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THE WORLD BANK ECONOMIC REVIEW

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Child Labor and Development: An Introduction

Kaushik Basu and Zafiris Tzannatos

Long neglected by economists, child labor has experienced a sudden resurgence of interest as a subject of research and analysis since the mid-1990s. This is surprising at first glance, because the global incidence of child labor has been on the decline for several decades now. What accounts for the increased interest? One factor is the growing emphasis in the development literature on poverty reduction, particularly among the most vulnerable sections of the population, which includes children, especially working children. Simultaneously, with the heightened recognition of the importance of human capital accumulation as a catalyst—and perhaps even a prerequisite—for development, child labor is viewed as a major impediment to economic progress.

The recent academic interest is matched by the increasing prominence of child labor in both national and international policy settings. This is manifested in a series of international conventions, such as the U.N. Convention on the Rights of the Child (1989), the International Labour Organization (ILO) Convention 182 on Elimination of the Worst Forms of Child Labor (1999), and the U.N. Millennium Declaration (2000) with its emphasis on poverty reduction and universal education. These three documents share a common concern for banishing global poverty and investing in children.

This international concern, enshrined in various conventions, has been mirrored by economists' interest in globalization and its implications for poverty eradication. The new research has dimmed some of the earlier optimism that growth and globalization will automatically trickle down to the benefit of all. Child labor is a prime example. Though its incidence has declined, children continue to work in large numbers and for long hours, more so than should be tolerable in this age of globalization and prosperity. This persistent search for new, possibly specific solutions is now being facilitated by the increasing availability of micro data, which enable the explicit formulation and testing of critical propositions and policies. This should result in a more rigorous understanding of intrahousehold allocation mechanisms, their interaction with market forces, and the effect of these interactions on child labor.

The articles in this issue of the *World Bank Economic Review* make a small contribution to the growing debate on child labor. They are based on papers presented at an international conference, "The Economics of Child Labour" in Oslo in May 2002, sponsored by the ILO, the United Nations Children's Fund

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(UNICEF), and the World Bank and organized by Fafo, the Norwegian Institute for Applied International Research. The volume provides an overview of the issues (Kaushik Basu and Zafiris Tzannatos), gives a historical account of child labor (Jane Humphries), and presents the normative and philosophical conundrums that surround the problem of child labor (Debra Satz).

Four other articles consider various issues of direct policy or analytical relevance to developing economies, individually and on a cross-country basis. Sonia Bhalotra and Chris Heady analyze the paradoxical result that (with some qualifications) child labor tends to be more frequent in wealthier rural families of Ghana and Pakistan and examine the implications of this finding. François Bourguignon, Francisco Ferreira, and Phillippe Leite simulate the effect of the Brazilian schooling subsidy program Bolsa Escola and a set of alternative specifications of this kind of conditional cash transfer program on child labor, poverty, and education. Arnab Basu and Nancy Chau tackle the specific issue of child labor in situations of debt bondage, and Furio Rosati and Mariacristina Rossi try to explain the joint determination of school attendance and hours of work among rural children in Nicaragua and Pakistan. It is certainly more helpful to know the determinants of the hours of child labor rather than of child labor itself. Yet there was very little previous work on this topic.

A noteworthy feature of this volume is that its genesis lies in the increasing cooperation among international agencies. An aspect of this cooperation is the creation of a joint facility for data collection, sharing, and analysis, which enables researchers and policymakers to access a wealth of primary data and information on child labor across the globe. This issue concludes with a short note on the Understanding Children's Work project under the common auspices of ILO, UNICEF, and the World Bank.

We hope that the research presented in this volume and the increasing availability of statistical information will contribute to a better understanding of child labor and to its eventual demise.

The Global Child Labor Problem: What Do We Know and What Can We Do?

Kaushik Basu and Zafiris Tzannatos

The problem of child labor has moved from a matter of regional and national concern to one of international debate and possible global persuasion and policy intervention. In crafting policy for mitigating this enormous problem of our times, it is important to start with a proper theoretical and empirical understanding of the phenomenon. What gives rise to child labor, and what are its consequences? What interventions might end child labor without hurting children? A well-meaning but poorly designed policy can exacerbate the poverty in which these laboring children live, even leading to starvation. The article surveys the large and rapidly growing literature on this subject, focusing mainly on the new literature based on modern economic theory and econometrics. It also looks at some of the broad policy implications of these new findings, with the objective of contributing to better informed discussion and policy design.

From at least as far back as 1802, when Robert Peel's Factories Act was passed in Great Britain, societies have made serious efforts to root out child labor. In the 200 years since then, the world has seen economic growth and prosperity that, even until fairly recently, would have been beyond human imagining. Yet despite that, at the time of the second centenary of the Factories Act, the world has an estimated 186 million child laborers—5.7 million in forced and bonded labor, 1.8 million in prostitution, and 0.3 million in armed conflict—a failure of stunning proportions.¹

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1. The estimates are for 2000, the latest for which global data are available (ILO 2002). A more detailed discussion of these statistics is in section III.

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The period of activism and economic progress in the 19th and early 20th centuries saw sharp reductions in child labor in industrial nations. What may not have been realized then was that some part of this problem had merely been exported to developing economies, which already had their own child labor problem. Partly because of the difficulty of collecting data on child labor, and partly because most child labor is integrated with other family work, its dimensions remained unknown for a long time. In the 1990s, following the Convention of the Rights of the Child (1989) and a confluence of factors from globalization to the systematic collection of statistics by the International Labour Organization (ILO), the World Bank, and individual nations, the world became aware that from a global perspective the child labor situation was not much better than it had been during the Industrial Revolution. Large numbers of children were working shockingly long hours in factories and sheds that were frequently poorly lit, squalid, and a hazard to health.

This awareness gave rise to a flood of research and writing about child labor that has dramatically increased understanding of the phenomenon and the consequences of alternative policy interventions. This raises hope of the possibility of a time-bound plan for putting an end to child labor and raising the level of well-being of children the world over. This article pulls together the recent research as an aid to thinking about policy for dealing urgently with this preventable problem of our times.

