

Are Saving and Bequest Constraints the Only Reasons for Child Labor? Evidence from Bangladesh

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This paper proposes a two-sector model of child labor to argue that income channels are necessary but not sufficient to explain the high incidence of child labor that we currently observe in less developed countries. In addition to income channels, the model in this paper uses two extra channels: parental optimism regarding the future and child's scholastic ability, which affects the costs of education in terms of money and time. The model's predictions are tested using data from the child labor survey of Bangladesh. Empirical results provide strong support in favor of the model's predictions that non-income channels have significant effects on the amount of time worked by child workers.

Keywords: Child Labor, Household Poverty, Parental Perception, Informal Sector, Returns to Education, Heterogeneous Ability

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INTRODUCTION

Reduction in child labor has not kept pace with falling poverty rates. Quite remarkably, world poverty fell from 28.5 percent to 12.7 percent between 2000 and 2012. On the other hand, during the same time period, the incidence of child labor only fell from 23 percent to 16.7 percent (Figure 1). In other words, the rate of poverty reduction was more than twice as fast as the reduction in the rate of child labor. This suggests that increasing household income is a necessary but not sufficient to achieve a corresponding reduction in the rate of child labor. Despite this, most extant theoretical and empirical studies assume that different income channels such as saving, bequest or credit constraints contribute to the high incidence of child labor even when parents are altruistic (Parsons & Goldin, 1989; Krueger, 1997; Basu & Van, 1998; Andvig, 1998; Ranjan, 1999; Baland & Robinson, 2000; Amin, Quayes & Rives, 2004; Edmonds, 2005; Basu et al., 2008). Clearly, there is a need to explore the role of other catalysts, in addition to household income, that affect the parental decision of sending their children to work instead of school. This paper proposes two such determinants: parental perception regarding the future economic conditions, which affect the expected return to education; and child's scholastic ability, which influences the cost of a certain amount of effective education².

Parental optimism or pessimism about the future outcome of a child's education and the relative return of work-experience compared to education can significantly affect the opportunity cost of sending the child to

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²Effective education is defined as the years of education completed with satisfactory performance necessary to get a formal sector job.

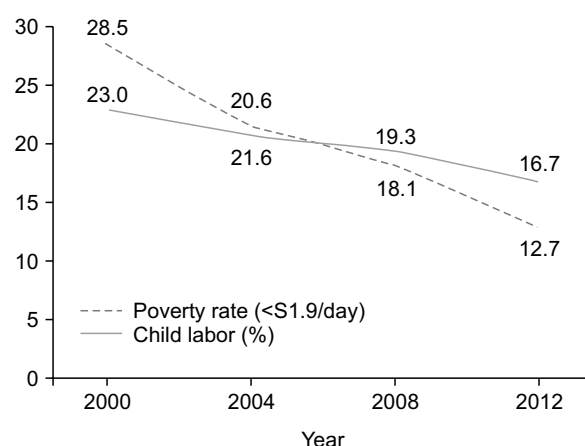


Fig. 1. World Poverty and Child Labor Rate.

Source: World Development Indicators 2016, World Bank.

Note: Figure 1 shows the time trend of world poverty and child labor rates since 2000. Both world poverty and child labor rates fall, but the poverty rate falls faster than the child labor rate.

school (Rahman et al., 1999; Ravallion & Wodon, 2000; Delap, 2001; Amin et al., 2004; Salmon, 2005; Khanam & Rahman, 2007; Khanam, 2008; Jensen, 2010, 2012). When the perceived value of education is low, which causes lower perceived chances of getting a job in the formal sector with a given level of education, the household's incentive to send the child to work increases. In some cases, the low perceived value of education by the parents can arise due to social and cultural reasons. A good example is the low level of education of children from backward or unscheduled castes in India, where occupational choices are strongly determined by caste status. Hence, parents and other members of the community may not find it optimal to choose a higher level of education for their children (Bachman, 1995) and instead send their children to work. Higher market returns for current work and acquired experience can also alter the parents' incentive to send their children to school. For example, in the diamond industry of Surat in India, reasonably well-off parents choose work over education for their children as they believe that the diamond-polishing industry offers long-term prospects for employment at a decent wage (Saradhi, 1998).

