have no say in other matters. A budget may be apportioned to her for expenditures in her domain, with or without additional restrictions being placed on her by her husband (see Guyer, 1988). One existing model that has elements of this idea is that of Lundberg and Pollak (1993)—see also Carter and Katz (1997). They begin by observing correctly that Nash bargaining models of households can look very different depending on what we take to be the threat point. The threat point does not have to be defined by utilities obtained in the event of a divorce; but could be the payoffs obtained in a non-cooperative equilibrium. So in their model the man and the woman retreat to their domains in the event of the bargain breaking down. What I am suggesting here is that the idea of domains of control may be more germane to household decision-making and not merely a feature of a breakdown in cooperation. In this approach a woman's power would be reflected in part by the size of the domain of her decision. Such a model could raise intricate game-theoretic questions, since how one person chooses over her domain will clearly depend on how she expects the other to choose over his domain and *vice versa* and, also, the contours of the domains could themselves be endogenous. These are some of the next steps to take in the research venture to map the structure of decision-making and power in the household. And they can influence in an important way how we design policy pertaining to poverty removal, the eradication of child labor, unemployment and social welfare.

References

Acemoglu, Daron and Robinson, James (2000), ‘Political Losers as a Barrier to Economic Development’, *American Economic Review*, vol. 90, 126-30.

Adam, Christopher, Hoddinott, John and Ligon, Ethan (2003), ‘Dynamic Intra-household Bargaining, Matrimonial Property Law and Suicide in Canada’, mimeo: Oxford University.

Agarwal, Bina (1997), '"Bargaining" and Gender Relations: Within and Beyond the Household', *Feminist Economics*, vol. 3, 1-51.

Bardhan, Pranab and Udry, Chris (1999), *Development Microeconomics*, New York: Oxford University Press.

Basu, Kaushik (1999), 'Child Labor: Cause, Consequence and Cure, with Remarks on International Labor Standards', *Journal of Economic Literature*, vol. 37, 1083-119.

Basu, Kaushik, Genicot, Garance and Stiglitz, Joseph (2003), 'Unemployment and Wage Rigidity when Labor Supply is a Household Decision', In Basu, K., Nayak., and Ray, R. (eds.), *Markets and Governments*, Oxford University Press.

Basu, Kaushik, Narayan, Ambar and Ravallion, Martin (2002), ‘Is Literacy Shared within Households? Theory and Evidence from Bangladesh’, *Labour Economics*, vol. 8, 649-65.

Basu, Kaushik and Van, Pham Hoang (1998), ‘The Economics of Child Labor’, *American Economic Review*, vol. 88, 412- 27.

Becker, Gary S. (1981), *A Treatise on the Family*, Cambridge: Harvard University Press.

Besley, Timothy and Coate, Stephen (1998), ‘Sources of Inefficiency in a Representative Democracy: A Dynamic Analysis’, *American Economic Review*, vol. 88, 139-56.

Blood, Robert and Wolfe, Donald (1960), *Husbands and Wives*, New York: Free Press.

Blumberg, Rae and Coleman, Marion (1989), ‘A Theoretical Look at the Gender Balance of Power in the American Couple’, *Journal of Family Issues*, vol. 10, 225-50.

Bourguignon, Francois and Chiappori, Pierre-Andre (1994), 'The Collective Approach to Household Behavior', in Blundell, R., Preston, I. and Walker, I. (eds.), *The Measurement of Household Welfare*, Cambridge: Cambridge University Press.

Browning, Martin (1992), 'Children and Household Economic Behavior', *Journal of Economic Literature*, vol. 33, 1434-75.

Browning, Martin, Bourguignon, Francois, Chiappori, Pierre-Andre and Lechene, Valerie (1994), 'Income and Outcomes: A Structural Model of Intrahousehold Allocation', *Journal of Political Economy*, vol. 102, 1067-96.

Browning, Martin and Meghir, Costas (1991), ‘The Effects of male and Female Labor Supply on Commodity Demands’, *Econometrica*, vol. 59, 925-51.

Carter, Michael, and Katz, Elizabeth (1997), ‘Separate Spheres and the Conjugal Contract,’ in Haddad, Hoddinott and Alderman (1997).

Chiappori, Pierre-Andre (1988), 'Rational Household Labor Supply', *Econometrica*, vol. 56, 63-89.

Chiappori, Pierre-Andre (1992), 'Collective Labor Supply and Welfare', *Journal of Political Economy*, vol. 100, 437-67.

Dasgupta, Indraneel (2000), ‘Women’s Employment, Intra-household Bargaining and Distribution’, *Oxford Economic Papers*, vol. 52, 723-44.

Desai, Sonalde and Jain, Devaki (1994), 'Maternal Employment and Family Dynamics: The Social Context of Women's Work in Rural South India', *Population and Development Review*, vol. 20, 115-36.