I. THEORY

This section and the next review some of the theory behind the empirical investigations and the assumptions that underlie the theory. Two crucial assumptions underlie some of the early models (see, for instance, Basu and Van 1998; Swinnerton and Rogers 1999) and have been used in a wide range of analyses, from dynamics to the modeling of social norms: the luxury axiom and the substitution axiom.

The Basic Model: Poverty, Substitution, and Social Stigma

The luxury axiom asserts that households send their children to work only when driven to do so by poverty. In other words, child nonwork (typically schooling and leisure) is a luxury good. Households whose adult incomes are very low cannot afford to keep children out of some productive activity. Only when adult incomes begin to rise do households take children out of the labor force. Implicit in this assumption is an altruistic view of the household: parents or guardians do not like to make their children work unless compelled by circumstances. The evidence seems largely to confirm this axiom (Edmonds 2001; Admassie 2002; Wahba 2002; Grootaert and Patrinos 1999, 2002), though there will be exceptions or what look like exceptions. These are discussed in section III.

The substitution axiom asserts that adult and child labor are substitutes, subject to some adult equivalency correction. More specifically, it means that adults can do what children do. There used to be a presumption in the folk literature that children were better than adults at certain tasks. Expressions like “nimble fingers” to describe child labor tended to perpetuate this belief. The substitution axiom expresses a contrary view. A careful study of the technology of production involving children by Levison and others (1998) lends strong support to the substitution axiom. They show that adults in India are as good as (if not better than) children at producing hand-knotted carpets. So from a purely technical point of view it is possible to replace child labor with adult labor. But of course, adults cost more, and for that reason firms may be reluctant to make the transition to adults-only labor.

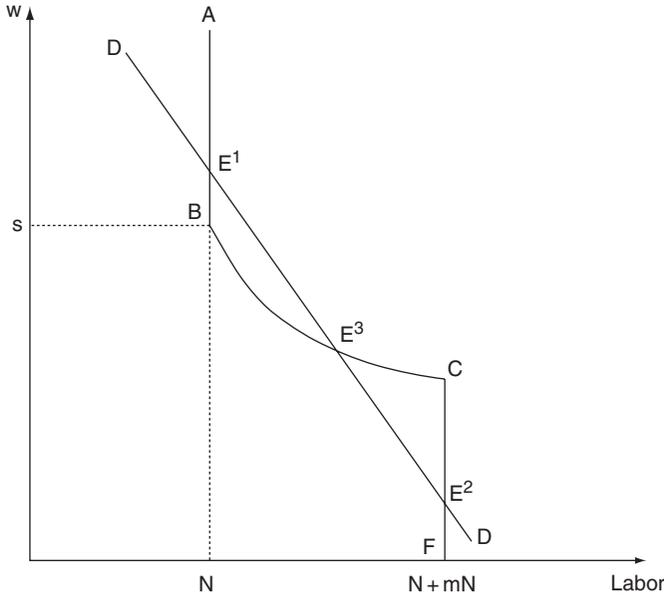
The basic idea behind the theory that emerges from these axioms is simple. Suppose, for simplicity, that the economy consists of N households and that each household consists of one adult and m children. Production takes place using labor alone. By doing a full day’s work, each adult can supply one unit of labor and each child $\gamma (\neq 1)$. This assumption formalizes the substitution axiom. Child labor is a substitute for adult labor, subject to an equivalent scale correction. Let the wage rate for a full day’s work by an adult be w and the wage rate for a full day’s work by a child be w^c , so that $w^c = \gamma w$.

Each household decides on the minimum tolerable level of household consumption, here called subsistence consumption, s , though it may well embody social notions of what is considered an acceptable level of consumption. Adults work full-time. Only if adults work full-time and income falls short of subsistence consumption are children sent to work (the luxury axiom).

Now consider figure 1, where the adult wage is represented on the vertical axis. If this wage is greater than s , only adults supply their labor. Assuming, for simplicity, that adult labor supply is perfectly inelastic, then AB is part of the labor supply. As w drops below s , children are sent to work in an effort to reach the target acceptable level of income. Hence, as w drops further below s , total labor supply increases. This continues until there is no further labor to supply. Then labor supply becomes inelastic once again. This explains the shape of the supply curve ABCF.

The essential feature of the supply curve here is its backward-bending section. Beyond this, there are many possible variations under different assumptions. The stretch BC can be a segment of the rectangular hyperbola under the assumption that the household uses child labor to achieve exactly a total income of s . This may not be reasonable, however, if just a small amount of child labor makes it impossible for the child to go to school. In that case, once a child is made to work the household may decide to make the child work quite a bit, thereby making the BC segment more elastic.

FIGURE 1. Effect of Subsistence Consumption on Child Labor



But as long as there is a backward-bending segment, the possibility of the demand curve for labor intersecting the supply curve more than once is a reality.²

That possibility with a standard downward-sloping demand curve for labor is illustrated in figure 1. In this case the labor market has three equilibria, E^1 , E^2 , and E^3 . Of these, E^1 and E^2 are stable, and they are the focus here. At E^1 wages are high and there is no child labor, and at E^2 wages are low and there is a high incidence of child labor. The same economy can get caught in any of these equilibria.³ If such an economy is stuck at the “bad equilibrium” with high

2. How plausible is this multiple equilibria in reality? It is arguable that in many nations, such as China or India, where child labor is so small a percentage of adult labor that a ban is unlikely to raise adult wages sufficiently to make parents voluntarily withdraw their children from the labor force. Though this may indeed be so in China or India, there are several nations, such as Ethiopia or Nepal, where child labor is a much higher percentage of adult labor (about four times that of China or India). In such countries the effect on adult wages of a ban on child labor may not be negligible. Moreover, in reality neither households nor firms are identical. This becomes evident that the multiple equilibrium result will not obtain as cleanly in reality as in the model, where all households are identical. But if child labor is considered as a percentage of total unskilled adult labor (which is what child labor competes with), the ratio is higher. So a ban on child labor can have a fairly substantial effect on the wage rate of totally unskilled workers. In other words there may be a segment of the heterogeneous economy in which the effect is large.