Another important factor that could affect the trade-off between work and education is the heterogeneous cost of effective education. Since the education system in most countries, especially in developing countries, is rigid and performance is measured in some fixed dimensions, some parents may find it costlier in terms of their time and money to send their children to school. Hence, instead of spending resources on children's education, these altruistic parents may prefer to simply save this money and pass it on to their children as a bequest to ensure a certain level of consumption for their children later in life. They can also send their children to work to learn a basic trade. These aforementioned factors that could change the incentive of parents to send their children to school, are generally not incorporated in the theoretical and empirical literature.

In this study, I propose a simple model similar to Baland and Robinson (2000) but allowing two sectors: formal and informal. In addition, I introduce parental perception regarding the value of their children's education and the heterogeneous cost of education that varies with the child's scholastic ability. This paper is different from Baland and Robinson in two distinct ways: 1) it adds two additional channels, namely parental perception and heterogeneous cost of education and allows for two sectors, and 2) it provides empirical evidence in favor of the proposed channels of child labor.

A few other papers also extend the Baland and Robinson framework to incorporate different realistic features. Pouliot (2006) introduces uncertainty into the model, showing that even when parents are not credit constrained and bequests are interior, child labor can still be inefficiently high if the return to human capital is uncertain and

insurance incomplete. Whereas Pouliot's (2006) result is purely theoretical and gives no empirical test, this paper differs in terms of defining the nature of uncertainty and providing a simple empirical framework to measure the effect of this uncertainty on the working hours of a child worker. Gao and Wahid (2009) extend the Baland–Robinson model to incorporate the cost and quality of education. They find that child labor increases with an increase in the cost of education, while child labor decreases when the quality of education rises. These results in Gao and Wahid (2009) also depend on the binding constraints of saving and bequest, and are theoretical in nature with no empirical framework or direction on how to measure these effects.

One of this paper's objectives is to re-produce the canonical results in literature, namely, that poverty, borrowing constraints, and one-sided altruism can give rise to child labor. In addition, it aims to show that even in the absence of the aforementioned conditions, the choice of child labor over child education can vary due to parental perceptions regarding future economic conditions and the child's scholastic ability, that I assume parents can perfectly observe. Then, most importantly, it provides a simple empirical estimation using the most recent child labor force survey data from Bangladesh to check the validity of the model's predictions. The rest of the paper is organized as follows. A simple model is developed in section 2. Section 3 provides a description of the data, the empirical specification and results. Section 4, discusses conclusions and the policy implications of the findings.

THE MODEL

Model Setup

I use a similar model structure to Baland and Robinson (2000). There are two generations: parents and children, both of whom are endowed with one unit of labor for each of two periods (periods 1 and 2). Unlike Baland and Robinson, I allow for two sectors: formal and informal³. For simplicity, I assume that the parents work in the same sector both periods and earn a constant wage w_p^f or w_p^i , where w_p^f is the wage in the formal sector and w_p^i is the wage in the informal sector and I assume $w_p^f > w_p^i$. In period 1, the child can either work or attend school or some other kind of unpaid training. If the child works I_c fraction of time in period 1, then he/she spends $1 - I_c$ fraction of time in studying at school or learning some skills, which does not involve any immediate monetary gain. Here I assume that the child will either be at work or in school/unpaid training. Many studies find that parents generally fear that the children will be idle if they stay at home and may develop some bad habits (especially older children), and so parents send their children to work even if children's income is not very crucial for household's consumption (Delap, 2001; Rahman et al., 1999).

If the child works in period 1, then she can only be employed in the informal sector, where the wage of a child worker is denoted by w_c and I assume $w_p^i > w_c$. So, a working child can earn $I_c w_c$ in the period 1. If a parent sends the child to school, then the cost of education depends on both the length of education $1 - I_c$ and the child's scholastic ability, denoted by z , which is perfectly observable by the parent in the beginning of period 1. I denote the cost function of education by $g(e, z)$ and assume that $g_e > 0$, $g_z < 0$, $g_{ez} < 0$, and $g_{ee} > 0$ ⁴, where subscript denotes partial derivative with respect to indicated variable and $e = 1 - I_c$.

In period 2, child's income depends on in which sector the child is employed. Let $h(e, y)$ be a continuous bounded function between 0 and 1 such that $h(0, y) = 0$ and $h(1, 1) = 1$, where $0 \leq y \leq 1$. Here y is a variable that expresses the labor market and other economic conditions in the period 2, where $y = 0$ means the worst labor market condition in which no level of education is sufficient to get a job in the formal sector and vice-versa; $h(e, y)$ can be thought of as the probability that a child with education level e with the economic conditions y will get a job in the formal sector. Here I assume that $h_e > 0$, $h_y > 0$, $h_{ey} > 0$, and $h_{ee} < 0$ ⁵, where subscript denotes partial derivative with respect to indicated variables. So, when a parent makes a decision regarding the level of e for the child in period 1, he has some expectation regarding y . Thus, child's expected income in period

³The formal sector, as defined in the Bangladesh Child Labor Force Survey 2013, is the part of the economy taxed and regulated by the government.

