Determinants of child labor

Lorenzo Rocco

Department of Economics, Padova

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Edmonds and Schady (2009)

- More than one in five children in the world work (215m). Most of these working children reside in poor countries.
- Investors (parents) weigh the returns to investments in education less than the costs (monetary and non-monetary) which include the foregone economic contribution of children.
- It is not clear whether parents fully internalize children costs of working when they decide about children work.
- Consequences of child labor
  - foregone future monetary earnings and non monetary benefits of human capital accumulation.
  - physical and mental health consequences

Luxury axiom

What are the causes of child labor?

- poverty (the main cause)
- lack of schools
- lack of incentives to parents

This paper tests the implications of the luxury axiom (Basu and Van, 1998) in Ecuador.

- Parents do not like to send their children to work if they can afford not to. Only if households are below the subsistence level they accept of sending their children to work removing them from school. As soon as their income exceeds the threshold of subsistence they hold children at school $\Longrightarrow$ attending school is a luxury good (elasticity of consumption wrt to income is large)

Implications of the luxury axiom

Given that child's wage and paid work-time is discrete, an exogenous increase in income

1. should reduce child work (i.e. paid work; excluded unpaid work in family business/farm)
2. should be less effective for children already at work: this behavior reveals that households are below the subsistence level. Gap difficult to fill since children requirements of food increase with age
3. should increase school enrollment
4. could imply an expenditure drop (households would accept to forgo child's wage and cut expenditures at the subsistence level if their other income sources allow to meet the subsistence level).

In Ecuador the exogenous income increase is provided by the BDH.

The BDH

- In Ecuador, as in several other Latin American countries, there exists a cash transfer program, the Bono de Desarrollo Humano (BDH), since 2003, that has replaced the Bono Solidario, in place since 1998.
- To better target the program to the poor, under BDH only the poorest two quintiles of the population are eligible (no well defined targeting under Bono Solidario).
- An index of household wealth, the Selben Index, as been defined by Statistics Ecuador, based on observable and easily measurable household assets and household composition, highly correlated with per-capita expenditure (a proxy for income).
    - Index derived from principal component analysis. Based on a survey conducted on a representative sample of Ecuadorian households, the Enquesta de Condiciones de Vida (ECV). The cutoff for eligibility was set to the 40th percentile of the ECV sample.

The BDH

- All households can ask to be assigned a Selben score by reporting info about their assets and composition.
- In the BDH program eligible households continue to receive transfers more or less indefinitely.
- The Selben index was updated in 2008-09.

Background

- Ecuador is divided in provinces, cantons and parishes.
- The rollout of BDH explicitly contained a randomized component in 4 of Ecuador's 24 provinces.
- Within provinces selected for the evaluation, parishes were randomly drawn.
- Within selected parishes, BDH eligible households were randomly sorted into BDH recipient households (lottery winners) and non-recipients (lottery losers).
- Within a community, both lottery winners and losers are observed.

Note:

- Households formerly receiving Bono Solidario transfers were excluded from the evaluation prior to lottery assignment.
- Lottery losers were taken off the roster of households that could be activated to receive BDH transfers.

Background

- The BDH is $15 per household per month, 7 percent of monthly expenditures for recipient households. The amount does not vary across eligible families.
- The transfer is paid to mothers, and does not have any condition attached to it (for instance is not conditioned to enroll children to school). It is a pure income transfer.
- Households assigned to the control group was folded into the program two years after the collection of the baseline (after the follow-up survey).

Randomization

- Randomization is the most simple experimental strategy.
- People are randomly assigned to treatment.
  - This implies that individual characteristics are orthogonal to the treatment.
  - This implies also that the distribution of characteristics should be very similar among the treated and the non-treated, provided that the pool which treated and controls are drawn from is sufficiently large.
  - Therefore the control group is a good approximation of the counter-factual of the treated group (i.e. the treated group in the absence of treatment).
- Provided that assignment to treatment and take up coincide, the effect of the treatment is given by

$$E(Y|T=1) - E(Y|T=0)$$

(News from the Backstage)

- The original design of the evaluation was meant to be a regression-discontinuity study of the impact of the benefit amount. Thus, the sample was limited to households around the threshold of the first and second Selben quintiles.
- The government decided to make transfers of the same magnitude to all households $\Longrightarrow$ switch from a regression discontinuity strategy to one based on randomization
- Because the baseline survey was already being collected (that on households around the threshold), the households originally drawn were randomly assigned to treatment or control groups.
    - Households assigned a normally distributed random number with mean zero and standard deviation one. All households with values zero or higher were assigned to the treatment group.

Data

- baseline interview on both treated and control groups before the beginning of the cash transfer program: measure of relevant base-line household characteristics (June-August 2003)
- follow-up survey (January to March 2005) detailed time allocation, schooling information, expenditures

Randomization successful in attaining balanced treatment and control samples (overall 2153 children aged 10 and older at the baseline), excepting for gender and total hours in domestic work.