3. A different kind of coordination problem and multiple equilibria are explored in Dessy and Pallage (2001). In their work the failure of coordination is between parents’ decision about child education and the decision of firms to adopt a suitable technology. In their model, unlike this one (see Basu 2002), the equilibria are Pareto ranked.

child labor, it pays to have a legal intervention banning child labor, for this will deflect the economy to the “good equilibrium.”

This does not automatically amount to a case for legal intervention any time there is child labor. In a very poor economy it is entirely possible that the demand for labor is so low that the only intersection of the demand curve with the supply curve occurs on the segment CF. In that case a ban on child labor can backfire, leaving the children and their parents impoverished and risking starvation.

In this model child labor is driven by poverty. That is not to deny that it can have other causes, some even beyond economics. There are important analyses, notably by Zelizer (1985), that point to the changing social conception of childhood and, relatedly, of the value of the child.⁴ How important are these social factors in explaining child labor? Zelizer is right in asserting that in the 19th century, child labor was often commended as necessary for building character and discipline and valuable for industrial competition. However, one must be cautious in not interpreting all opposition to legislation banning child labor as reflecting such views and supporting child labor. Even in contemporary times many economists oppose coercive legislation (in some contexts, so do we), but this usually reflects their view of how the labor market works and how legislation is likely to affect children. It *need not be* an indicator of any normative difference or any difference in the conception of childhood and the worth of children.

What one can take away from Zelizer is that social norms matter, sometimes in very concrete ways, as demonstrated by Lopez-Calva (2003), following the models of Lindbeck and others (1999). In a nutshell the argument is as follows. For simplicity, assume that each household i has one child and that the child wage rate is fixed at w^c and that the benefit from having the child work is given by w^c . To decide whether child labor is worth it, the cost of having the child work needs to be deducted from the benefit. Let $c(i)$ be the leisure cost of child work as perceived by household i . Without loss of generality, assume that $c(i)$ rises monotonically with i .

Now suppose that there is another cost of sending the child to work, the social cost or the stigma cost, θ . Following standard arguments (for example, Granovetter and Soong 1983), assume that this cost depends on how many others send their children to work, so that the stigma cost of sending a child to work is given by $\theta(n)$, where n is the number of children expected to be working and $\theta'(n) < 0$, suggesting that one becomes more brazen the more other people are doing the same. Hence, household i will send its child to work only if $w^c - \theta(n) \geq c(i)$.

Now define $\iota(n)$ as the critical household that will send its child to work when it is expected that n children are working in the aggregate. Hence,

4. Indeed there are persuasive historical accounts of how child labor was often valued and technology that could use child labor was advertised as such (Tuttle 1999). There is also the possibility, unlike in the above model, of a child being the autonomous decision-maker concerning child labor, as emphasized by Iversen (2002).

$w^c - \theta(n) \equiv c[\iota(n)]$. When n is the expected size of aggregate child labor, all households $i \leq \iota(n)$ will send their children to work. It follows, therefore, that the actual amount of child labor will be equal to $\iota(n)$. Evidently, n^* is an equilibrium amount of child labor (in the sense of rational expectations) if $n^* = \iota(n^*)$.

Hence, child labor can depend critically on social norms, in particular on the stigma costs of sending a child to work. It is also easy to see that $\iota(n)$ is a monotonically increasing function. Hence, social norms can be compatible with multiple equilibria. Two innately identical societies can socially engineer themselves into different levels of child labor, which, once in place, tend to persist. Also, because the social stigma may vary depending on the type of labor—whether a child works in a factory, farm, or at home, for example—the extent of different kinds of child labor may vary in urban and rural areas and between factories and homes.

It is possible to go beyond poverty and social stigma and look for even more causes of child labor. It could depend on the quality and availability of schools and the transactions cost involved. These variables can in turn be further disaggregated. Moreover, there is evidence that some of these variables affect fertility (Tzannatos and Symons 1989), which would make m , the number of children in a household, endogenous. Relatedly, the incidence of child labor will respond to government incentives to make schooling more attractive, such as giving children food for attending school or giving parents of schoolgoing children cash transfers.

The relation between child labor and schooling can be captured theoretically in a somewhat different way with a political economy model. Such models are new in this area, and their full implications remain to be evaluated. A brief account of such a model is provided next.

Child Labor, Schooling, and Political Economy Models

Political economy models, though still rare (Krueger and Tjornhom 2001; Doepke and Zilibotti 2002; Tanaka 2003), provide interesting insights into child labor and schooling, endogenously explaining why some nations ban child labor and others do not.

In Tanaka's model, government does not legislate against child labor. Instead, it collects taxes and runs schools and, by providing good schools, tries to wean children away from labor to education. In this model, as long as a household does not send its children to school, rising tax rates make it worse off. But once the schools are good enough for households to decide to take the children out of the labor market and send them to school, its welfare responds to the tax rate like an inverted U, because an increase in the tax rate improves the quality of schools.

Households differ from one another, but the broad contour of their preferences is as just described. This means that preferences are not single-peaked, but they are nevertheless of the kind that may satisfy the conditions for the use of

the median voter theorem (Epple and Romano 1996; Glomm and Ravikumar 1998). Tanaka then imposes the necessary technical restrictions and uses the median voter theorem to predict the tax rate (and therefore the quality of schooling) that the government will choose. This in turn determines the incidence of child labor in the economy. In his model a rise in the tax rate results in a decline in child labor. But in the end the tax rate itself is deterministic. He shows that if inequality is high, in the sense of the median income being much lower than the average income, then the tax rate will be low and child labor will be high. Like in the model of Swinnerton and Rogers (1999), inequality is closely related to the incidence of child labor, though the causation is very different.