⁴Cost of education increasing at an increasing rate.

⁵Probability of getting a job in the formal sector increases at a decreasing rate.

2 is given by;

$$E(w_c^2) = w_p^f \times h(e, y) + w_p^i \times [1 - h(e, y)] \quad (1)$$

Parent's Problem

The parent's utility function is separable for two periods and depends on consumption in the respective period. Parents are also assumed to be altruistic. Thus, parent's utility function can be written as follows:

$$W_p[c_p^1, c_p^2, W_c(c_c)] = U(c_p^1) + U(c_p^2) + \delta W_c(c_c) \quad (2)$$

Where $U(\cdot)$ and $W_c(\cdot)$ are twice continuously differentiable, strictly increasing and strictly concave functions. c_p^1 and c_p^2 parent's consumption in period 1 and 2, respectively, and c_c is child's consumption. δ measures the degree of parental altruism; a low value for δ means a less altruistic parent. Parent chooses the amount of saving (s) at an exogenous gross rate of interest (r), amount of bequests, and amount of his/her child's time selling in the labor market or alternatively the amount of education for the child to maximize the utility function given in equation (2). So, the parent's maximization problem can be written as follows:

$$\text{Max}_{s, b, l_c} W_p[c_p^1, c_p^2, W_c(c_c)]$$

Subject to,

$$\begin{aligned} c_p^1 &= w_p + l_c w_c - s - g(e, z) \\ c_p^2 &= w_p - b + rs \\ c_c &= E(w_c^2) + b \end{aligned}$$

First order Kuhn-Tucker conditions are given by:

$$s: -U'(c_p^1) + rU'(c_p^2) \leq 0, s[-U'(c_p^1) + rU'(c_p^2)] = 0 \quad (3)$$

$$b: -U'(c_p^2) + \delta W_c'(c_c) \leq 0, b[-U'(c_p^2) + \delta W_c'(c_c)] = 0 \quad (4)$$

$$l_c: U'(c_p^1)(w_c + g_e) + \delta(-w_p^f h_e + w_p^i h_e) \leq 0, l_c[U'(c_p^1)(w_c + g_e) + \delta(-w_p^f h_e + w_p^i h_e)W_c'(c_c)] = 0 \quad (5)$$

If there are interior solutions for s , b and l_c , then first order conditions are:

$$s: U'(c_p^1) = rU'(c_p^2) \quad (6)$$

$$b: U' = \delta W_c'(c_c) \quad (7)$$

$$l_c: U'(c_p^1)(w_c + g_e) = \delta(-w_p^f h_e + w_p^i h_e)W_c'(c_c) \quad (8)$$

Substituting equations (6) and (7) into equation (8) and after some manipulation:

$$r(w_e + g_e) = (w_p^f - w_p^i)h_e \quad (9)$$

$$\text{Where } \frac{\delta g}{\delta l_c} = \frac{\delta g}{\delta e} \frac{\delta e}{\delta l_c} = -g_e, \frac{\delta h}{\delta l_c} = \frac{\delta h}{\delta e} \frac{\delta e}{\delta l_c} = -h_e, \text{ and } e = 1 - l_c$$

Here equation (9) determines the household's optimal choice of child labor in which the left hand side shows the gain from choosing an extra unit of l_c and the right hand side shows the associated loss. Here, gain comes from wage earned from child labor and cost saved by choosing a lower level of education, and this multiplies with gross interest rates to compare loss that comes in period 2 from potential loss in child's income, which is the

difference between the wage rates in the formal and informal sectors multiplied by the change in the probability of employment in the formal sector. This is the similar result of proposition 1 in Baland and Robinson (2000). Propositions 2 and 3 in Baland and Robinson that say when saving or bequests are at corner, then the child labor is inefficiently high, are also straightforward to prove using equations (3) to (5).

Now, suppose both s and b are interior, that is, non-negative constraints do not bind. But suppose that the parent's expected value of y is lower than the actual value of y or the best predicted value of y , where y is an indicator variable measuring period 2's labor market and other economic conditions that affect the probability of getting a job in the formal sector for a given level of education. This divergence can occur due to a parent's lack of information that may stem from the parent's socio-economic background, low education, poor networking, etc. This can give rise to an inefficiently high amount of child labor. The result is stated in the following proposition 1.