Table 1: Differences in Time Allocation at Baseline by Treatment Status

Children 10 and older at baseline

	Variable (b/se)	Treatment Group	Control Group	Mean Difference	Regression Adjusted Difference
	Sample Size	1,124	1,029	2,153	2,153
Time Allocation	Paid Employment	0.12	0.12	0.00	0.00
		(0.01)	(0.01)	(0.02)	(0.02)
	Unpaid Market Work	0.43	0.42	0.01	0.01
		(0.01)	(0.02)	(0.03)	(0.02)
	Domestic Work	0.82	0.83	-0.01	-0.01
		(0.01)	(0.01)	(0.02)	(0.02)
	Total Hours Last Week, Market Work	9.48	8.79	0.68	0.57
		(0.45)	(0.44)	(0.62)	(0.59)
	Total Hours Last Week, Domestic Work	9.10	8.40	0.70**	0.21
		(0.27)	(0.25)	(0.35)	(0.37)
	School Enrollment	0.70	0.71	-0.01	0.00
		(0.01)	(0.01)	(0.03)	(0.02)
	Out of School or in Paid Employment	0.32	0.31	0.01	0.00
		(0.01)	(0.01)	(0.03)	(0.03)
Individual Characteristics	Age (at baseline)	13.03	12.98	0.05	n/a
		(0.05)	(0.06)	(0.07)	
	Male	0.47	0.52	-0.05**	n/a
		(0.01)	(0.02)	(0.02)	
	Speaks Indigenous Language	0.10	0.08	0.02	n/a
		(0.01)	(0.01)	(0.02)	
	Has Disability	0.01	0.01	0.00	n/a
		(0.00)	(0.00)	(0.01)	
	Oldest Resident Child	0.59	0.59	-0.01	n/a
		(0.01)	(0.02)	(0.02)	
	Oldest Resident Girl	0.40	0.37	0.02	n/a
		(0.01)	(0.02)	(0.02)	
	Mother Present	0.93	0.94	-0.01	n/a
		(0.01)	(0.01)	(0.02)	
	Mother's Years of Education	3.72	3.51	0.21	n/a
		(0.09)	(0.09)	(0.15)	
	Father Present	0.82	0.83	-0.01	n/a
		(0.01)	(0.01)	(0.03)	

Household Characteristics	Rural Locality	0.53	0.49	0.04	n/a
		(0.01)	(0.02)	(0.03)	
	Household Size	6.15	6.14	0.01	n/a
		(0.06)	(0.06)	(0.12)	
	# School Age Children Present	2.73	2.65	0.08	n/a
		(0.04)	(0.04)	(0.08)	
	# Children 0 to 5 Present	0.51	0.47	0.03	n/a
		(0.02)	(0.02)	(0.05)	
	Total Monthly Expenditure	227.61	230.74	-3.13	n/a
		(4.87)	(4.12)	(7.19)	

All characteristics are at baseline. Regression adjustment includes parish fixed effects and all controls from "Age" down to "Total Monthly Expenditure" marked with "n/a". Household Size, Age, # school age, and # children are included as dummy variables in all regressions. For each characteristics, the standard error is reported on the line below the mean. Standard errors are corrected for clustering at the parish level. ** is significant at 5 percent. * is significant at 10 percent.

Leakage

- In this experiment, assignment to treatment and take up do not coincide
  - 39 percent of the control sample receives the BDH (the list of lottery losers not immediately passed on and when households started receiving the transfer it was political unfeasible to withhold it)
  - 32 percent of household assigned to treatment do not take up the program (lack of information, cost of traveling to the bank, stigma)

Therefore

- intention to treat (i.e. assignment to treatment) is exogenous
- actual treatment is endogenous (because take up is endogenous)

The model

Reduced form model (effect of the intention to treat):

$$e_{ip1} = \alpha + \lambda_p + \lambda_a + \beta X_{i0} + \delta E_{i0} + \gamma_r l_i + \varepsilon_{ip} \quad (1)$$

- e_{ip1} dummy indicating whether children i in parish p is in paid work at the follow-up (1)
- $\lambda_p$are parish fixed effects
- $\lambda_a$are age dummies
- X_{i0}children and household level characteristics at the baseline (0), number of children 0-5, number of children in school age at the baseline (all dummies) - see Table 1
- E_{i0}baseline (0) time allocation characteristics - see Table 1
- l_i outcome of the lottery (win / lose)

The model

2SLS: the effect of transfer receipt t_i (a dummy variable):

$$e_{ip1} = \alpha + \lambda_p + \lambda_a + \beta X_{i0} + \delta E_{i0} + \gamma_{2s} t_i + \gamma_Z t_i Z_{i0} + \varepsilon_{ip} \qquad (2)$$

- t_i is endogenous because the take-up is endogenous.
- $t_i$is then instrumented by l_i
- we investigate whether the effect of the transfer (γ_{2s}, 2s is for second stage) varies with some baseline characteristic Z_{i0}
  - at school or at work at the baseline
  - other children at home

Recall:

$$\gamma_{2s} = \frac{\gamma_r}{\gamma_{1s}}$$

The lottery rises the probability of receiving the BDH by 31.9 percentage points: this comes from the first stage (1s) regression of t_i on l_i (and the same controls as in (2))
Therefore

$$\gamma_{2s} = \frac{1}{0.319}\gamma_r = 3.13\gamma_r$$

Table 2: Impact of BDH on Paid Employment

Children 10 and older at baseline

	Reduced Form	Two Stage Least Squares				
	(1)	(2)	(3)	(4)	(5)	(6)
Reduced Forms						
Lottery Winner	-0.022					
	(0.015)					
BDH Recipient		-0.070	-0.118**	-0.325**	-0.103	-0.395**
		(0.047)	(0.053)	(0.129)	(0.063)	(0.119)
Interactions: (BDH Recipient * Baseline Characteristics)						
Baseline Characteristics: Out of school or In Paid Employment			0.147			
			(0.114)			
Baseline Characteristics: Additional school age children present				0.328**		0.377**
				(0.162)		(0.145)
Baseline Characteristics: Children under 5 present					0.105	0.239
					(0.127)	(0.166)
Baseline Characteristics: Additional school age * children under 5 present						-0.175
						(0.123)

