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The Collective Model of the Household and an Unexpected Implication for Child Labor

Hypothesis and an Empirical Test

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Abstract

Basu and Ray use the collective model of the household and show, theoretically, that as the woman's power rises, child labor will initially fall, but beyond a point it will tend to rise again. A household with a balanced power structure between the husband and the wife is least likely to send its children to work. An empirical test of this relationship using data from Nepal strongly corroborates the theoretical hypothesis.

The Collective Model of the Household and An Unexpected Implication for Child Labor: Hypothesis and an Empirical Test

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THE COLLECTIVE MODEL OF THE HOUSEHOLD
AND AN UNEXPECTED IMPLICATION FOR CHILD LABOR:
HYPOTHESIS AND AN EMPIRICAL TEST

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1. Introduction

The 'collective model' of the household assumes that a household maximizes a

weighted average of the wife's and husband's utilities, where the weights capture each

agent's 'power' or effectiveness in the decision-making process.[1] Hence, unlike in

Becker's (1981) classic 'unitary model', any change in a variable that changes the balance

of power in the household can lead to changes in the household's consumption pattern,

even when the household's total income and all prices remain unchanged. There is a large

literature that tracks exactly how changes in the balance of power changes a household's

consumption. Thus there are studies which show that greater power to the woman results

in better clothing for the children, less expenditure on tobacco, better nutrition for the

children and so on.[2] What has however been rarely studied is the relation between the

balance of power in the household and the incidence of child labor.[3]

The present paper is focussed entirely on this relation. First, a theoretical model is

developed to show that the balance of power in the household impacts on child labor in

unexpected ways. It is argued that as the woman's power increases, child labor will first

fall and then rise. The hypothesis is the result of an interesting theoretical process. It is

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[1] See Chiappori, 1988; Browning and Meghir, 1991; Bourguignon and Chiappori, 1994; Browning, Bourguignon, Chiappori, and Lechene, 1994.
[2] Lundberg, Pollak and Wales, 1997; Kanbur and Haddad, 1994.
[3] Moehling (1995), Iversen (2001), Emerson and Portela (2001), and Basu (2001) constitute virtually the totality of the literature on this.

formally derived in Section 2. In Section 3 the hypothesis is empirically tested using household data from Nepal. The data yield robust corroboration of the hypothesis.

These findings have important policy implications. They suggest that a household in which power is well balanced between the husband and the wife is least likely to send the children to work. In other words, if we are interested in curbing child labor and are dealing with a traditional society where women have very little power, we should try to empower women. However, our study also suggests that this relation is not monotonic. In other words, if we give too much power to the women, we can get a negative backlash with child labor rising once again. Section 4 comments on these and other policy implications.

2. Theory

Consider a household consisting of a wife (agent 1), a husband (agent 2) and a child (agent 3). There are n goods in this economy. Let $u_i : \Re_+^n \to \Re$, i = 1,2, be the utility function of agent i. The collective model claims that the household maximizes a weighted average of the utility functions of the two adults:

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

where $\theta \in [0,1]$ captures the balance of power in the household. As θ increases the wife's power increases.

In order to study the effect of the household's power structure on child labor, all we have to do is to admit child leisure as one of the goods in the vector x. Then if we define child labor as 1 minus child leisure, the household's optimization will yield results on how much the child will be made to work.

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To keep the analysis simple, we will assume that there are three goods – good 1, good 2 and child leisure. We will use e_3 to denote the amount of work the child does. Hence $1 - e_3$ is child leisure. In this theoretical section, we will consider only the child's effort (assuming that the adults always work). Therefore, there should be no confusion in writing e for e_3. Hence, the utility functions of the wife and the husband may be written as:

$$u_1 = u_1(x_1, x_2, 1\text{-}e)$$

$$u_2 = u_2(x_1, x_2, 1\text{-}e).$$

The two substantial assumptions that we would like to maintain are (A) the husband and the wife have different preferences over the two goods 1 and 2 and (B) both of them find it painful to send their children to work.

Our main hypothesis, to wit, that as θ rises, e will first fall and then rise, is largely a direct consequence of assumptions (A) and (B) (as we show below). Hence, in a sense our empirical test could be thought of as a test of the collective model of the household along with the restrictions that come with assumptions (A) and (B).

Let us first explain the hypothesis intuitively, before turning to the formal derivation.