Proposition 1

Even when saving (s) and bequests (b) have interior solutions, child labor can be inefficiently high if parent's expected economic conditions for period 2 are worse than the actual economic conditions, that is, when $E(y) < y$ (assuming the same level of child's ability).

Proof of proposition 1 is given in the Appendix. Here proposition 1 tells that the parental perception regarding future opportunity is an important determinant of child labor. Households for which income from children's work is not crucial for consumption can still send their children to work if parents think that education alone may not be enough to get a job in the formal sector. This supports the findings by Delap (2001) and Rahman et al. (1999).

In many developing and least developed countries, merely receiving a certain length of education is not enough—scholastic performance is also very important in gaining a well-paying formal sector job. Educational achievement and performance is also dependent on a child's scholastic ability. However, in many cases, shortfalls in a child's ability can be compensated by providing more support. Parents can help and support children to perform better in school, and if they are not educated, then they can hire people to help their children. If parents themselves help their children, then they have to forgo the associated income that could be earned by working for that time instead. On the other hand, if they hire a tutor, they reduce the income available for other expenses. Thus, the cost of education is negatively related to a child's scholastic ability; that is, if the ability of the child is low, the parent has to invest more resources to help their child achieve a certain level of education. This phenomenon can lead to higher child labor if the parent cannot afford this investment. This relationship is stated in the following proposition.

Proposition 2

For a given y , household's optimal choice of child labor increases as the ability of the child decreases.

Proof of proposition 2 is given in the Appendix. Here proposition 2 states that even when the household does not have borrowing or bequest constraints, the household will choose a higher level of child labor if it observes a low level of child's ability. The reason may be because the parent perceives that it is highly unlikely that the child will get a job in the formal sector unless the parent chooses a high level of education for the child. But the cost of education would be very high as the cost function of education is strictly convex in child's ability. So, instead of choosing a higher level of education for the child, a household would choose a larger amount of child labor so that the parent can save a larger amount from child's income and save the cost of higher education, and then subsequently make a larger bequest. This will ensure a certain level of welfare for the child in the future.

Proposition 3

With interior saving and bequests solutions, the larger the gap between wages in the formal and informal sectors, the smaller the amount of child labor chosen by the household.

The validity of proposition 3 can be seen from equation (9): as $w_p^f - w_p^i$ increases, the right hand side of equa-

tion (9) gets larger. To ensure efficiency, the household chooses a larger level of education and a lower level of child labor, which raises the left hand side and lowers the right hand side of equation (9) as $g(e, z)$ is strictly convex but $h(e, y)$ is strictly concave. This will ensure efficiency at some higher level of education. Thus, proposition 3 holds true for a given level of y with both saving and bequests being interior. Parents' wage in period 1 also plays an important role in determining the level of child labor. If parent earns w_p^i in period 1, then it is more likely that the non-negative saving constraint will be binding and it may lead to an inefficiently higher level of child labor.

DATA AND EMPIRICAL ESTIMATION

Data

Data used in the empirical estimation is from Child Labour Survey Bangladesh 2013 (BBS 2015). This survey was conducted by the Bangladesh Bureau of Statistics with the support of the International Labour Organization (ILO). The objective of the survey was to estimate the employment of persons aged 5 to 17 years, their work place conditions, and to probe and diagnose the circumstances leading to the existence of child labor in the country. It covers all 64 districts of Bangladesh, which are divided into 1512 Primary Sampling Units (PSUs) or Enumeration Areas (EAs) and from each PSU/EA, 24 households were selected systematically with a random start. Thus, a sample of 36242 households was collected.

In the survey, a person is defined as a child if his/her age is below 18. To be considered as a working child, the reference age of a child is the age group 5 to 17 years for both males and females. However, according to the labor law of Bangladesh 2006, the minimum legal age of employment is 14. Hence, I use age group 5-14 years for my estimation. Here, a working child is defined as a child between 5 to 14 years' old who is engaged in economic activities for at least one hour in a given week during the period of the survey. The economic activities cover all activities involving the production of goods and services for personal use or for sale, work in formal or informal sectors of the economy, inside or outside of families, and work for payment or profit or as a household worker outside of the child's family for an employer with or without payment (BBS 2015).

Descriptive Statistics

Table 1 shows the frequencies and the percentage of children and working children in the sample. In the sample, the proportion of male and female children aged 17 or below are almost even, but the fraction of male working children is significantly higher than the fraction of female working children in the 5-14 age group.