All regressions based on 2153 children observed in both baseline and follow-up periods. All regressions include parish fixed effects and controls for all characteristics listed in table 1. Household Size, Age, # school age, and # children are included as dummy variables in all regressions. Robust standard errors are corrected for clustering at the parish level. Columns 2-6 instrument for BDH receipt with an indicator for whether an individual won the BDH lottery. Interactions of BDH receipt with the indicated baseline characteristics are instrumented with lottery assignment interacted with the specified baseline characteristic variable. * is significant at 10 percent. ** is significant at 5 percent.

Results

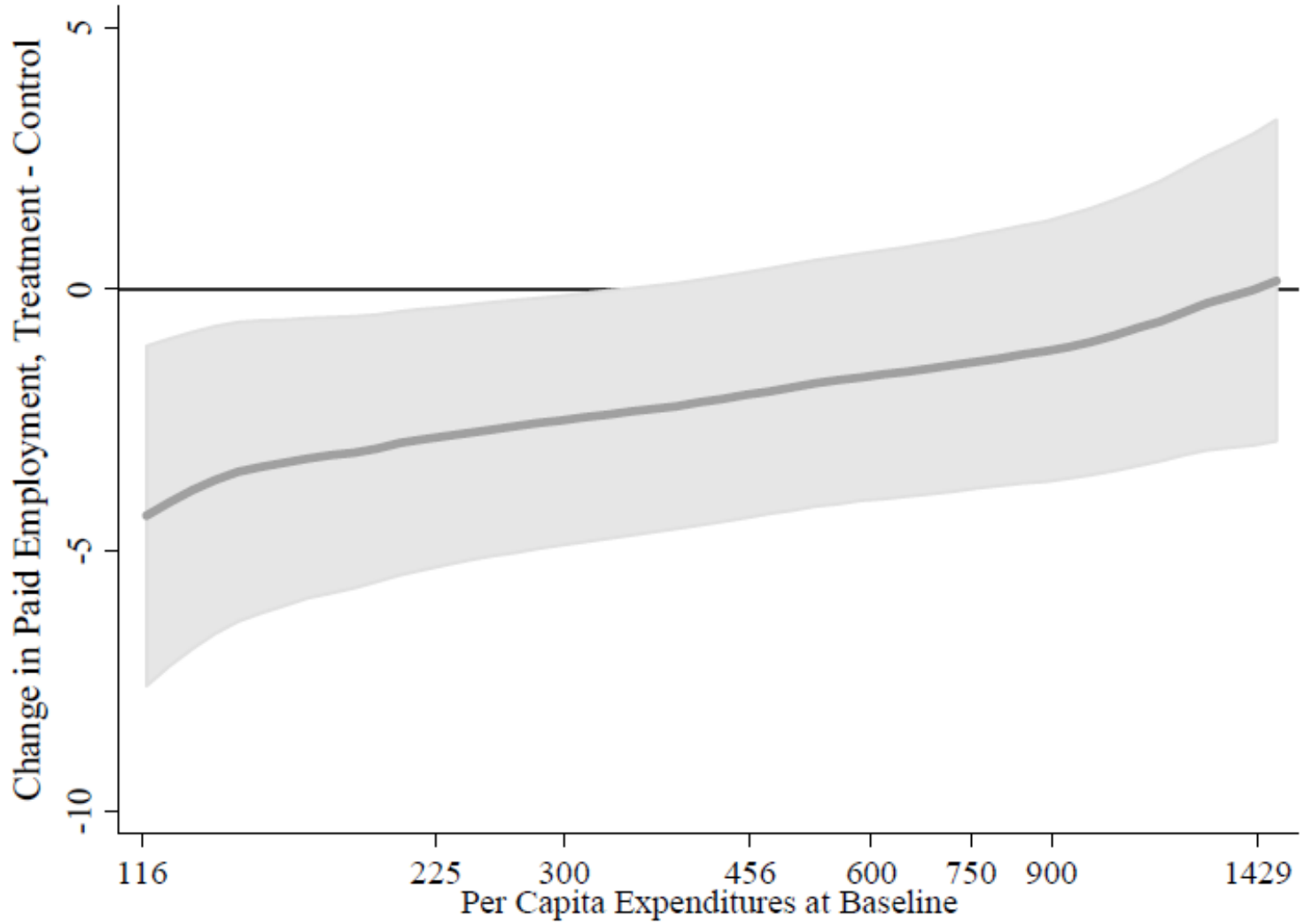
- Winning the BDH lottery is associated with a 2.2 percentage point decline in the probability a child aged 10+ works for pay at follow-up.
- IV results imply that BDH receipt is associated with a 7.0 percentage point decline in child labor.
- 17 percent of control children work for pay at follow-up $\Longrightarrow$ the BDH is associated with a 41 percent reduction in child labor.
- The decline in work for pay is entirely due to children out of work at baseline ("per-transition" children) (12 percentage point decline)

Remark: median child wage is \$80 per month. The BDH was \$15: if the transfer is large enough to pull the household above the subsistence level, households are ready to renounce to some income. Not so if the child is already at work at the baseline: in this case switching costs, both psychological and material (buy new books?) could be too large.