Folbre, Nancy (1986), 'Hearts and Spades: Paradigms of Household Economics', *World Development*, vol. 14, 245-55.

Grossman, Gene and Helpman, Elhanan (1994), ‘Protection for Sale’, *American Economic Review*, vol. 84, 833-50.

Grown, Caren, Elson, Diane and Cagatay, Nilufer (2000), ‘Introduction’, *World Development*, vol. 28, 1145-56.

Guyer, Jane (1988), ‘Dynamic Approaches to Domestic Budgeting,’ in Dwyer, D. and Bruce, J. (1988), *A Home Divided*, Palo Alto: Stanford University Press.

Haddad, Lawrence, Hoddinott, John and Alderman, Harold (eds.) (1997), *Intrahousehold Resource Allocation in Developing Countries: Methods Models and Policy*, Baltimore: John Hopkins University Press.

Haller, Hans (2000), ‘Household Decisions and Equilibrium Efficiency’, *International Economic Review*, vol. 41, 835-47.

Hoddinott, John and Haddad, Lawrence (1995), 'Does Female Income Share Influence Household Expenditures? Evidence from Cote D'Ivoire', *Oxford Bulletin of Economics and Statistics*, vol. 57, 77-95.

Iyigun, Murat (2002), ‘Endogenous Gender Power and Economic Development,’ mimeo: University of Colorado, Boulder.

Kanbur, Ravi and Haddad, Lawrence (1994), 'Are Better off Households more Equal or less Equal?', *Oxford Economic Papers*, vol. 46, 445-58.

Kocherlakota, Narayana (1996), ‘Implications of Efficient Risk-sharing without Commitment’, *Review of Economic Studies*, vol. 63, 595-609.

Ligon, Ethan (2000), 'Dynamic Bargaining in Households (with an Application to Bangladesh)', mimeo: University of California, Berkeley.

Ligon, Ethan, Thomas, Jonathan and Worrall, Tim (2000), ‘Mutual Insurance, Individual Savings, and Limited Commitment’, *Review of Economic Dynamics*, v. 3, 216-46.

Lundberg, Shelly, and Pollak, Robert (1993), ‘Separate Spheres Bargaining and the Marriage Market’, *Journal of Political Economy*, vol. 101, 988-1010.

Lundberg, Shelly, and Pollak, Robert (1994), ‘Noncooperative Bargaining Models of Marriage’, *American Economic Review,* vol. 84 (2), 132-137.

Lundberg, Shelly, and Pollak, Robert (2003), ‘Efficiency in Marriage’, *Review of Economics of the Household*, vol. 1, 153-167.

Lundberg, Shelly, Pollak, Robert and Wales, Terence (1997), 'Do Husbands and Wives Pool Their Resource? Evidence from the United Kingdom Child Benefit', *Journal of Human Resources*, vol. 32, 463-80.

Manser, Marilyn and Brown, Murray (1980), 'Marriage and Household Decision-Making: A Bargaining Analysis', *International Economic Review*, vol. 21, 31-44.

Mason, Karen (1986), 'The Status of Women: Conceptual and Methodological Issues in Demographic Studies', *Sociological Forum*, vol. 1, 284-300.

McElroy, Marjorie B. and Horney, Mary Jean (1981), 'Nash-Bargained Decisions: Towards a Generalization of the Theory of Demand', *International Economic Review*, vol. 22, 333-49.

Mencher, Joan (1988), 'Women's Work and Poverty: Women's Contribution to Household Maintenance in South India', in Dwyer, D. and Bruce, J. (1988), *A Home Divided*, Palo Alto: Stanford University Press.
.
Milesi-Ferretti, Gian-Maria and Spolaore, Enrico (1994), ‘How Cynical can an Incumbent be? Strategic Policy in a Model of Government Spending’, *Journal of Public Economics,* vol. 55, 121-40.

Moehling, Carolyn M. (1995), 'The Intra-household Allocation of Resources and the Participation of Children in Household Decision-Making: Evidence from Early Twentieth-Century America', mimeo: Northwestern University.

Quisumbing, Agnes and Maluccio, John (1999), 'Intra-household Allocation and Gender Relations: New Empirical Evidence', mimeo: IFPRI, Washington, D.C.

Rahman, Rushidan Islam (2000), ‘Poverty Alleviation and Empowerment through Microfinance: Two decades of Experience in Bangladesh’, Research Monograph 20, Bangladesh Institute of Development Studies.

Riley, Nancy (1997), 'Gender, Power and Population Change', *Population Bulletin*, vol. 52, 1-46.

Sally, David (2000), ‘Confronting the Sirens: Rational Behavior in the Face of Changing Preferences’, *Journal of Institutional and Theoretical Economics,* vol. 156, 684-714.