The characteristics of children and working children are reported in Table 2. The mean ages of male and female children are very similar. Here the mean age of working children is higher than the mean age of all children as no child below 5 years old is considered to be a working child (about 20 percent of children in our sample are below 5). So, working children are a subset of children, excluding those aged less than 5 years. Interestingly, the female working child is on average more than one year younger than the male working child. In the case of education, it seems that there is no significant difference between male and female children, whereas male working children have on average 0.7 years more education than female children. This indicates that on an average after the completion of primary schooling, most male working children start supporting their families, whereas

Table 1. Proportion of Children and Working Children (age 5-14 years)

	Number		Percent	
	Male	Female	Male	Female
Children	25677	24122	51.56	48.44
Working Children	713	551	56.41	43.59

Source: Own computation from Bangladesh Child Labor Survey 2013 data.

Table 2. Characteristics of Children and Working Children (age 5-14 years)

		Children		Working Children	
		Male	Female	Male	Female
Age (year)	Mean	9.31	9.22	12.52	11.15
	Std. Dev	4.84	4.82	1.78	2.75
Education (years)	Mean	3.79	3.92	4.79	4.08
	Std. Dev	3.36	3.32	2.53	2.73
Marital status	Married	0.32	2.18	1.82	14.00
	Widow/Widower	0.08	0.08	0.28	7.00
	Separated	0.01	0.05	-	-
	Divorce	0.01	0.02	-	-
Religion	Islam	89.09	88.71	91.44	89.11
	Hinduism	9.71	9.88	7.57	7.99
	Buddhism	0.93	1.02	0.98	2.36
	Christianity	0.26	0.25	0.42	-
	Others	0.16	0.14	-	-
Reason for dropping out	Fail	7.31	7.49	3.84	6.45
	Not interested	41.96	26.00	35.55	19.35
	To gain work experience	10.41	4.12	19.95	9.14
	To get married	0.05	12.02	-	1.08
	To support family	15.62	7.02	16.88	13.98
	Parents not interested	2.68	9.59	2.05	9.68
	No school nearby	0.53	1.35	-	1.08
	Expensive	19.56	30.52	19.95	37.10
	Others	1.89	1.89	1.79	2.15

Source: Own computation from Bangladesh Child Labor Survey 2013 data.

female working children typically do not receive the opportunity to finish primary education before they are required to support the family.

The survey also provides information regarding child marriage and the proportion of married children who are working. As shown in the table, more female children, both working or non-working, are married compared to male children. This implies a significantly higher child marriage rate for girls. In the case of religion, the proportions of Muslim, Hindu, Buddhist and Christian children and working children are very similar to the results of Household Income and Expenditure Survey. A similar pattern can also be observed for working children.

An important descriptive statistic in Table 2 is the reason for dropping out of school. The reasons provide significant evidence in favor of assumptions made in the model. For example, the model assumes that the ability of a child is one of the main determinants of education or child labor, and drop out due to either failing or lack of interest both reflect scholastic ability. As shown in the table, these two reasons combined comprise 42 percent of dropouts among children and 35 percent among working children. The model also assumes that parents' expectation about the child's future educational outcome is another important determinant of education or child labor. The reasons of "parents not interested" and "to gain work experience" appertain to a child working when not crucial for family consumption, can be attributed to the aforementioned assumption. These reasons account for 6 percent of dropouts among children and 5 percent among working children.

In the model, another determinant of child labor is the low income of parents, in which case child's income is essential for family consumption. From the table, we can see that an important reason for dropping out of school is to "support family" and this is consistent with the model's formulation. In addition, the model also assumes

that the cost of education plays a crucial role in determining the level of education or child labor. The evidence in favor of this assumption can be seen from the table where 24 percent of dropouts among children and 25 percent among working children are due to the prohibitive cost of education. There are some other reasons for dropping out. One such reason, especially relevant for female children, is to get married. However, this also can be attributed to parents' expectations, who may not find it valuable to educate their girls and prefer to have them married sooner.

Characteristics of households that have children and working children are illustrated in Table 3. In terms of location, households residing in rural areas have a larger fraction of children and working children. Among children and working children, about 55 percent reside in rural households. Other household characteristics do not differ much for households with children versus working children. As expected, a lower fraction of households with working children own a house or land compared to households without working children.