Results

- The effect is larger among the poorest (see Figure 4)
  - Note about Fig. 4: children at school at the baseline are partitioned according to hh log expenditure per capita. The effect of BDH is estimated separately for each level of log expenditure per capita and reported in the picture.
- There is also less participation to unpaid marked work, a bit more participation to domestic work, less total hours and more school enrollment
- Finally some evidence that expenditures decline (imprecise estimates, the sign is ok)

FIGURE 4: LOTTERY EFFECTS ON PAID EMPLOYMENT BY PCX AT BASELINE



Results

Table 3: Treatment Effects (2SLS) on Time Allocation

Children 10 and older at baseline

		Unpaid Market Work		Domestic Work		Total Hours		Enrolled in School	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BDH Recipient		-0.218**	0.068	0.078	0.155	-3.652	-9.192*	0.157*	0.218**
		(0.067)	(0.104)	(0.056)	(0.096)	(3.110)	(4.639)	(0.080)	(0.108)
Interactions: (BDH Recipient * Baseline Characteristics)									
Baseline Characteristics	Out of school or In Paid Employment	0.065		-0.141*		0.993		0.009	
		(0.116)		(0.081)		(4.648)		(0.139)	
	Additional school age children present		-0.329**		-0.081		8.905**		-0.064
			(0.137)		(0.111)		(4.435)		(0.100)
	Children under 5 present		-0.139		-0.279**		-0.437		-0.061
			(0.229)		(0.134)		(7.122)		(0.131)
	Additional school age * children under 5 present		0.140		0.111		-3.806		0.039
			(0.112)		(0.129)		(4.648)		(0.109)

All regressions based on 2153 children observed in both baseline and follow-up periods. See notes to Table 2 for a listing of all included controls. Robust standard errors are corrected for clustering at the parish level. All regression results are the result of instrumenting for BDH receipt with lottery assignment and for the BDH interaction with the lottery assignment interacted with the listed variable. * is significant at 10 percent. ** is significant at 5 percent.

Results

Table 4: Treatment Effects (2SLS) on Expenditures
Children 10 and older at baseline

		Total		Food		Nonfood		Housing		School	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
BDH Recipient		-2.271	-13.589	-1.851	10.831	-10.271	-43.807	5.966	8.509	3.885	10.879**
		(27.594)	(49.703)	(16.349)	(21.319)	(13.198)	(35.223)	(7.717)	(7.915)	(5.739)	(3.882)
Interactions: (BDH Recipient * Baseline Characteristics)											
Baseline Characteristics	Pre-transition	-25.456		-17.707		-4.493		-4.500		1.245	
		(36.440)		(18.633)		(23.614)		(9.981)		(6.186)	
	Additional school age children present		23.555		-20.628		43.488		4.497		-3.803
			(58.320)		(27.228)		(41.259)		(9.499)		(7.443)
	Children under 5 present		-36.635		-12.680		-8.593		-13.111		-2.251
			(54.655)		(27.940)		(32.593)		(15.552)		(8.077)
	Additional school age * children under 5 present		-15.804		6.469		4.447		-14.325		-12.395**
			(35.649)		(18.240)		(21.076)		(10.333)		(5.543)

All regressions based on 2153 children observed in both baseline and follow-up periods. Robust standard errors are corrected for clustering at the parish level. We instrument for receipt of BDH transfer with lottery assignment and for the BDH interaction with the lottery assignment interacted with the listed variable. * is significant at 10 percent. ** is significant at 5 percent.

Conclusions

Results are all consistent with the implications of the luxury axiom.

- The exogenous increase in income allows families to meet their subsistence needs without child labor's contribution. We observe a 40 percent decline in child labor even though the BDH is less than 20 percent of foregone earnings.
- Declines in child labor are entirely among pre-transition children who have not yet left school. Children already in paid employment at baseline are not affected by the transfer.
    - the interpretation of the findings is that the transfer delays the age at which a child transitions to paid employment.
- The luxury axiom implies possible declines in expenditures because of foregone income from child labor. We observe declines in total expenditures that are similar in magnitude to foregone child labor earnings (but imprecisely estimated)

Basu et al. (2010)

Recent evidences challenge the view that poverty is the main cause of child labor.

- Dumas, 2007, argues that child labor is mainly explained by labor market imperfections in Burkina Faso
- Bhalotra and Heady, 2003, observe that children of land-rich households are often more likely to be in work than the children of land-poor households. They suggest that this paradox can be explained by failures of the markets for labor and land in rural Pakistan and Ghana. However the wealth paradox persists for girls in both countries, whereas for boys it disappears after conditioning on other covariates.

Basu et al. (2010)

The purpose of this paper is that of discussing how poverty and market imperfections interact in explaining child work.

- Example: suppose that poor household would accept to send their children to work to escape extreme poverty.
  - Labor market imperfection (e.g. labor demand far away) could prevent households to do so even if they want to.
  - If households acquired some new land, we would observe child labor because now there would be demand for it.
  - If land increased above a given threshold, the luxury axiom would imply that children will not work even if there is demand of child work.
  - This pattern is consistent with a inverted U-shaped relation between wealth and child work.

In this paper child work is defined as domestic work and unpaid work in family farm, because of the rural Indian context analyzed, where there is little waged work, agriculture is the dominant activity and land is the main form of wealth.