Since both husband and wife consider it painful to send the child to work the household's evaluation of the cost of child labor remains unchanged no matter what the value of θ. This is simply another way of saying that the weighted average of the same value is unaffected by changes in the weights. Next note that if θ is $\frac{1}{2}$, the goods purchased by the household will not be ideal for either the man or the wife. Hence, if θ is

$\frac{1}{2}$, and the child is sent out to work, the benefit of the goods bought by the additional income will benefit neither adult too much. On the other hand, if $\theta = 1$, the woman being the sole decision-maker in the household will direct the additional money earned by sending the child to work to purchase exactly the goods she finds valuable. Hence, sending the child to work would now seem more worthwhile. The same logic with the man being the sole decision-maker would hold if $\theta = 0$. Hence if θ takes extreme values, the household will be more prone to make the child work.[4]

A simple model to formalize this idea may be specified as follows. We shall assume that there are two goods, 1 and 2, and the two adults, the woman (agent 1) and the man (agent 2), differ in their attitude towards the two goods. Agent 1 tends to like good 1 more. With e denoting the amount of work done by the child, let $c(e)$ be the cost of work to the child, where $c'(e) > 0$, $c''(e) > 0$, for all e. We will assume, as explained above, that both parents feel the child's pain of labor. We capture these assumptions in a somewhat stylized manner by assuming that agents 1 and 2 have the following utility functions:

$$u_1 = \min\{x_1, ax_2\} - c(e)$$

$$u_2 = \min\{ax_1, x_2\} - c(e)$$

where $a > 1$. If we hold e constant and draw the indifference curves of the two agents in the goods space, x_i being the amount of good i consumed by the household, we have a

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[4] We do not want to claim that our assumptions are beyond reproach. It is, for instance, possible to argue that, while both parents find child labor painful, they differ about what the child should do with the time saved by not working—one may want the child to study, the other to play. This could dilute the zest of the

picture as in Figure 1. I_1 and I_2 denote indifference curves of, respectively, the woman and the man. If they both face the same budget constraint, for instance, the one shown on line AB in Figure 1, the woman would prefer to consume more of good 1. If a = 1 their relative preferences converge.

Assuming that the price of both goods is 1 and child wage is w, the household's problem (using (1) above) is to maximize

$$\Omega = \theta \min\{x_1, ax_2\} + (1-\theta)\min\{ax_1, x_2\} - c(e) \tag{2}$$

$$\text{subject to } x_1 + x_2 \leq ew + \bar{w} \tag{3}$$

where $\bar{w}$ is the total income from non-child-labor sources.

The main hypothesis that this paper sets out to test empirically is an outcome of solving the above maximization problem of the household. The result is here stated as a theorem and given a formal proof.

In stating and proving the Theorem let us denote the solution to the household's maximization problem as:

$$x_1^* = x_1(\theta, w, \bar{w})$$

$$x_2^* = x_2(\theta, w, \bar{w})$$

$$e^* = e(\theta, w, \bar{w}).$$

Theorem 1: Starting from $\theta = 0$, as θ rises the amount of child labor (i.e. e) initially falls and then rises.

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parents from keeping the child from work. Our hunch is that this difference will not be big enough to alter our hypothesis. In any case, one way to view the empirical test is as a test of this hunch.

Proof. First note that the following inequalities must always hold:

$$a x_2^* \geq x_1^*$$ (4)

and

$$a x_1^* \geq x_2^*$$ (5)

To prove this, note first that both (4) and (5) cannot be false, since a > 1. So, without loss of generality, assume (4) is violated. Then, given a > 1, it follows that

$$a x_1^* > x_2^*$$ (6)

Hence (2) reduces to:

$$\Omega = \theta a x_2^* + (1-\theta)x_2^* - c(e).$$

Since (4) is false and (6) true, it is possible to raise x_2^* and lower x_1^* while holding total household expenditure constant. Since this raises Ω we have a contradiction. This proves that (4) and (5) must always hold. Hence (2) may be written as:

$$\Omega = \theta x_1 + (1-\theta)x_2 - c(e)$$

or further, by using (3), as:

$$\Omega = \theta x_1 + (1-\theta)(ew + \bar{w} - x_1) - c(e)$$ (7)

The household's aim is to maximize this by choosing x_1 and e.

From (7) it is easy to see that if $\theta \geq 1-\theta$, or

$$\theta \geq 1/2,$$ (8)

then the household will set x_1 as large as possible, to wit, $x_1 = a x_2$, since we already know that, if the budget constraint is given by AB in Figure 1, the household will always remain within line segment between points $\hat{a}$ and $\hat{b}$; and that at point $\hat{a}$, $x_1 = ax_2$. This coupled with the budget constraint (3), gives us

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$$x_1 = \frac{a}{1+a}(ew + \bar{w}).$$

Inserting this in (7) yields

$$\Omega = \theta a \frac{(ew+\bar{w})}{1+a} + (1-\theta)\frac{(ew+\bar{w})}{1+a} - c(e) \qquad (9)$$