Empirical Strategy and Estimation Results

In addition to saving and bequest channels, the model identifies two additional channels of child labor. These are heterogeneity in child's ability, which causes heterogeneity in the cost of education, and differential future expectations on the part of parents depending on their socio-economic background. I attempt to capture these four channels using a number of variables. For saving, I use the income of the household head and dropout due to income. For bequest, I use whether the household owns any house or land. Ownership of a house and land are used to capture bequest as housing and land prices are on the whole uniformly high across the country. I also assume that a household that owns a house or land would not face any bequest constraint as it can borrow against these assets. In addition, other assets such as different durable goods owned by the household can also be used, but their impact may not be very obvious as a bequest channel since no formal credit can be obtained using these assets as collateral.

The effect of scholastic ability on the amount of hours that a child works is captured by combining the two related reasons of dropping out mentioned above: failing and lack of interest. This is a conservative and direct measure of lack of ability on the part of the child to continue study. To capture the effect of parental optimism, denoted by γ in the model, I construct a measure for γ as there is no useful information in the survey that can be used as a direct measure of γ . Our indirect measure of γ is constructed using the following Probit model:

$$\Pr(I = 1|X) = \Phi(X'\beta) \quad (10)$$

Table 3. Characteristics of Households

		Children	Working children
Location (%)	Urban	44.93	44.86
	Rural	55.07	55.14
Main activity (5)	Agriculture	32.49	34.67
	Industry	4.34	4.83
	Service	54.41	55.22
	Others	8.75	7.28
Household size		5.32	5.41
House ownership (%)		75.86	66.46
Land ownership (%)		75.44	66.93

Source: Own computation from Bangladesh Child Labor Survey 2013 data.

⁶Working children on average work 34.37 hours per week and about 19.78 percent of working children work more than 40 hours per week.

⁷Child labor law in Bangladesh prohibits employers from hiring children for these types of work.

Where the dependent variable is a dummy that assumes a value of 1 if the working child is working more than 40 hours⁶ in a week or employed in a risky or hazardous work that is detrimental to the child's mental or physical health⁷. As independent variables, I control for a number of parental and household characteristics that are likely correlated with the household's choice of working hours and condition of child labor. These include age, sex, religion, and employment sector of household head, household income, household's possession of a house, land, TV, and radio, household head's access to the Internet, household head's years of education, and urban/rural location of the household. Results of the Probit model are shown in Table 4.

In Table 4, the coefficients of head_age (age of household head), radio (dummy = 1 if household owns a radio, 0 otherwise), and urban (dummy = 1 if household resides in urban area, 0 otherwise) are positive. So, as the age of the household increases, the probability of the incidence of child labor in that household rises significantly. Similarly, if a household has a radio or resides in an urban area, the probability of the incidence of child labor in that household increases. However, the coefficients of radio and urban are not statistically significant. The probability of the incidence of child labor in a household significantly falls when the household head works in the formal sector (head_sector = 1 if household head works in formal sector, 0 otherwise), or household head's income (head_income) or years of schooling (head_eduyear) increases, or household owns land (dummy = 1 if household owns land, 0 otherwise) or a TV (dummy = 1 if household owns a television, 0 otherwise), or household has female rather than male children. In addition, dummy variables for ownership of a house, religious identity (muslim) and household head's access to the internet have expected negative impact on the probability of the incidence of child labor, but these are not statistically significant. The overall model is highly statistically significant, that is, all the characteristics of households in Table 4 are jointly statistically significant (p-value of the null hypothesis that all coefficients are simultaneously zero is almost 0).

I obtain the predicted probabilities from the above Probit model. These probabilities indicate the chance of a child worker being employed in a hazardous job given household and household head characteristics. I consider these chances as the degree of pessimism of the household. Hence, household's or parental optimism is then constructed as follows:

Table 4. Probit Regression Results

	Coefficient	Standard Error
head_age	0.155	0.002
muslim	-0.018	0.078
head_sector	-0.129	0.054
head_income	-0.000	0.000
head_internet	-0.139	0.112
tv	-0.161	0.065
radio	0.039	0.085
head_eduyear	-0.022	0.007
house	-0.061	0.068
land	-0.141	0.061
urban	0.009	0.064
female	-0.333	0.052
constant	-2.186	0.147
N	18492	
LR chi ²	158.75	
Prob > chi ²	0.000	

Source: Own computation from Bangladesh Child Labor Survey 2013 data.