Outline of the paper

1. model of child labor in perfect labor market. The resulting relation between land (wealth) and child labor is monotonically decreasing
2. model of child labor with imperfect labor markets. The resulting relation between land and child labor is ambiguous and up to certain assumptions, inverted-U shaped
3. empirical assessment of the relation between inherited land (exogenous endowment) and child labor, confirms predictions of point 2

The theoretical model

- Households treat child leisure or school time as a luxury good.
- There is one adult in each household who will supply 1 unit of work on the labor market regardless of the wage level.
- Let's assume that wage is the same for adults and childs. Let it be w.
- Households own k units of land.
- HHs utility function is $u(x, e) = \phi(x) - c \cdot e$ where
  - x is total consumption
  - $e \in [0, 1]$ is the amount of child work.
  - Utility function is quasi-linear with $\phi' > 0$ and $\phi'' < 0$ and $c > 0$ is the utility cost of child work.
- Let's check that child leisure $1 - e$ is a luxury good according to this utility function.
  - Suppose you increase income: income can be used to buy consumption x or to reduce child labor e. When x is sufficiently high, the marginal utility of reducing child work, exceeds the marginal utility of adding to consumption.

Perfect labor market case

Each household can buy or sell each amount of labor at the wage w
Given their amount of land, each household can earn an (optimal) agricultural profit equal to

$$\pi(k, w) = max_l \, f(k, l) - wl$$

where l is hired labor and of course $\pi_k(k, w) > 0$
The resulting level of consumption is

$$x = \pi(k, w) + (1 + e)w$$

i.e. agricultural profits plus own labor revenues.

Perfect labor market case

Next, households maximize their utility by determining e.
Note that utility maximization is separated from profit maximization

- under complete markets, the separation theorem holds, i.e. the two choices are separated in the sense that the one does not constraint the other (the choice about how much child labor using does not influence the optimal amount of labor l to be hired on household land).

$$max_e \, \phi\left(\pi(k,w) + (1+e)w\right) - ce$$

The first order condition is

$$\phi'\left(\pi(k,w) + (1+e)w\right) w - c = 0$$

whose total differentiation with respect to k and e yields:

$$\phi''\left(\pi(k,w) + (1+e)w\right) w\pi_k(k,w)dk + \\ + \phi''\left(\pi(k,w) + (1+e)w\right) w^2 de = 0$$

Perfect labor market case

Re-arranging terms we get

$$\frac{de}{dk} = -\frac{\pi_k(k, w)}{w} < 0$$

Child labor monotonically decrease with land.

No labor market case

We consider the extreme case where labor market is absent and workers are immobile (less extreme imperfection yields similar results). Therefore each households has only its own labor endowment to be used in its land. Now the separation theorem fails: profits maximization depends on e^*.
Household production is

$$q = f(k, 1 + e)$$

So that utility maximization is

$$max_e \, \phi\left(f(k, 1 + e)\right) - ce$$

The corresponding first order condition is

$$\phi'(\cdot) f_e(\cdot) - c = 0$$

No labor market case

The total differential of the foc with respect to k and e is

$$\left[\phi'' f_k f_e + \phi' f_{ek}\right] dk + \left[\phi'' f_e^2 + \phi' f_{ee}\right] de = 0$$

i.e.

$$\frac{de}{dk} = -\frac{\left[\phi'' f_k f_e + \phi' f_{ek}\right]}{\left[\phi'' f_e^2 + \phi' f_{ee}\right]}$$

The denominator is certainly negative, the sign of the numerator is ambiguous.

No labor market case

Assume that

$$\phi(x) = \begin{cases} Ax - \frac{Z}{2}x^2 & , \text{ if } x < \frac{A}{Z} \\ \frac{A^2}{2Z} & , \text{ if } x \geq \frac{A}{Z} \end{cases}$$

(initially concave and than flattens out)
Assume also that the production function is Cobb-Douglas

$$f(k, 1+e) = mk(1+e)$$

Household problem is then

$$max_e \begin{cases} Amk(1+e) - \frac{Z}{2}\left[mk(1+e)\right]^2 - ce & , \text{ if } mk(1+e) < \frac{A}{Z} \\ \frac{A^2}{2Z} - ce & , \text{ if } mk(1+e) \geq \frac{A}{Z} \end{cases}$$

Note: given that the marginal cost of e (i.e. c) is always positive, the optimal solution cannot be for a level of e such that $\phi'(x) = 0$, i.e. it cannot occur in the flat part of ϕ.

No labor market case

The optimal level of child labor is such that (foc of the upper case)

$$Amk - Zm^2k^2(1+e) - c = 0$$

i.e.