In an elegant model calibrated to fit Great Britain's experience in the 19th century, Doepke and Zilibotti (2002) endogenize the very act of restricting child labor. In their model, households with many children and less wealth tend to oppose legal restrictions on child labor (for reasons similar to the ones already investigated). Doepke and Zilibotti recognize, however, that the number of children and the amount of human capital in a household depend, in turn, on whether there are legal restrictions on child labor. They first model the steady state in the presence of legal restrictions and in the absence of restrictions. In the presence of restrictions the steady state is characterized by greater equality and more social mobility.

The most interesting feature of their model is the endogenous explanation of the ban. They show that there can be multiple steady-state equilibria in the economy. There can be an economy in which fertility is high, per capita wealth is low and poorly distributed, and opposition to legal restrictions is so high that government does not legislate against child labor, so these conditions persist through time. Alternatively, the same economy could be caught in a steady-state equilibrium in which household size is low, equality is high, and public opinion strongly favors legal restrictions. One exogenous change that can shift an economy from the first equilibrium to the second is a rise in the productivity of education.

Dynastic Traps, and Other Theoretical Extensions of the Model

In most of the discussion so far, dynamics have received little attention. Once there is an interest in dynamics and in what happens to children when they grow up, it becomes essential to, minimally, break up children's activities into three categories: leisure, schooling, and work. This permits exploration of what happens to human capital formation over time and whether child labor helps or hurts in the accumulation of human capital. Also, there are important questions to ask about the relation between child labor and schooling. If all of a child's time is devoted to labor and schooling, a rise in child labor will, by definition, imply a fall in schooling. But bringing in leisure as a separate category allows for an examination of more complicated relations between labor and education. Finally, explicit modeling of schooling enables exploration of changes in child labor over time.

There is now a small body of literature that analyzes the dynamics of child labor (Basu 1999; Dessy 2000; Razzaz 2001; Hazan and Berdugo 2002; Emerson and Souza 2003; Bell and Gersbach 2001). It assumes that a person who receives more education as a child grows up to have higher human capital. It is possible to add qualifications to this by noting that child work can take the form of apprenticeship, which enables the child to learn some craft or acquire some other form of human capital, or that in acquiring human capital it is not only the amount of time spent on schooling that counts but also the amount of money spent on education. Though these are possible, it seems reasonable to assume a positive link between amount of schooling and human capital acquired.

Under normal conditions in capital and labor markets, higher human capital will mean a higher labor income. Hence, a person who supplies more labor and gets less education as a child will grow up to be poorer as an adult. Following the logic of the basic model, this person's child will also be sent to work, thereby perpetuating child labor across generations. Child labor can thus be thought of as a dynastic trap. A child laborer tends to grow up to have children who are child laborers by virtue of their family history. Likewise, a child who manages to go to school, which will typically mean escaping labor, will likely have a larger income as an adult and therefore have no need to send any children to work.

Again, there is the possibility of multiple equilibria: Of two otherwise identical dynasties, one can be caught in the dynastic child labor trap, whereas the other is not. This gives rise to a host of possible policy interventions, including the provision of loans or subsidized schooling, bans on child labor, and information campaigns about the adverse effects of certain types of child labor (this could raise the awareness of the parents, so that they weigh the long-run costs of child labor more heavily, which amounts to increasing the benefits of schooling in their perception). The interaction between child labor and the nature of the capital market has been studied in a multiperiod model by Baland and Robinson (2000), who construct a model in which it is Pareto efficient to ban child labor.⁵

It is possible to develop this sketch of dynamics further by explicitly modeling the household's fertility decision. Hazan and Berdugo (2002), building on the work of Galor and Weil (1996), show how economies can be caught in a trap where fertility and child labor are high and output per capita is low. Technological progress increases the wage differential between adults and children, lowering the benefit from child labor and leading to lower fertility. In their model, banning child labor hastens the transition to low fertility and sustained growth steady-state equilibrium, which is Pareto dominant.

5. See also Ranjan (1999) and Cigno and others (2002). A cross-country study by Dehejia and Gatti (2001) lends support to the thesis that lack of access to credit contributes to child labor. Households use child labor as an instrument for coping with income variability (Jacoby and Skoufias 1997).

In recent years theoretical analyses of child labor have been extended in various directions, analyzing the formation of social norms and the role of “tipping points” (Chaudhuri 1997; Lopez-Calva 2003), the relation between child labor and trade (Ranjan 2001; Jafarey and Lahiri 2002; Brown 2000; Dixit 2000; Brown and others 2002), the relation between income distribution and child labor (Swinerton and Rogers 1999; Rogers and Swinerton 2001), the effect of minimum wage legislation on child labor (Basu 2000), the worst forms of child labor (Dessy and Pallage 2002; Basu and Chau 2002), efficiency wage and child labor (Genicot 2000), Nash bargaining and child labor (Gupta 2000; Iversen 2002),⁶ and the connections between child labor and fertility (Levy 1985; Basu 1993; Bardhan and Udry 1999; Chaudhuri 2000; Fan 2002; Brown and others 2002).

Rather than entering these myriad subfields of inquiry, the next section surveys some of the empirical findings of the rapidly growing literature on child labor and then examines what has been learned about policymaking in this area.

II. DEFINITIONS AND ESTIMATES

According to the latest ILO estimates, 211 million children aged 5–14 years are “economically active” and 186.3 million are “child laborers” (further discussion of these terms comes later). These figures have to be treated with caution, however, because there are problems with both undercounting and overcounting.

The ILO collected the data by tracking children’s work status over the previous week. It is now well-known, as documented by Levison and others (2002), that children’s work is notoriously intermittent (for example, seasonal or as needed). Children take up and leave jobs much more frequently than do adults. So the fact that a child did not work the previous week does not mean that the child did not work during the previous month or year. To correct for this, Levison and others worked out intermittency multipliers, which allow them to use the estimated number based on one week’s record to derive the number of children who do some work. Their work using Brazilian data shows that the real number will be 72–94 percent higher. Applying the intermittency multipliers to the ILO estimate gives a figure of economically active children somewhere between 365 million and 409 million.