$$y = 1 - \Pr(\widehat{i = 1} | X). \quad (11)$$

Thus, the measure of y here tells us the chance that the working child will not over work or not be employed in hazardous work given the household and parental characteristics. Finally, to test the propositions of the proposed model, I run the following OLS regression:

$$\begin{aligned} \text{hours}_i = & \alpha_0 + \alpha_1 \text{income}_i + \alpha_2 \text{dropout_income}_i + \alpha_3 \text{dropout_cost}_i + \alpha_4 \text{house}_i + \alpha_6 \text{land}_i + \alpha_7 \log(y)_i + \\ & \alpha_8 \text{dropout_ability}_i + \alpha_9 \text{sector}_i + \alpha_{10} \text{urban}_i + u_i \end{aligned} \quad (12)$$

Where the dependent variable, *hours*, is the number of hours that a child worker works in a week, *income* is the household annual income, *dropout_income* is the dropout due to poverty, *dropout_cost* is the dropout due to higher cost of education, *house* is a dummy which takes a value 1 if household owns a house and 0 otherwise, *land* is a dummy which takes a value 1 if household owns any land and 0 otherwise, y is the measure of household optimism, *dropout_ability* is the dropout because of poor performance in the school or lack of interest in the study, *sector* is the broad area of economic activities (formal and informal) from which most of the household's livelihood originates, *urban* is a dummy which takes a value 1 if household resides in urban area and 0 otherwise. The results of the above regression (equation 12) are reported in Table 5.

Column (1) of Table 5 shows the estimates of the traditional Baland and Robinson model, which has only saving and bequest channels. Here, the first three variables illustrate the effect of the savings channel. The estimate of *dropout_income* has the expected sign and statistically significant at the 1 percent level of significance. The p-value of this estimate is 0.008. The estimate of *dropout_cost* has the expected sign, but is not statistically significant and household income neither has the expected sign nor is it statistically significant. So, after controlling for *dropout_income*, other measures of the savings channel do not have much explanatory power. Here, if a child drops out of school because of poverty, then the household is probably facing a binding savings constraint and the children in this household are likely to work an additional 2 hours per week. The remaining two estimates in column (1) are for the bequest channel: ownership of house and land. The estimate of ownership of house has the expected sign and is also highly statistically significant, with a p-value of 0.0001. It shows that if a household

Table 5. Regression Results

	Dependent variable is working hours.	
	(1)	(2)
<i>dropout_income</i>	2.094 (0.776)	2.278 (0.905)
<i>dropout_cost</i>	1.021 (0.907)	1.593 (1.018)
<i>income</i>	0.007 (0.052)	0.025 (0.055)
<i>house</i>	-2.848 (0.747)	-2.159 (0.893)
<i>land</i>	0.527 (0.749)	0.954 (0.726)
$\log(y)$		-43.601 (-19.393)
<i>dropout_ability</i>		1.648 (0.745)
<i>sector</i>		-0.617 (0.778)
<i>urban</i>		1.435 (0.889)
R2	0.04	0.06
N	473	473

*Robust standard errors clustered at household level are reported in the parentheses.

Source: Own computation from Bangladesh Child Labor Survey 2013 data.

with a working child owns a house, the working hours of the child fall almost 3 hours per week. The estimate of land is not statistically significant. The R^2 value is 0.04, which shows that 4 percent of variation in child working hours is explained by the traditional model of child labor.

Column (2) of Table 5 reports the estimation results for the extended model proposed in this paper. All the estimates of saving and bequest channels of this extended model are similar to the estimates of the basic Baland and Robinson model in terms of magnitude and statistical significance. There are four new variables included in the estimation of the extended model, with the two key variables being parental optimism (y) and child's ability, which is measured by dropout due to poor performance or lack of interest (dropout_ability). The other two variables are included to reflect the fact that this extended model allows for two sectors and also there is no restriction on spatial movement. Here the estimate of parental optimism is -43.6 , which shows that if parents become 10 percent more optimistic, then the working hours of child workers falls by about 4 hours per week. This estimate is statistically significant at the 5 percent level, with a p-value of 0.026.

The estimate of the measure of ability (dropout_ability) has the expected sign. If the child discontinued study due to poor performance or lack of interest, then as a child worker her working hours go up by about 1.5 hours per week. This is also statistically significant at the 5 percent level (p-value 0.029). The R^2 value increases by about 50 percent (0.04 to 0.06) once I include the two key variables of the model, where each of these variables is highly statistically significant. So, the additional channels of child labor as proposed by the model has significantly increased the explanatory power of the traditional model of child labor.