$$e* = \left[A - \frac{c}{mk}\right]\frac{1}{Zmk} - 1$$

The maximum level of $e*$ is attained for $k = \frac{2c}{Am}$

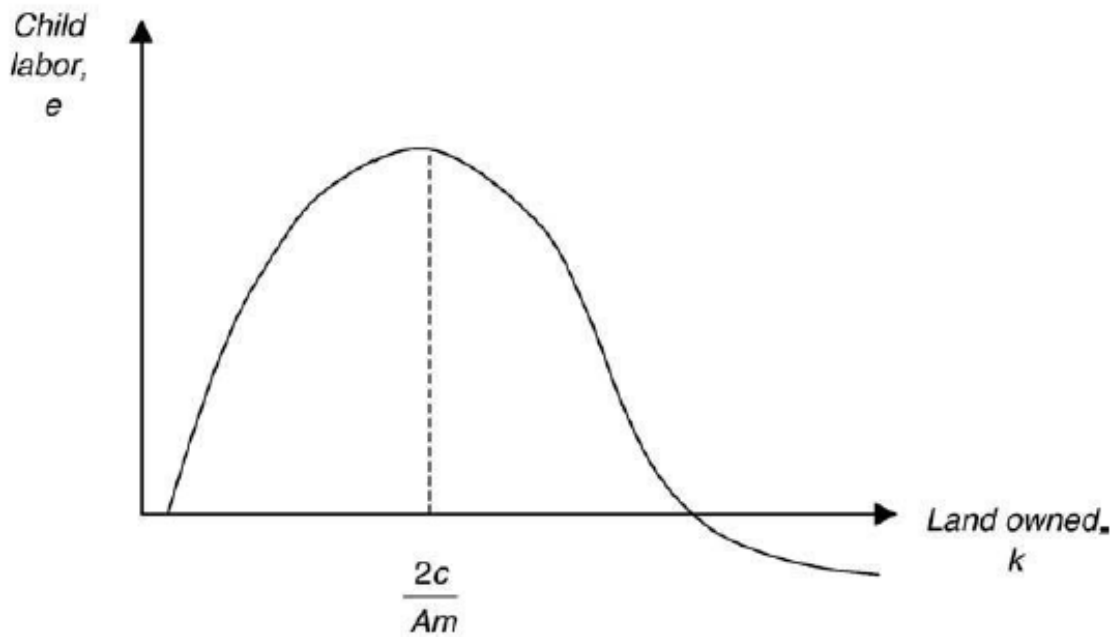


Fig. 2. The Inverted-U of Child Labor.

Empirical analysis. The data

- Data from the Mid-Himalayan region of Himachal Pradesh and Uttaranchal
- random sample of 83 villages in Uttaranchal and 82 villages in Himachal Pradesh were chosen, located in high mountain, isolated and far away any jeepable road.
- In the second stage, a random sample of 25 households was chosen in each village
- In this region land is the main form of wealth. Around 94% of land is inherited (exogenous endowment) while 2% is purchased.

The data

- Out of a total of 4116 households in this data set, for the first set of 1969 households only average child labor information by gender was collected to minimize survey time. The remaining 2147 households (at least 5 households from each village) were asked about the average number of hours per day in a year spent by each child in each activities.
- These latter households have 4162 children — 2129 boys and 2033 girls, between the ages of 6 and 14 years.

Empirical analysis

- child labor will include domestic work that consists of chores done inside the house and work done for the household but outside the home such as livestock grazing, collection of goods for household use.
- Figure 3 plots the non-parametric relation (Gaussian kernel regressions) between inherited land (wealth) and child hours of work per day

Fig. 3. Inherited land and child labor.

Results (simple associations)

Table 3
Village fixed-effects regressions for child labor.

Variable	All labor	Labor without domestic work	Labor for 10 to 14 years	Labor without domestic work for 10 to 14 y
Female dummy	0.450*** (0.079)	−0.008 (0.039)	0.870*** (0.112)	0.036 (0.056)
Low caste * female * age	0.103*** (0.027)	0.017* (0.009)	0.048* (0.027)	0.0003 (0.009)
Inherited land	0.707*** (0.085)	0.281*** (0.041)	0.912*** (0.093)	0.367*** (0.049)
Inherited land squared	− 0.087*** (0.016)	−0.038*** (0.006)	−0.101*** (0.015)	−0.045*** (0.006)
Low caste	−0.294* (0.153)	−0.013 (0.075)	0.135 (0.183)	0.117 (0.109)
Number of children	−0.163*** (0.037)	−0.053*** (0.018)	−0.117*** (0.042)	−0.039* (0.022)
Number of adult females	−0.046 (0.074)	0.039 (0.037)	−0.145* (0.084)	0.017 (0.047)
Number of adult males	−0.035 (0.060)	−0.015 (0.032)	−0.018 (0.070)	−0.039 (0.038)
Schooling of adult males	−0.076*** (0.015)	−0.012* (0.007)	−0.074*** (0.018)	−0.012 (0.009)
Schooling of adult females	−0.110*** (0.017)	−0.045*** (0.008)	−0.142*** (0.020)	−0.049*** (0.010)
Constant	4.409*** (0.186)	0.975*** (0.094)	4.924*** (0.220)	1.132*** (0.123)
Number of observations	4162	4162	2445	2445
R^2 within	0.119	0.056	0.181	0.065

Note: *Denotes significance at 10%, ** at 5% and *** at 1%.

Results

- on average, the turning point occurs around 4 acre of land per household for all children
- for older children the turning point shifts to the right by half an acre.
- the turning point in each case is far below the maximum but around three times the mean. Hence most households face the upward sloping part of the relationship
- the derivative with respect to land, at mean land holding, implies that child labor for all children increases by approximately 0.5 h/day for every acre of land. This value increases to 0.7 h for older children

Conclusions

- the luxury axiom underlies household behavior, but labor market imperfections mask the implications of the luxury axiom
- very poor households with little land "do not demand" their child labor neither there is market demand.
  - (possibly rich households in the same village demand child labor - see Figure 3: at 0 landholding child work 3.8 hours/day)
  - labor market is almost not existent since villages are remote, and isolated

Bharadwaj, Lakdawala and Li, (2013)

Perverse consequences of well intended regulation: evidence from India's child labor ban.