Differentiating this with respect to e and setting it equal to zero, gives us the first-order condition:

$$\frac{\theta w(a-1) + w}{1+a} = c'(e) \qquad (10)$$

Next consider the case where (8) is violated, that is $\theta < 1/2$. Then the household

will set x_1 as small as possible (i.e. at point $\hat{b}$ in Figure 1). Hence $ax_1 = x_2$, which, along

with (3), imply $x_1 = (ew + \bar{w})/(1+a)$. Inserting this in (8), we get

$$\Omega = \frac{\theta(ew+\bar{w})}{1+a} + (1-\theta)\frac{a(ew+\bar{w})}{1+a} - c(e)$$

And from the first-order condition we obtain

$$\frac{\theta w(1-a) + aw}{1+a} = c'(e) \qquad (11)$$

Since $c''(e) > 0$, these first-order conditions automatically satisfy the second-order

conditions.

From (11) it is obvious that as θ rises, e must fall, since $1 < a$ and $c''(e) > 0$. Hence

starting from $\theta = 0$, up to $\theta = 1/2$, child labor falls as θ rises. Beyond 1/2, as θ rises

further, (10) becomes the relevant condition and so child labor will begin to rise. | |

Hence, what the theorem has shown is that the response of child labor to the index

of power of the wife looks as in Figure 2. If the parameters were exactly as specified

above the figure would have been a perfect U. But in this case we illustrate a slightly distorted case, as explained below.

Before venturing to empirical investigation, it should be clarified that there are other kinds of relations that *can* with a little ingenuity, be generated theoretically. By introducing a sharply diminishing marginal utility, the U-shaped relation can be altered. Some other possible relations are explored in Basu (2001). This is exactly what makes empirical work important in an area like this.

On the basis of some very plausible assumptions we have here established the U-shaped relation. The assumptions we need are essentially that both parents are united about child labor being undesirable but they disagree on what is the ideal consumption basket for the household. The rest of the many assumptions we made were purely for expositional convenience.

The exact U-shape, symmetric around • •= ½ is of course a consequence of the specific algebraic assumptions that we made. Also, in reality, the parents may have *some* difference of opinion about the cost of child labor. It could be that the mother considers this more costly than the father or vice versa. In such cases the U-shape can acquire some distortion, such as becoming, respectively, • •shaped (tau-shaped) or J-shaped. In fact the case illustrated in Figure 2 is one where the above result is distorted by adding the feature that that mother finds child labor more painful than the father. Hence, at • = 0 child labor is higher than when • = 1.

3. Data and Results

The data on child labor comes from the Nepal Living Standards Survey (NLSS) conducted in June, 1995 by the Household Survey Unit of the Central Bureau of Statistics (CBS). The latter (i.e. CBS) is under the National Planning Commission. The main objective of the NLSS is to collect data from Nepalese households and provide information to the government to monitor progress in national living standards and to evaluate the impact of various policies and programs on the living conditions of the population. The NLSS differs from other surveys that have been done in Nepal in gathering information on a variety of areas rather than focussing only on one area. The sample size for the NLSS is 3388 households. Further, this sample is divided into four strata based on the Geographic regions of the country: mountains, urban hills, rural hills and the *terai*. The questionnaire for the NLSS collected information at three levels: the household level, the individual level and information on specific items such as food items, land plots and type of crops.

Table 1 presents the sample means, along with standard errors, of some of the key variables of interest in our study. To get a sense of where Nepal stands vis-à-vis other developing nations, note that the average number of children in a Nepalese household is somewhat lower than the comparable sample means in the data sets of Peru (3.84) and Pakistan (5.61) reported in Ray (2000, Table 3). Moreover, the gender balance between the number of boys and girls in the household is much more even than that reported for Peru and Pakistan. On average, the most educated female member enjoys less than half the educational experience of the most educated male member of the household. While the ratio of child labor hours to that of the adult male in Nepal (0.19) is somewhat higher

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than that reported for Peru (0.12) and Pakistan (0.13) in Ray (2000, Table 3), the corresponding ratio of child labor hours to female labor hours in Nepal (0.24) is identical to that in Peru, but a good deal lower than that in Pakistan (0.60). The information on daily wages shows that a mild gender disparity in child wages in favor of girls is sharply reversed in adults (16-55 years) with the gap narrowing somewhat in the older age groups (56 +).

To put the theory to test, we need to locate a suitable variable that determines female bargaining or the amount of say that the female has in household decision-making. The determinants of power are many but it seems reasonable to suppose that the more educated a woman is the more power she will have or, the greater the income contribution she makes to the household, the more say she will have in household decision-making. Accordingly, this study uses, as a measure of the female's bargaining power in the household, the ratio (θ) of the educational experience (in years of schooling) of the most educated adult female member to the sum of the educational experiences of the most educated adult male and adult female members of that household. The empirical exercise, subsequently, establishes robustness of the qualitative impact of female bargaining power on child labor hours by using an alternative measure for such power, namely, the share ($\hat{\theta}$) of adult female earnings in total adult (i.e. non child) earnings.