There is also the problem of undercounting the labor of girls. The ILO clarifies that, as with most organizations engaged in collecting data on child labor, it ignores the unpaid and not-for-market work that is done in the household, such as household chores. It is not surprising that boys turn out to be doing more labor

6. These can be of two kinds—those in which the bargain is within the household and those in which the parent bargains with an employer about a child’s pay, treating the child as simply an input for generating wealth.

TABLE 1. Participation in Labor Activities and Schooling in India by Children Aged 6–16, by Gender, 1994 (percent)

Gender	Agricultural work	Nonagricultural work	Household work	Total work	School enrollment
Boys	5.2	2.3	5.3	12.8	71.5
Girls	4.5	1.7	10.5	16.6	57.0
All	4.9	1.9	7.7	14.6	64.7

Source: Cigno and Rosati (2001), based on the Human Development of India Survey, conducted by the National Council for Applied Economic Research, New Delhi.

than girls, not only in this new ILO data but in 19th-century British data as well.⁷ Girls do a disproportionate amount of household work—often for such long hours that schooling is impossible. Ignoring this work thus underestimates girls' work. As Burra (1997, p. 204) points out in her exhaustive study of child labor in India, much of female child labor appears “invisible to the casual observer.”

But when child work is carefully estimated, including unpaid household work, it turns out that girls do more work than boys. Burra (1997) provides evidence of specific industries and rural work in which girls easily outnumber boys.⁸ Research by Cigno and Rosati (2001), using data collected by the National Council of Economic Research that include statistics on household work, shows that girls do 33 percent more work than boys (table 1).

Ignoring household work thus encourages gender injustice and gives an erroneously low figure for the incidence of child labor. If this correction of 33 percent is made to the adjusted estimate of economically active children, the number goes up to somewhere between 425 million and 477 million. This would mean close to 40 percent of the world's children are economically active.

Though this number seems high, both corrections are reasonable. Countering this, however, is the problem of overcounting. The ILO treats as economically active any child who did one hour or more of work in the previous week. Such a generous definition would tend to include too many children—and not only in developing economies but in industrial ones as well, where children often deliver newspapers and babysit and, at times, work in agricultural activities.

For this reason it may be preferable to use ILO's estimates on “child labor” instead of economically active children. ILO defines a “child laborer” as follows: for ages 5–11 it is treated as synonymous with “economically active”; for ages 12–14 it includes children who do 14 hours or more of nonhazardous work per week or 1 hour or more of hazardous work per week. This yields the estimate of

7. According to the census of England and Wales, in 1861, 36.9 percent of boys aged 10–14 years were working and 20.5 percent of girls (Cunningham 1996). For historical accounts of child labor and the related debate on international labor standards, see Goldin (1979), Weiner (1991, chapter 6), Cunningham and Viazzo (1996), Moehling (1999), Engerman (2003), and Humphries (2003).

8. Jayaraj and Subramanian (2002) have created an index of disadvantage for working children, and find that girls are more disadvantaged than boys in Tamil Nadu, India.

TABLE 2. Global Child Labor, Aged 5–14, 2000

Gender	Total no. of children (millions)	Child labor (millions)	Child labor participation rate (%)	Children in hazardous work (millions)	Hazardous work participation rate (%)
Boys	616.4	97.8	15.9	61.3	9.9
Girls	583.1	88.5	15.2	50.0	8.6
All	1,199.4	186.3	15.5	111.3	9.3

Source: Authors' calculations based on ILO (2002, tables 1, 6, and 8).

186.3 million child laborers already mentioned (table 2). Though there are some difficulties even with this calculation,⁹ they are small in terms of net effect. Thus in this article, the data in table 2 are taken as the summary description of current global child labor.¹⁰

III. THE DETERMINANTS AND CONSEQUENCES OF CHILD LABOR

Over the past 10 years, thanks to a large number of multipurpose household surveys, a few surveys explicitly focused on child labor, and a substantial amount of econometric research based on these statistics, economists have begun to map the causes and determinants of child labor and acquire an understanding that is far-reaching though incomplete.¹¹ Some of the findings on the causes of child labor corroborate what many may have expected intuitively. But some findings are unexpected, and some touch on issues that had not been given much attention previously.

Poverty

One of the most expected but nonetheless contentious determinants of child labor revealed by these studies is poverty. This notion was introduced here as the luxury axiom. The role of poverty has been the cornerstone of much of the thinking about child labor.¹² Casual empiricism seems to confirm its significance. Even in very poor nations, where child labor is widespread and human

9. It is, for instance, not clear that even for children below the age of 12 years, 1 hour of work per week (about 10 minutes a day) should have a child count as a child laborer.

10. In recent times policymakers and academics have tried to take a more nuanced stance on child labor, paying special attention to the worst forms of child labor, which includes hazardous work and forced labor. This has been reflected in conventions, such as ILO Convention 182 and certain laws, like the Sander's Amendment in the United States (see discussion in Basu 2001). For this reason the ILO estimates of hazardous child labor are included in table 2.

11. For a comprehensive overview of the state and causes of child labor around the world see U.S. Department of Labor (2000). For a more eclectic review, mainly of the World Bank's research in this area, see Bhalotra and Tzannatos (2002).

12. See Jayaraj (1993), Basu and Van (1998, 1999), Basu (1999a), Swinnerton and Rogers (1999), Freije and Lopez-Calva (2000), Ray (2000a, 2000b), Bhalotra (2000), and Nagaraj (2002).

beings of all ages are subject to the same laws, the children of doctors, lawyers, professors, and in general the middle classes are not found to be laboring. A recent study by Nagaraj (2002) of the *beedi* industry in Tamil Nadu and Karnataka, India, finds that the number of children aged 5–14 attending school rises monotonically as monthly household per capita expenditures rise from less than 120 rupees to 455–560 rupees, passing through nine intermediate categories. In the absence of other data, Nagaraj treats schooling as a kind of complement of child labor. This may not be completely valid, as mentioned, but the study does seem to broadly confirm the hypothesis that rising income takes children away from work and into schooling.