- political opposition to child labor is widespread and many countries issued bans against child labor.
- this is also the case for India in 1986, with the Child Labor Prohibition and Regulation Act.
- this paper evaluates the effect of Indian child labor ban.
- from a theoretical point of view, the effects of the ban are ambiguous
  - on the one hand, when enforced, the ban increases the cost of child labor to employers, reducing demand
  - on the other hand, under the luxury axiom, families turn to child labor when they are below the subsistence level. Thus, they are ready to accept lower wages and increase the supply of child labor to meet the subsistence level.

The ban I

- enacted in 1986
- restriction below age 14 for certain occupation and sectors.
- occupations subject to the ban after 1986 and before 1993 (the period under examination) were: occupations that involved transport of passengers, catering establishments at railway stations, ports, foundries, handling of toxic or inflammable substances, handloom or power loom industry and mines among many others. The list of "processes" that were banned for children includes beedi (hand rolled cigarette) making, manufacturing of various kinds (matches, explosives, shellac, soap etc), construction, automobile repairs, production of garments etc.
- EXCEPTION: agriculture was exempted and family-run businesses were allowed to hire their own children
- For the industries/processes where child labor was not explicitly banned, including agriculture, the 1986 law placed limits on how many hours and which hours children could work.

The ban II

- penalties for employers who contravene the ban:
  - imprisonment for a term which shall not be less than three months but which may extend to one year or with fine which shall not be less than ten thousand rupees but which may extend to twenty thousand rupees or with both.
- enforcement of the 1986 law has been largely weak. Negligible at the federal level. At the state level, the years 1990 to 1993 produced 60,717 inspections in which 5,060 violations of the act were detected; 772 of these 5,060 violations resulted in convictions.

The model - baseline I

- one sector
- each household is composed of one adult and m children
- household supply both adult and child labor
- both adults and children are endowed with one unit of *time*
- adult labor is supplied inelastically. One unit of adult time is equivalent to one unit of labor
- child labor is supplied only as long as family income reaches the subsistence level (luxury axiom). One unit of child time is equivalent to γ units of child labor
- adult and child labor are perfect substitutes in the production function $f(L)$

The model - baseline II

- perfect substitutability implies that a firm is indifferent between hiring adult or child labor. This implies that $w_c = \gamma w_a$, where w are labor earnings per unit of time (wage).
- suppose that a ban to child labor is introduced. Firms hiring children are caught with probability p and have to pay a fine D.
- suppose also that p is small –> case of imperfect enforcement. If so, hiring child labor continues to be a valuable option
- for firms to be indifferent between adult and child labor, wages should be such that $w_c = \gamma w_a - pD$, i.e. child wage must decline
- poor families, in order to meet their subsistence level need to expand labor supply, by asking more children to work.

The model - extensions I

- two sectors (manufacture and agriculture)
- the ban regards only manufacture
- perfect mobility across sectors
- the ban reduces child wages in manufacture –> flow of child labor towards agriculture –> wages decline in agriculture –> adult labor flows from agriculture to manufacture
- eventually the same amount of labor is employed, with a different allocation: only adult labor in manufacture and a mix of adult and child labor in agriculture. Wages are unchanged.
- overall child labor does not reduce but turns to agriculture.

The model - extensions II

- two sectors
- imperfect mobility: barriers to enter in manufacture from agriculture
- imperfect mobility implies that labor markets are not integrated and generally wages in manufacturing will be higher than in agriculture.
- the ban will reduce child wages but not necessarily this reduction is enough to move child labor out of manufacture. In this case, household supply more child labor to compensate for lower wages.
- only if the ban if sufficiently well enforced, child wages drops enough to push some children out of manufacture. Child wages are lower in both sectors so that poor families need to increase supply of child labor.

The model - extensions III

- when the ban is sufficiently enforced another effect will emerge
- the flow of child labor out of manufacture is not compensated by an inflow of adult labor from agriculture –> adult wages in manufacture increase
- rising adult wages in manufacture increase families income that might induce a reduction in the supply of child labor (it depends on whether adult wage rise enough to meet the subsistence level).
- in particular, in the extreme case where reduction in child labor supply exceeds the flow out manufacture, child labor supply to agriculture falls as well –> higher child wages in agriculture –> further decrease in child labor supply.

Data

- The data are from the Integrated Public Use Microdata Series International (IPUMS) database for India.
- The database is built from the employment and unemployment surveys collected by the National Sample Survey Organization (NSS) of the Government of India.
- Focus on the 1983, 1987 and 1993 rounds of the survey as these most closely correspond to periods before and after the 1986 Child Labor Act.
- Information on labor supply of nearly 515,000 children between the ages of 6 and 17

The effect of ban on child wages

- difference-in-differences strategy

$$\begin{aligned} log(wage_{it}) &= \gamma_0 + \gamma_1 Under14_i + \gamma_2 Post1986_t + \\ &+ \gamma_3 Under14_i * Post1986_I + \gamma_X X_{it} + \delta_t + \nu_{it} \end{aligned}$$

- X_{it} family size, household head characteristics, gender, and state-region fixed effects
- δ_t survey year fixed effects
- according to the theory, after the ban wages earned by individual younger than 14 (=children) should decline