Sen, Amartya (1983), 'Economics and the Family', *Asian Development Review*, vol. 1, 14-26.

Sen, Amartya (1990), 'Gender and Cooperative Conflict', in Tinker, I. (ed.), *Persistent Inequalities*, New York: Oxford University Press.

Sen, Gita, George, Asha and Ostlin, Piroska (2002), ‘Engendering Health Equity: A Review of Research and Policy,’ Harvard Center for Population and Development Studies, Working Paper, Vol. 12, No. 2.

Strotz, R. H. (1955), ‘Myopia and Inconsistency in Dynamic Utility maximization’, *Review of Economic Studies*, vol. 23, 165-80.

Thomas, Duncan (1990), 'Intra-household Resource Allocation: An Inferential Approach, *Journal of Human Resources*, vol. 25, 635-64.

Udry, Christopher (1996), ‘Gender, the Theory of production and the Agricultural Household’, *Journal of Political Economy*, vol. 104, 1010-46.

Vendrik, Maarten C. M. (2000), ‘Dynamics of a Household Norm in Female Labor Supply,’ mimeo: Maastricht University.

Walker, Ian and Zhu, Yu (1999), 'The Labour Supply of Married Couples and the Effects of Intra-Household Redistribution', mimeo: Keele University.

Zelizer, Viviana (1994), ‘The Creation of Domestic Currencies’, *American Economic Review*, vol. 84, 138-42.