At a more macro level, it is clear that as nations become richer, the incidence of child labor tends to fall. In China the sharp decline in child labor began in the 1970s, when gross domestic product growth began to accelerate, and has persisted until now. During 1985–95, when Thailand experienced average annual growth of 9 percent, the labor participation rate of children aged 14–15 (for whom comparable information exists) was halved, to 21 percent (Tzannatos 2003). In India also, the labor participation rate of children has declined since the 1970s, though less sharply than in China (ILO 1996). Like China, India had a higher growth rate through the 1980s and 1990s than in previous decades, though not as high as in China.

Although all this suggests that the luxury axiom is probably valid empirically, these broad-brush descriptions cannot be taken as proof. For that, however, there are now micro studies that seem to reinforce the role of poverty.¹³

Vietnam witnessed rapid growth through the 1990s. During that time there were two household surveys, one in 1992/93 and one in 1997/98. Of the 4,800 households covered in the first round, 4,305 were part of the second survey, thereby creating a convenient panel data set. During the five years between the two surveys Vietnam's gross national product (GNP) per capita grew at the rate of 6.5 percent a year and child labor (ages 6–15) fell 26 percent. In a recent study Edmonds (2001) analyzes 3,436 of the households that were classified as rural to determine whether the decline in child labor can be attributed to the rise in standard of living. Urban households were excluded because the great heterogeneity in types of labor by children added considerable complexity to the analysis and because urban children make up a much smaller proportion of the nation's total child labor.

Many alternative explanations are considered, and different kinds of child labor are explored, such as in agriculture and family business, as well as child labor in the aggregate. The decline in child labor seems unequivocal and to cut across all age groups and kinds of child labor (table 3).

13. Some early research found that the effect of adult income was often negative but small (and at times insignificant) after controlling for other variables. Most likely this is the result of measurement errors, failure to take into account the role of wealth (especially land), inappropriately controlled endogeneity, and arbitrary functional forms used in the estimation (Bhalotra and Tzannatos 2002).

TABLE 3. Probabilities of Child Labor Participation in Vietnam, 1992/93 and 1997/98

Age	1992/93				1997/98			
	Work	Outside house	Agriculture	Family business	Work	Outside house	Agriculture	Family business
10	0.31	0.00	0.29	0.03	0.17	0.00	0.16	0.00
11	0.36	0.01	0.33	0.04	0.27	0.00	0.26	0.02
12	0.46	0.03	0.38	0.07	0.34	0.00	0.32	0.02
13	0.54	0.03	0.47	0.06	0.42	0.02	0.39	0.05
14	0.67	0.05	0.56	0.11	0.49	0.04	0.42	0.07
15	0.77	0.09	0.66	0.09	0.61	0.04	0.52	0.10

Source: Edmonds (2001), based on data from the Vietnam Living Standards Surveys.

Edmonds (2001) develops a new, nonparametric variation of the Blinder-Oaxaca decomposition approach to determine the extent of the decline in child labor that can be attributed to the decline in poverty. He first runs a nonparametric (locally linear) regression to map the cross-sectional relation between the incidence of child labor and household income (measured by household expenditure per capita) using the 1992/93 data. This cross-sectional relation is then used to predict the amount of child labor in 1997/98, taking account of the large increase in per capita expenditure during this interval. He finds strong corroboration of the hypothesis that rising living standards cause child labor to decline. He finds that increased household income can explain 94 percent of the decline in child labor for households at the poverty line.

Critiques of the Poverty Axiom

The axiom that poverty causes child labor has, however, not gone unquestioned. There are empirical studies (for example, Ray 2000a, in his study of Pakistan) that have failed to find a positive relation between poverty and child labor. But it is arguable that the income that a household targets as the minimum acceptable may not coincide with the nation's or region's official poverty line. So using a poverty headcount ratio based on the official poverty line may not explain the incidence of child labor.

Another critique of poverty-based explanations of child labor comes from Bhalotra and Heady (2003), who have tried to show, using data for Ghana and Pakistan, that households that own (or operate) larger amounts of land tend to make their children work more. Because a larger landholding would typically mean greater wealth, this seems to suggest that greater poverty does not lead to greater child labor.

The main reason that greater land ownership may contribute to higher child labor is, as Bhalotra and Heady recognize, that labor market imperfections mean that owning or controlling land amounts to having the opportunity for more productive use of the household's labor, including child labor. So if two households are equally disinclined to send their children to work but one has

more land, that household may choose to make the children work simply because such a household finds that child labor is more rewarding than the other household does. It is not surprising, then, that land ownership makes a difference on the margin.

Edmonds and Turk (2002) found something similar in Vietnam. Households that start their own business are more likely to send children to work.¹⁴ The reason must be the same. A household that starts its own business is like a household with a lot of land. It has greater opportunity to use its own labor more productively. This does not mean that poverty is not a determinant of child labor, simply that child labor, like all other inputs, also responds to incentives and opportunities. It seems likely that sufficiently disaggregated household data, ranging from households that own no land to those that have very large quantities of land, would show a nonlinear relation with child labor, which would first rise as land ownership rose and then eventually fall off. Beyond some point the wealth of the household would kick in as the dominant factor, causing child labor to decline.

Human Capital Formation and the Dynamics of Child Labor

The story gets even more complicated as the relations between human capital formation and child labor and the intergenerational dynamics of child labor are explored. Consider the relations between child labor, schooling, and human capital formation.¹⁵ Does child labor hurt education and the acquisition of human capital? Most middle- and upper-income parents take for granted that child labor is inimical to education and the growth of a person into a productive human being. But what such parents aspire to for their children is very different from what someone living on the edge of the poverty line could even conceive of (Appadurai 2002). It is entirely possible that for people living such a precarious life there is indeed a tradeoff between education and well-being, at least in their perception. For the child of a poor craftsman, the proposition that it is better to learn the parent's craft than go to school is not something that can be dismissed out of hand. Hence, there is a case for investigating what the data show.