The effect of the ban on child wages

TABLE 3. Effect of Ban on Child Wages

	Dependent Variable: Log(Real Wages)			
	All Sectors Ages 6-30 (1)	All Sectors Ages 6-20 (2)	Manufacturing Ages 6-30 (3)	Agriculture Ages 6-30 (4)
Under14*Post1986	-0.100***	-0.038**	-0.048**	-0.008
	(0.036)	(0.018)	(0.023)	(0.014)
Observations	100,394	33,038	60,257	40,137
R-squared	0.546	0.375	0.493	0.366

*** p<0.01, ** p<0.05, * p<0.1 All regressions include a dummy for Post-1986, a dummy for "Under 14" as well as controls for gender, family size, age of household head, sector dummy (agricultural or manufacturing), age fixed effects, gender of household head, urban status, survey year fixed effects, state-region fixed effects, hh type fixed effects, religion fixed effects, household head's education level fixed effects, household head's industry fixed effects. "Under 14" is a dummy variable that takes the value of 1 if the child is under 14 years of age. Sample consists of all individuals who are currently employed in paid jobs and are related to the household head. Standard errors are clustered by age-year. Real wages are nominal wages deflated by the average wholesale price index reported by the Government of India for the respective year. Sample only contains respondents with non-zero wages, trimmed at the 1% and 99% percentiles.

The effect of the ban on employment

- Same model as before, excepting that the dependent variable is employment status.

TABLE 4. Overall Effect of Child Labor Ban on Employment

	Dependent Variable: Employed					
	All Sectors		Manufacturing		Agriculture	
	Ages 6-20	Ages 10-17	Ages 6-20	Ages 10-17	Ages 6-20	Ages 10-17
	(1)	(2)	(3)	(4)	(5)	(6)
Under14*Post1986	0.019**	0.017***	0.004**	0.005***	0.016**	0.013***
	(0.008)	(0.005)	(0.002)	(0.001)	(0.006)	(0.004)
Mean of Dep. Var. (for children under 14)	0.080	0.141	0.014	0.027	0.079	0.140
Observations	644,893	332,282	643,312	331,447	0.065	0.114
R-squared	0.256	0.172	0.142	0.101	0.205	0.164

*** p<0.01, ** p<0.05, * p<0.1 See notes under Table 3. Sample consists of all individuals in specified age range who are related to the household head.

Results

- results on both wages and employment are consistent with a two-sector model with imperfect mobility.
- lower child wages induce a flow of child labor out of manufacture and a reduction in wages also in agriculture.
- facing lower child wages households are forced to increase child labor supply to both sectors
- note: as expected child labor increases more in agriculture (flow in + additional supply)

Analysis on Siblings

- a child whose sibling is below the legal working age will suffer a larger drop in household income and thus be more likely to work than a child whose sibling is above the legal working age
- let's compare the employment outcomes of children with siblings who are below or above age 14, both before and after the ban is in place (DID):

$$\begin{aligned} empl_{it} &= \gamma_0 + \gamma_1 Treatment_i + \gamma_2 Post1986_t + \\ &\quad + \gamma_3 Treatment_i * Post1986_l + \gamma_X X_{it} + \delta_t + \nu_{it} \end{aligned}$$

- $Treatment_i$: =1 child with a sibling aged between 10 (working age) and 13 (affected by the ban); =0 child with a sibling aged above 14 or below 9 (unlikely to work) and so not affected by the ban.

Analysis on siblings.

TABLE 5. Sibling-based Effects of the Ban on Child Employment

	Dependent Variable: Employed (1=Yes, 0=No)				
	All Sectors			Agriculture	Manufacturing
	Ages 6-9	Ages 10-13	Ages 14-17	Ages 10-13	Ages 10-13
	(1)	(2)	(3)	(4)	(5)
Treatment*Post1986	0.003***	0.008***	-0.002	0.006**	0.002
	(0.001)	(0.003)	(0.005)	(0.002)	(0.008)
Pre-Ban Mean of Dep. Var.	0.020	0.142	0.336	0.115	0.027
Observations	187,126	182,005	145,562	181,712	181,712
R-squared	0.025	0.098	0.180	0.104	0.045

*** p<0.01, ** p<0.05, * p<0.1 All regressions include a dummy for Post-1986, a dummy for "Treatment" as well as controls for gender, family size, age of household head, age fixed effects, gender of household head, urban status, survey year fixed effects, state-region fixed effects, hh type fixed effects, religion fixed effects, household head's education level fixed effects, household head's industry fixed effects. Sample of children consists of all who are related to the household head, excluding any who are the household head or the spouse of the household head. "Treatment" is a dummy variable that takes the value of 1 if the child has a sibling who is between the ages of 10 and 13 (inclusive) and takes on a value of 0 if sibling is between ages of 14-25 (inclusive) or below the age of 9. Standard errors are clustered by household.

Conclusions

- this paper does not intend to suggest that all child labor bans are useless.
- in fact, well formulated and implemented bans could absolutely help in eliminating child labor
- however reducing child labor could worsen welfare at least to some families, those unable to meet the subsistence level
- Basu (2004): "Legal interventions, even when they are properly enforced so that they do diminish child labor, may or may not increase child welfare. This is one of the most important lessons that modern economics has taught us and is something that often eludes the policy maker".
- there are many options available to policy makers who wish to reduce the incidence of child labor (like cash transfers, increasing investments in and returns to education, etc).