Table 2 compares the sample means of θ, $\hat{\theta}$ and of some other key indicators between households with and without working children. The following points are worth noting: (i) the female's share of the household's educational experience (θ) is considerably lower than her share of adult earnings ($\hat{\theta}$), and (ii) the sharp fall in the ratio of rural to urban

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households from those with working children to those without suggests that the majority of Nepalese child laborers are in the rural areas.

Table 3 provides information on the share (at sample mean) of adult female, adult male and child earnings in total household's earnings, and on how these shares vary between households with and without working children. The share of child labor earnings in total household earnings in Nepal (5.6%) is nontrivial and is very close to the figure (5.9%) reported for Pakistan and much higher than that for Peru (1.6%) reported in Ray (2000, Table 4). Note that in the subsample of Nepalese households with working children, the share of child earnings rises to over 20%.

Let us now turn to the estimates. In the following discussion, we refer to e_1, e_2, e_3 as the aggregate labor hours worked, respectively, by adult females, adult males and children (0-15 years), and w_1, w_2, w_3 are the corresponding daily wage rates. The empirical exercise centers around the estimation of child labor hours (e_3) under alternative specifications. The basic child labor hours equation is specified as follows:

$$e_{3h} = \beta_0 + \beta_1 \theta_h + \beta_2 \theta_h^2 + \beta_3 (tpc)_h + \beta_4 n_{3h} + \beta_5 n_{4h} + \beta_6 w_{3h} + u_{1h} \tag{12}$$

where h denotes household, n_3, n_4 denote, respectively, the number of children in age groups 10-15 years and less than 10 years; tpc is the total per capita consumption. Note that tpc is used as a proxy for non child household income in the absence of reliable income information. Note, also, that as the estimated coefficients for n_1 (number of adult females) and n_2 (number of adult males) turned out to be insignificant, they were omitted in the estimations reported below.

The alternative specifications for the estimation of (12) are as follows.

(A)   OLS estimation of (12).

(B)   Estimation of (12) with Heckman correction for sample selection.

(C) Instrumental Variable Estimation (IVE) of (12) with tpc regarded as an endogenous regressor, and instrumented by a set of variables. The IVs used are: non child (i.e. adult) earnings, (adult earnings)^2, development region (DR, measured as a qualitative variable), rural/urban (RUR, measured as a dummy which takes the value 1 if household is rural, 0 if it is urban), n_1 (no. of adult males), n_2 (no. of adult females).

(D) Simultaneous Equation Estimation, using 3 SLS, of a 5 equation system consisting of (12) and the following 4 equations. (note: The household subscript, h, has been omitted for clarity)

$$e_1 = \gamma_0 + \gamma_1 w_1 + \gamma_2 w_2 + \gamma_3 N + \gamma_4 \, tpc + \gamma_5 \theta + \gamma_6 \theta^2 + u_2 \qquad (13)$$

$$e_2 = \alpha_0 + \alpha_1 w_1 + \alpha_2 w_2 + \alpha_3 N + \alpha_4 tpc + \alpha_5 \theta + \alpha_6 \theta^2 + u_3 \qquad (14)$$

$$tpc = \delta_0 + \delta_1 DR + \delta_2 RUR + \delta_3 n_1 + \delta_4 n_2 + \delta_5 n_3$$
$$+ \delta_6 n_4 + \delta_7 w_1 + \delta_8 w_2 + \delta_9 w_3 + u_4 \qquad (15)$$

$$\theta = \in_0 + \in_1 DR + \in_2 RUR + \in_3 n_1 + \in_4 n_2 + \in_5 n_3$$
$$+ \in_6 n_4 + \in_7 w_1 + \in_8 w_2 + \in_9 w_3 + u_5 \qquad (16)$$

where N ($= n_1 + n_2 + n_3 + n_4$) denotes the total number of household members, and

(u_2, u_3, u_4, u_5) are the stochastic error terms. The 3 SLS procedure, used in estimating (D) [i.e. equations (12) – (16)], besides recognizing the endogeneity of θ, tpc, also, allows mutual feedback between equations (12) – (16) through the non diagonal (5 × 5) variance matrix of the estimated errors of the 5 equation system. As already noted, we investigate the sensitivity of our results to the variable used to measure the female's bargaining power by re-estimating (D) with θ replaced by $\hat{\theta}$ ($= w_1 e_1/(w_1 e_1 + w_2 e_2)$) in the equations.