CONCLUSION

Most models of child labor supply focus mainly on the income side, i.e., income, savings and bequests. However, in many circumstances, household income alone is not sufficient to explain the phenomenon of child labor. The model proposed here thus incorporates additional important determinants of child labor. Empirical results suggest that in addition to income, there are several other factors that could potentially affect child worker status and working hours, such as child's and household head's gender, household head's literacy and sector of employment, location of the household—and especially—the scholastic ability of the child. However, from the empirical framework used in this paper, it is difficult to draw any strong causal conclusions due to possible measurement errors and omitted variable bias. Thus, the future research in this area should focus on determining the causal link between child labor and these factors. The use of randomized controlled trials may provide the best way forward in this respect.

In the meantime, the model proposed in section 3 has several implications for policy. Firstly, since economies are now divided into many sectors, broadly bifurcated into formal and informal sectors, a ban on child labor may not be very effective if most of the child labor is absorbed in the informal sector, where monitoring is difficult and costly. In such situations, banning child labor will not be sufficient to reduce it. So, instead of relying on laws and regulations, steps should be taken to increase the opportunity cost of child labor for an altruistic parent. Policies should be adopted to remove any structural or cultural barriers that deter some sections of the population from getting a job in the formal sector even when they are well qualified. Thus, for those sections of the population, government can fix a quota for government jobs and encourage the formal private sector to hire from those sections of the population by providing tax benefits or other types of subsidies.

Moreover, education should not only be free up to some certain level, but also be of high quality, so that education can increase the chances of getting a formal sector job. Parents need to be convinced that attending school will increase the probability of getting a job in the formal sector for their children. In addition, since the ability of children varies, education should better value and foster different types of abilities. Policies should also seek to foster a richer variety of job opportunities, with government promoting businesses and industries that employ people with a variety of abilities and skills. Finally, policies should be adopted to reduce the size of the informal sector, which will lower the wage offered to children as there will be competition between low skilled adult

workers and child workers. It will also increase the cost of employing child labor as employers in the formal sector may fear the legal consequences of employing child labor.

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Appendix

Proof of proposition 1

Let the efficient level of education and child labor be denoted by e^* and I_c^* , respectively. Also, let the level of education and child labor associated with $E(y)$ be denoted by $\bar{e}$ and $\bar{I}_c$. Since saving (s) and bequests (b) are interior, so equations (6) and (7) are still valid, but the equation (9) for e^* and $\bar{e}$ can be written as follows:

$$r(w_c + g_e(e^*, z)) = (w_p^f - w_p^i)h_e(e^*, y) \quad (12)$$

$$r(w_c + g_e(\bar{e}, z)) = (w_p^f - w_p^i)h_e(\bar{e}, E(y)) \quad (13)$$

Here $h_e(e, E(y)) < h_e(e, y)$ as $E(y) < y$ and $h_{ey}(\cdot) > 0$. Subtracting equations (13) from (12) we get:

$$r[g_e(e^*, z) - g_e(\bar{e}, z)] = (w_p^f - w_p^i)[h_e(e^*, y) - h_e(\bar{e}, E(y))] \quad (14)$$

Now suppose $\bar{e} > e^*$, so left hand side of equation (14) is negative as $g_{ee} > 0$ but the right hand side is positive as $h_{ee} < 0$, which is a contradiction. So, there must be some $\bar{e} \in (0, e^*]$ for which equation (14) holds (for $\bar{e} = e^*$ the equation holds trivially). This implies $\bar{I}_c < I_c^*$.

Proof of proposition 2

Consider two different level of ability; z and z' , without loss of generality suppose $z' > z$. From equation (9) the efficient level of child labor under z and z' can be written as:

$$r(w_c + g_e(e, z)) = (w_p^f - w_p^i)h_e(e, y) \quad (15)$$

$$r(w_c + g_e(e', z')) = (w_p^f - w_p^i)h_e(e', y) \quad (16)$$

where e and e' are the efficient level of education associated with z and z' , respectively. Now suppose $e > e'$, so $h_e(e, y) < h_e(e', y)$ as $h_{ee} < 0$. Hence, $(w_p^f - w_p^i)h_e(e, y) < (w_p^f - w_p^i)h_e(e', y)$, this together with equations (12) and (13) imply that $g_e(e, z) < g_e(e', z')$. But we know that $g_{ee} > 0$ and $g_{ez} < 0$, also we assume $e > e'$ and $z < z'$, so inequality in (15) cannot be true. So, we must have $e < e'$. This implies $I_c > I_c'$.