Figure 1

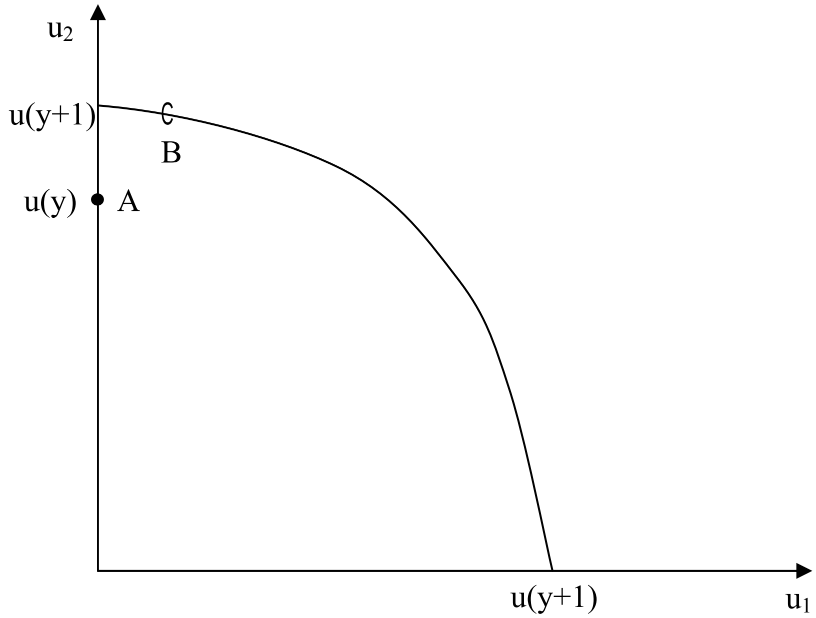


Figure 2

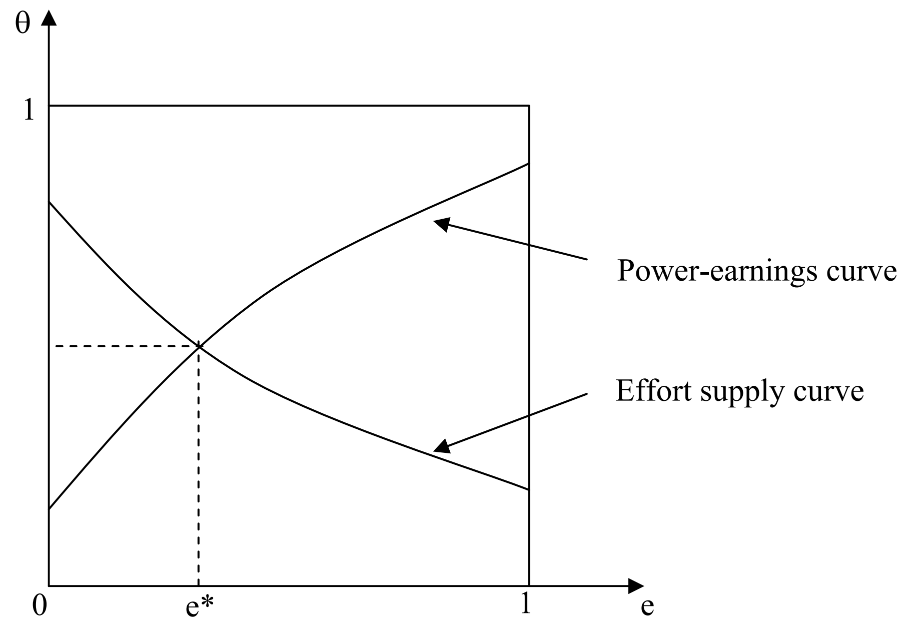
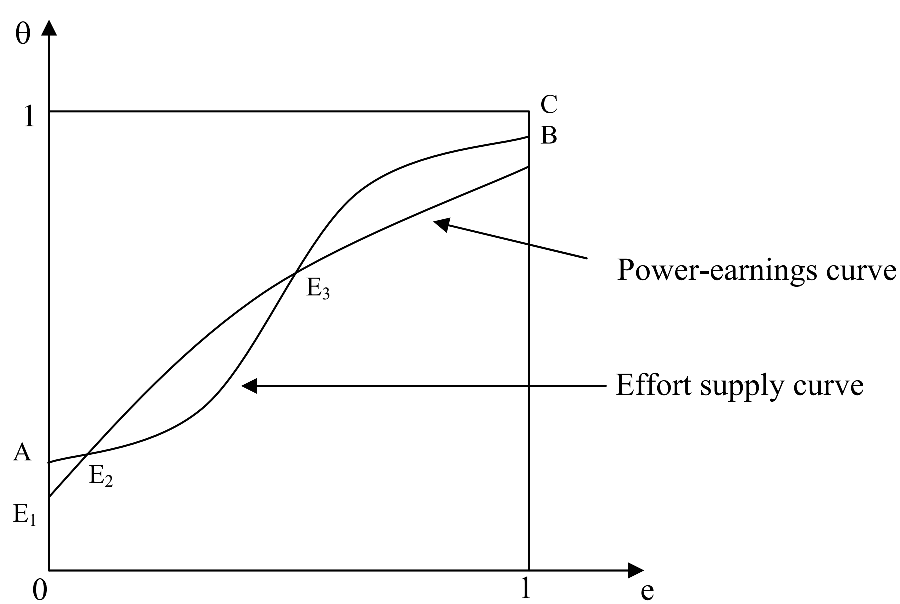
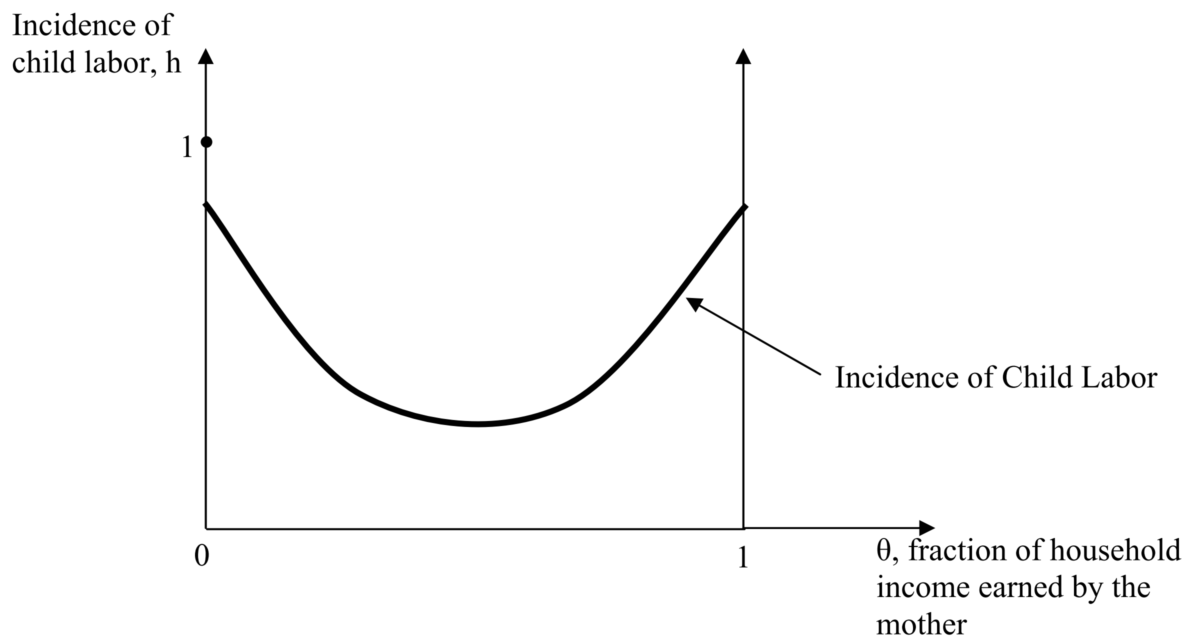


Figure 3





Incidence of
child labor, h
1
Incidence of Child Labor
0
1
θ, fraction of household
income earned by the
mother

Figure 4