Since the focus of this paper is on e_3 [equation (12)], we report, in case of (D), only the 3 SLS estimates of equation (12), while those of equations (13) – (16) will be made available on request. Table 4 presents the estimates of equation (12) under the alternative specifications (A) – (D). In addition, the table also reports the 3 SLS estimates of equation (12) in the 5 equations system [equations (12) – (16)], with θ being replaced by $\hat{\theta}$ as a measure of female power. The latter is referred to as specification E. Note,

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incidentally, that the tables report robust standard errors correcting for an unknown form of heteroskedasticity. We, also, estimated a tobit regression model of the child labor hours, e_3 [equation (12)]. The coefficient (left censored) estimates and standard errors of this model, referred to as specification F, are presented in Table 5. In this paper, we have defined an 'adult' as an individual aged 16 years and above. However, to examine robustness of our principal empirical results to the definition of an 'adult', in the Heckman and 3SLS estimates reported in Table 4 (ie., specifications B, D), an 'adult' is defined to be an individual aged 20 years and above.

The following conclusions emerge from Tables 4, 5.

(i) The magnitudes of the estimated coefficients are fairly sensitive to the specification. However, the direction of impact, i.e. the sign of the estimate, is generally quite robust. For example, the child wage rate (w_3) and the number of girls, boys in the household (n_3, n_4) have significantly positive impact on child labor hours. Similarly, rising household affluence (as measured by tpc) either significantly reduces child labor hours (as in specifications A, C, E, F) or has no significant impact (as in specifications B, D).

(ii) Of particular interest in this study, are the estimated coefficients of θ, θ^2 (specifications A-D, F) and of $\hat{\theta}, \hat{\theta}^2$ (specification E). Tables 4 & 5 confirm that, while the magnitudes vary, the estimate of the linear coefficient (i.e. of θ, $\hat{\theta}$) is negative and highly significant and that of the quadratic coefficient (i.e. of θ^2, $\hat{\theta}^2$) is positive and highly significant in most cases. The IV estimates of θ, θ^2 (specification C), which are both statistically insignificant, are the main exception. In other words, conditional on the other household characteristics remaining unchanged, the relationship between e_3 and θ (or $\hat{\theta}$) is U shaped (or, more precisely, tau-shaped) exactly as predicted in the previous section. It is important to note that this U shaped relationship is quite robust to specification.

(iii) To throw further light on the impact of female's bargaining power ($\theta, \hat{\theta}$) on child labor hours, we plot the graphical relationship between the two under the alternative specifications (A) – (F), with the other variables held constant at the sample means. The graphs, presented in Figs. 3(a) – 3(f), all confirm that as we move from a state of negligible female power (i.e. θ, $\hat{\theta} \simeq 0$) to one where it is nearly absolute (i.e. θ, $\hat{\theta} \simeq 1$), child labor hours (e_3) initially decline but, then,

increase, as women begin to dominate men in terms of their educational experience or their labor earnings.

(iv)   These graphs, also, largely agree on another interesting finding. While the initial decline in e_3, with increasing θ (or $\hat{\theta}$), is reversed beyond a critical θ (or $\hat{\theta}$), the value of e_3 at $\theta = \hat{\theta} = 1$ is less than that at $\theta = \hat{\theta} = 0$. In other words, child labor hours, when male power is fully dominant ($\theta = \hat{\theta} = 0$), exceed that when female power dominates completely ($\theta = \hat{\theta} = 1$). In other words, the incidence of child labor as a function of female power is τ-shaped.

In closing we should mention that in this study we have made no effort to distinguish between male and female child labor. From the piecemeal evidence that is available on this we know that the gender of the child makes a difference; that the incidence of girl and boy labor can be very different and they may respond to different variables. However, our theoretical analysis suggests that even if the incidence of male and female child labor happens to be different, each one's response to changes in the structure of power in the household should be the same in the sense of both being tau-shaped. Nevertheless, this is a subject of interest and deserving of future empirical investigation.

4. Policy

As awareness of the enormous problem of child labor worldwide has increased, there has occurred a rise in research trying to identify the determinants of child labor. This research has the value of informing policymakers how best to mitigate the problem of child labor. While studies have isolated factors such as parental income, parental education, school quality, incentives given for attending school, credit availability (see, for instance, Basu and Van, 1998; Basu, 1999; Ravallion and Wodon, 2000; Ray, 2000;

Baland and Robinson, 2000), there have been very few studies on the relation between the balance of power in the household between the husband and the wife and its impact on child labor.

The results derived in this paper show that from the point of view of child labor it is best to have households where power is evenly balanced, that is, neither the man (and, more surprisingly) nor the woman should have a disproportionate amount of power.

While previous studies have shown that higher parental education makes child labor less likely, our study shows that there are greater subtleties involved in this relation. While it may be better, ceteris paribus, to have more-educated adults, the incidence of child labor is kept at its lowest by achieving a more balanced level of education among the parents. Since most developing countries are characterized by a disproportionately low level of education and literacy among women, our study provides additional reason why female education ought to be emphasized in developing countries.