The literature seems to support the view that, although some work can help children acquire human capital, by teaching them the skills and attitudes needed to function well as adults and at times by enabling them to earn the money needed to go to school (French 2002; Psacharopoulos 1997), in general child labor impedes the acquisition of education and human capital. This emerges clearly from an analysis of three rounds of data from the National Household Surveys in Brazil in 1982, 1988, and 1996. Emerson and Souza's (2002b) regression analysis using these data shows that starting to work at a younger

14. The same is confirmed by Canagarajah and Coulombe (1997). Kanbargi and Kulkarni (1991) found that in Karnataka, India, having a larger number of cattle can mean a higher incidence of child labor.

15. This is a topic with a rapidly growing literature. See, for instance, Rosenzweig and Evenson (1977), Maitra and Ray (2002), Ray (2000b), Deb and Rosati (2002), and Rosati and Rossi (2003).

age results in forgone earnings as an adult for both men and women. The loss of earnings is greatest for children who begin to work at the age of 9 or younger, then for those who start to work between 10 and 13 years, and finally for those who start to work between 14 and 17 years. For reasons that are not altogether clear, this study finds that starting work at an earlier age is relatively more costly for girls than for boys. This needs further investigation because another study (Swaminathan 1997) using data for Bhavnagar, Gujarat, finds the opposite result.

Are these forgone earnings caused by the fact that child labor interferes with schooling? Here an interesting difference shows up between those who start work as children (below the age of 13) and those who begin work as adolescents (aged 14–17). These two categories show different results when the regressions are run with and without a person's own education as an explanatory variable. Emerson and Souza (2002b) find that for the adolescents the forgone earnings are a direct outcome of education not acquired (that is, time spent at work and away from school). For children there are negative effects over and above the loss caused by lack of schooling. Child labor inhibits the acquisition of human capital through loss of education and through other channels, for instance, by damaging health or affecting attitudes (see Rosati and Rossi 2003).

An intriguing relation between child labor and education occurs across siblings. Thus although a particular child working cuts into education, work and education often seem to go together across siblings in poor families: one child's labor makes it possible for another child to go to school (see Morduch 2000 for a general discussion). Though this phenomenon of "sibling complementarity" seems obvious,¹⁶ it has not received much attention in the literature. An exception is a study by Emerson and Souza (2002a) that, using 1998 National Household Survey data for Brazil, establishes systematic relations between birth order and propensity to go to school or work. The last-born boy is less likely to work than his older siblings. This observation seems universal. Almost as widespread is the observation that the first-born girl is less likely to attend school than her younger siblings.

This sibling complementarity shows up largely in households that are moderately poor, because in rich households all children will be out of work and in school; in very poor households the reverse will be true. What sibling complementarity suggests is that in moderately poor households some children are kept away from school (and sent to work or made to look after the household) to enable other children to go to school. This observation has important moral and policy implications, especially because birth order also seems to be tied to gender, with girls' labor often being used to enable younger male siblings to go to school. Not much more can be said about this, because not much more is known, but it is an important topic deserving further research.

16. *Complementarity* refers to the relation between child labor and schooling. For a single child these two are typically substitutes (though of course there are exceptions) but across sibling these are more likely to be complements. Hence, the terminology.

Finally, what of intergenerational dynamics? That poverty is transmitted from one generation to another and has been through the ages is well known and documented. Horrell and others (2001) find, in addition, that downward shocks not only leave families worse off but can impede the formation of human capital among descendants. They reach this conclusion by studying a very unusual 19th-century data set. The Marine Society, established in Great Britain in 1756 to recruit poor, unemployed boys for the navy, kept detailed records of the boys interviewed between 1770 and 1861, including information on their socioeconomic background. Horrell and colleagues use this data set to show that poverty in one generation transmits to future generations in the form of lower human capital, creating dynastic poverty traps. They also show that this pernicious effect of poverty can be mitigated by a systems of social security, such as Great Britain's Poor Laws.

Evidence of dynastic traps exists for contemporary times as well. Wahba (2002) analyzes the 1988 Egyptian Labor Force Sample Survey, a nationally representative sample of 10,000 households. Her analysis is based on 10,742 children aged 6–14 for whom full information on schooling, work, and parental characteristics is available. She finds that a 10 percent rise in the market wage rate for illiterate men results in a 22 percent decrease in the probability of child labor for boys and a 13 percent decrease for girls.¹⁷ Wahba develops a bivariate probit model, allowing the decisions regarding schooling and work to be made simultaneously and interdependently. She finds that the child of a parent who was a child laborer has a higher probability of being a laborer than the child of a parent who was not a child laborer. The probability of a boy working rises 10 percent if his mother worked as a child and 5 percent if his father worked as a child.

The same phenomenon was modeled and empirically tested by Emerson and Souza (2003) using National Household Survey data for Brazil. They explored the further question of whether having worked as a child would boost the probability of that person's child working by more than the amount that can be explained by the fact that the person will be poor as an adult (because of having been a child worker). The answer is yes. They surmise the presence of social factors that cause the perpetuation of child labor through nonincome channels. It may be that having been a child laborer affects one's social norms and attitudes toward child labor (Basu 1999a; Lopez-Calva 2003), making one more prone to send one's child to work.¹⁸

17. It is worth noting as a digression that she finds strong support for the axiom that it is hardship that makes parents send their children to work.

18. In a study of India that does not directly relate to child labor but is concerned instead with education, Behrman and others (1999) find that a greater amount of schooling for girls increases the human capital of the next generation and this effect is, at times, greater than that obtained directly through schooling. This is caused by home teaching. They find that children with literate mothers spend on average one hour more on study at home than children with illiterate mothers.

One may question whether there are genetic channels through which these propensities, such as the one to seek education, transmit from one generation to another. The answer seems to be no, based on a study by Lloyd and Blanc (1996) comparing orphans and nonorphans in Sub-Saharan Africa. They find that the guardians with whom a child lives matter more significantly than the child's biological parents. This reinforces the likelihood that it is social factors that Emerson and Souza are capturing in their study.

Two caveats are worth mentioning with respect to both the empirical results cited here and the policy generalizations that can be drawn from them. First, the empirical literature on child labor is relatively young. Many studies (some quoted in this article) report results that are at best preliminary. Although some of the shortcomings can be corrected through future refinements, some generic problems endemic to economic and social research may persist well into the future.