Table 1: Selected Household Characteristics in Nepal (Sample Mean)

Characteristic	Sample Mean[a]
Number of children in the household	2.70 (2.08)
Ratio of girls to boys	0.97 (1.12)
Ratio of the most educated woman's educational experience to that of the most educated man in the household[b]	0.46 (0.62)
Daily Child Wages of Girls (10 – 15 years)	Rs. 44.32 (38.33)
Daily Child Wages of Boys (10 – 15 years)	Rs. 38.70 (24.06)
Daily Adult Wages of Females (16 – 55 years)	Rs. 51.35 (47.71)
Daily Adult Wages of Males (16 – 55 years)	Rs. 86.42 (71.99)
Daily Adult Wages of Elderly Females (56 years +)	Rs. 51.46 (65.04)
Daily Adult Wages of Elderly Males (56 years +)	Rs. 61.31 (48.32)
Ratio of child labor hours to adult female labor hours	0.24 (0.57)
Ratio of child labor hours to adult male labor hours	0.19 (0.41)
Rural (=1) or Urban Household (=0)	0.79 (0.41)

[a] Figures in parentheses denote standard deviations.

[b] Measured in years of schooling.

Table 2: Comparison of Selected Household Characteristics Between Households With and Without Working Children

Characteristic	Sample Mean[a]	
	Households with Working Children $(e_3 > 0)$	Households without Working Children $(e_3 = 0)$
Woman's Share of Educational Experience (θ)	0.40 (.31)	0.39 (0.32)
Woman's Share of Earnings $(\hat{\theta})$	0.27 (0.29)	0.29 (0.29)
Percentage of Total Consumption Spending on Education	0.0228 (.043)	0.0289 (.053)
No. of Adult Women (16 years and above)	2.89 (1.81)	2.64 (1.67)
No. of Adult Men (16 years and above)	3.02 (2.10)	2.71 (1.89)
No. of Girls (0 – 15 years)	1.91 (1.44)	0.51 (0.80)
No. of Boys (0 – 15 years)	2.04 (1.76)	1.70 (1.56)
Rural (=1) or Urban (=0) Household	0.87 (0.33)	0.75 (0.43)
Adult Earnings	Rs. 12.13 (11.80)	Rs. 21.94 (22.41)

*a*Figures in parentheses denote standard deviations.

Table 3: Shares of Household Earnings in Nepal

Household Member	Sample Mean[a]		
	Households with Working Children $(e_3 > 0)$	Households Without Working Children $(e_3 = 0)$	All Households
Woman's Share	0.331 (.207)	0.389 (.316)	0.374 (.292)
Man's Share	0.458 (.251)	0.611 (.316)	0.570 (.308)
Child's Share	0.211 (0.165)	--	.056 (.126)

[a]Figures in parentheses denote standard deviations.

Table 4: Estimates of Child Labor Hours Under Alternative Specifications[a]

Variable	Coefficient Estimate				Variable	Coefficient Estimate
	OLS (A)	Heckman Correction (B)	IV[b] Estimation (C)	3 SLS[c] Estimation (D)		3 SLS[d] Estimation (E)
Female's Share of Adult Education (θ)	-0.145[e] (.061)	-1.73e-7[e] (3.35e-8)	-0.054 (.069)	-0.974[e] (.480)	Female's Share of Adult Earnings $(\hat{\theta})$	-0.278[e] (.110)
θ^2	0.145[e] (.067)	1.19e-7[e] (3.40e-8)	0.055 (.073)	1.041 (.559)	$\hat{\theta}^2$	0.207[e] (.100)
Total per capita consumption (tpc)	-9.21e-7[e] (4.66e-7)	-2.79e-13 (1.73e-13)	-4.26e-6[e] (1.45e-6)	7.98e-7 (3.56e-6)	tpc	-8.59e-6[e] (1.47e-6)
No. of Girls (n_3)	.109[e] (.021)	.114[e] (0.017)	.108[e] (.021)	.130[e] (.007)	n_3	0.130[e] (.007)
No. of Boys (n_4)	.019[e] (.007)	.011[e] (.005)	.014[e] (.007)	.021[e] (.005)	n_4	.016[e] (.004)
Child Wage Rate (w_3)	.013[e] (.002)	.015[e] (.001)	.013[e] (.002)	.014[e] (.0004)	w_3	.014[e] (.0004)
Constant	-.029 (.021)	-.022 (.013)	.002 (.025)	-.025 (.023)	Constant	.071 (.030)

[a]Robust Standard Errors in parentheses.

[b]Hausman Test for H_0: Difference between OLSE (Specification A) and IVE (Specification C) is not systematic is: $\chi_5^2 = .08$ i.e. H_0 is not rejected. See text for a list of the instruments used.

[c]Breusch Pagan Test for H_0 : Variance Matrix for Specification D is diagonal is $\chi_{10}^2 = 246.332$ i.e. H_0 is rejected.

[d]Breusch Pagan Test for H_0 : Variance Matrix for Specification E is diagonal is $\chi_{10}^2 = 923.116$ i.e. H_0 is rejected.

[e]Statistically significant at 5% level.

Table 5: Tobit Estimates[a] of Child Labor Hours (Specification F)

Variable	Coefficient Estimate
Female's Share of Adult Education (θ)	-0.649[b] (.269)
θ^2	0.725[b] (.307)
Total Per Capita Consumption (tpc)	-.000031[b] (6.68e-6)
No. of girls (n_3)	0.405[b] (.032)
No. of boys (n_4)	.027 (.015)
Child Wage Rate (w_3)	.030[b] (.001)
Constant	-1.136 (.086)

[a]Standard Errors in Parentheses.

[b]Statistically significant at 5% level.

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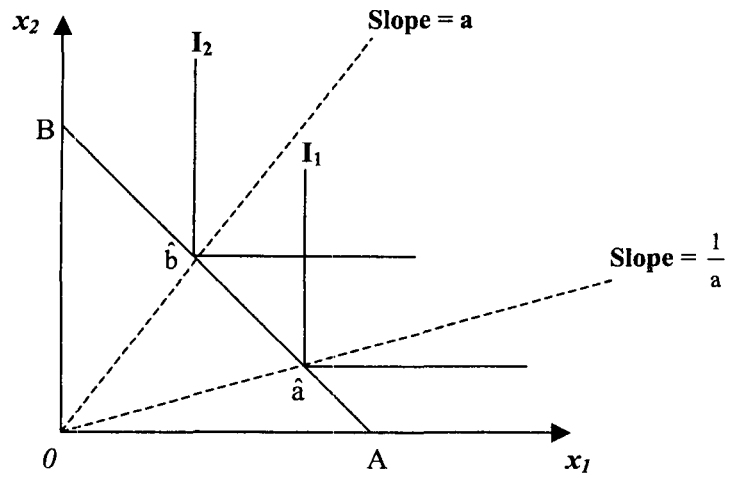
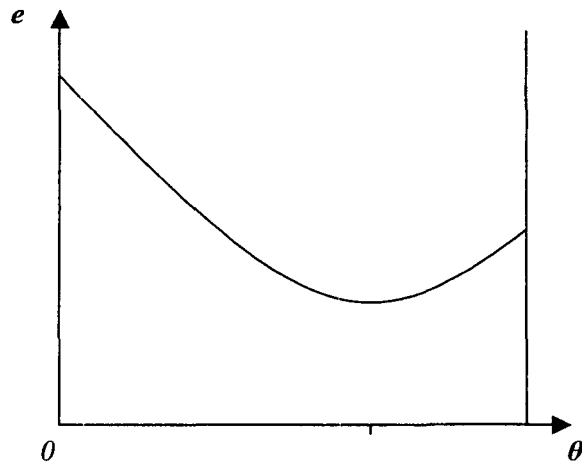**Figure 1: Indifference Curves**

Figure 1: Indifference Curves

Figure 2: The Incidence of Child Labour

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Figure 3: Relationship Between Child Labor Hours and Female Power Under Alternative Specifications*
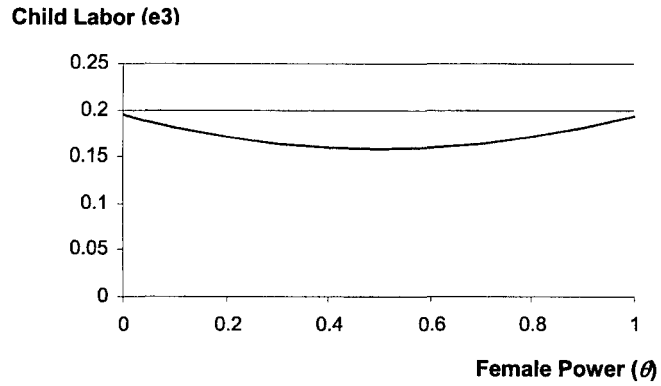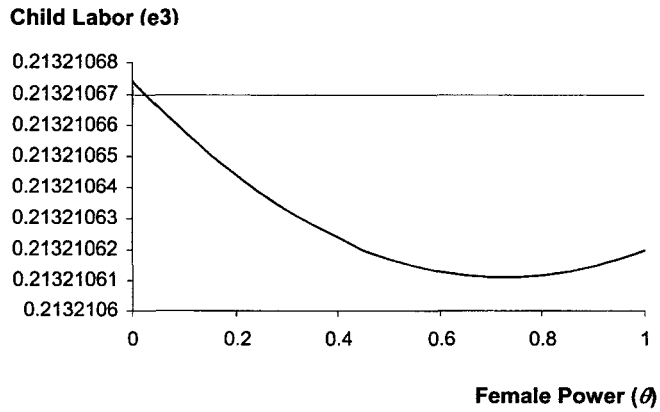
Figure 3(a). OLS

Child Labor (e3)

Female Power (θ)

Figure 3(b). Heckman Model

Child Labor (e3)

Female Power (θ)

* Child labor is measured in standard days. Other variables in each regression were held fixed at their mean value.
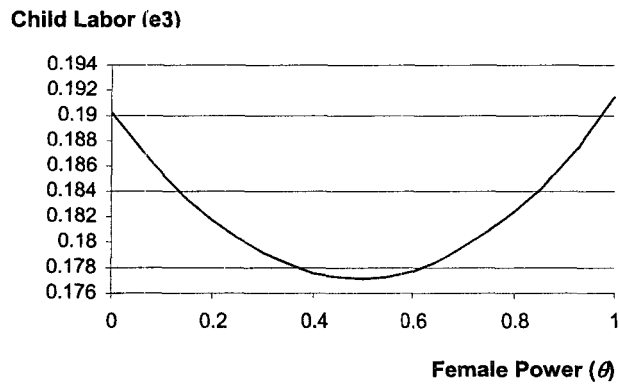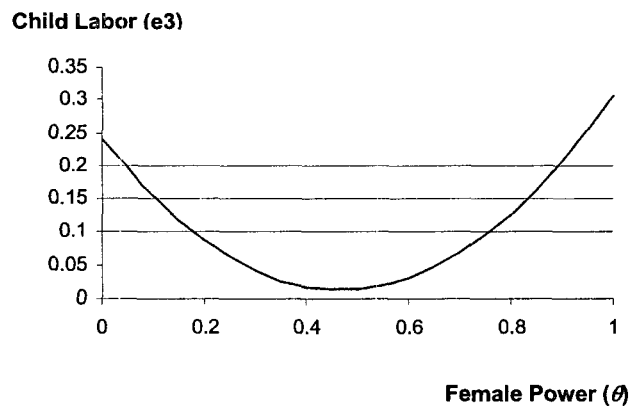
Figure 3(c). IV Model[*]

Child Labor (e3)

Female Power (θ)

Figure 3(d). 3SLS Model, θ

Child Labor (e3)

Female Power (θ)

[*] Note that the coefficients of θ, θ^2 are both statistically insignificant [see Table 4]. Since the coefficients in the other models are significant, the insignificance here may indicate that the instruments are not the most appropriate.
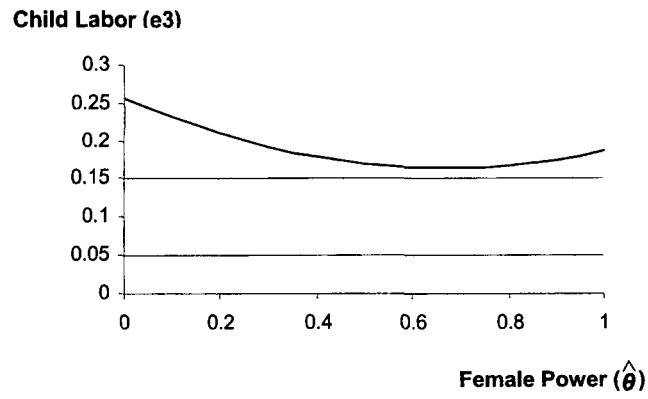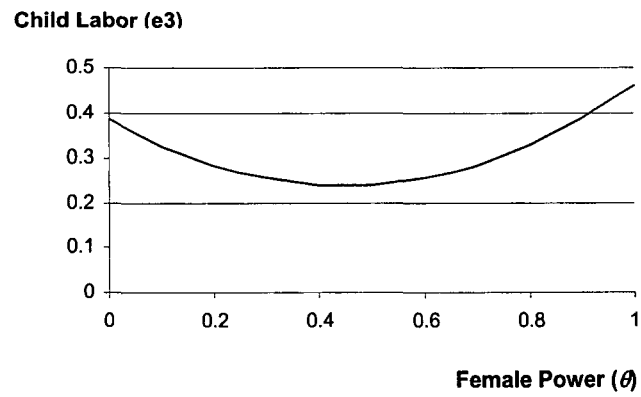
Figure 3(e). 3SLS Model, $\hat{\theta}$

Child Labor (e3)

Female Power ($\hat{\theta}$)

Figure 3(f). Tobit Model

Child Labor (e3)

Female Power (θ)

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