Second, cross-section estimates may fail to capture important life-cycle effects, and estimates more generally can be affected by endogeneity or identification problems.¹⁹ Also, studies that include as explanatory variables the occupation of adults, land ownership, or other income variables may be tainted by multicollinearity. The results for control variables (such as household size, relationship of child to head of household, age of child, birth order) may be similarly affected. The omission of some variables from the estimation (because data are lacking) may also engender biases. Because many studies simultaneously examine the relation between child labor and education, there can be unobserved heterogeneity (for example, in the academic ability of children or their health or disabilities) that can be further conflated by the inclusion of parental education (a measure of tastes) or nonlinearities in the returns to education. Regional effects, community infrastructure (such as availability of water, electricity, and transportation), and local unemployment rates can prevent the results of different studies, even if in the same country and year, from being comparable. There are often disequilibrium effects (such as migration) that evade researchers. The use of dummy variables in estimation poses additional complications, as does the use of noneconomic variables (such as social norms), which can be proxied in different ways or altogether omitted from the estimation.

IV. SOME POLICY IMPLICATIONS

Much of the early debate on child labor focused on whether policy intervention was even appropriate. In the heyday of *laissez-faire* many observers believed that if child labor was a product of the market, it must be efficient to have child

19. For an extended discussion on each of these problems and their effects on estimation see Bhalotra and Tzannatos (2002).

labor. If one were committed to the efficiency of the market, the state had no reason to be involved in the market.

The flaws in this argument are obvious enough. Education involves externalities, and so a decision by an individual or a household may not be in the best interest of society. This argument was cogently summarized by Grootaert and Kanbur (1995) in an article that sparked considerable debate. Another problem is child agency. The decision on whether a child will work, study, or play is usually made by the child's parents or guardians, and the standard consumer sovereignty argument does not apply to cases where one person decides for another.²⁰

Even recognizing these caveats, some would argue that the *laissez-faire* prescription of nonintervention while waiting for the benefits of growth to trickle down and end child labor is the best *available* strategy. This is the position of Nardinelli (1990), who reads the experience of the Industrial Revolution and its aftermath in Great Britain as evidence of how futile legal interventions are in the face of market forces that give rise to child labor. Moehling (1999) takes a similar line of argument, based on an econometric analysis of U.S. historical data.

It is possible to argue, however, based on an understanding of the modern theory and data, that government intervention to control child labor is both desirable and possible. Policies need to recognize the powerful market forces that give rise to child labor in the first place and that will doubtlessly respond to any intervention. They need to be aware of the many pitfalls and risks of backlash in this complex area of interaction between household economics and market structures.

An important ground rule can be that any policy for child labor (including the policy decision to do nothing) must be justified primarily by the interests of children. That leaves out arguments of the structure: "policy x concerning child labor will leave children worse off but is justified in the interest of boosting the country's exports and through that its GNP." In brief, the policy interventions presented here arise from a child-centric perspective. These policy interventions are of two kinds: collaborative measures and coercive measures.

Collaborative Measures

Broadly speaking, collaborative measures are interventions that alter the economic environment of decisionmakers, rendering them more willing to let children stay out of work and spend more time on other activities, especially schooling. Such measures do not require coercion and may not even require any legislative backup. Thus a policy that improves the functioning of adult labor markets, so that adult incomes rise and unemployment falls, is always desirable

20. A recent philosophical discussion of this and an examination of what exactly "voluntary choice" means in the context of child labor occurs in Satz (2003).

from the point of view of curtailing child labor. Given that parents typically want to keep children out of work and in school, parents who have enough income of their own to make child labor unnecessary will tend to withdraw children from work and put them in school.

Does this mean that simply giving unconditional income subsidies to poor households will curtail child labor? Though the answer may generally be yes, one has to be careful. Such subsidies could instead be used to buy land or open a business, which in turn could increase child labor by creating an easy production environment for employing children.

Closely related is the policy of improving credit and insurance markets, so that adults who fall on bad times can borrow on reasonable terms and so do not have to take their children out of school and send them to work to help the household ride out the rough patch. The link between credit markets and child labor has been noted in the literature (Baland and Robinson 2000; Ranjan 2001).

But by far the most direct collaborative measures are those that reward children who go to school instead of working. Many such interventions have been tried, and there is now a small body of empirical literature on the programs. Among the policy intervention that build in incentives for parents to send their children to school (or for children to go to school) are Bolsa Escola in Brazil (Bourguignon and others 2003; Lavinás and others forthcoming),²¹ Progresá in Mexico (Schultz 2001; Skoufias and Parker forthcoming), Red de Protección Social in Nicaragua (Maluccio forthcoming), food for education programs in Bangladesh (Ravallion and Wodon 2000), mid-day meal schemes in India (Dreze and Kingdon 1999), school construction programs in Indonesia (Duflo 2000), and back-to-school measures in Indonesia following the financial crisis (Filmer and Sayed 1999).

Schooling has responded to such incentives in most of these programs. Dreze and Kingdon (1999) find that school participation among girls is 15 percent higher when the local school provides a mid-day meal and that girls' schooling responds more to such incentives than boys' schooling—an important finding for efforts to keep girls away from work, which, though often invisible, frequently involves more hours than boys' work.

Mexico's Progresá (recently changed to Oportunidad) extends to some 40 percent of rural families and provides large incentives to schooling (as well as medical tests and nutritional programs). For example, in poor areas a mother

21. Brazil has another program, Programa de Erradicacáo do Trabalho Infantil, that, like Bolsa Escola, provides an income subsidy but in the form of a rural targeted transfer program. Comparisons of schooling, child participation, hours worked, academic progress, and dangerous work in program households and control households indicate that the program increased academic performance and lowered child labor in participating households. Nonparticipating children worked longer hours after program implementation but no other adverse spillover effects are observed (Yap and others forthcoming).

receives a grant of 225 pesos if her daughter is enrolled in the ninth grade. The grant is equivalent to 44 percent of an average male day-laborer's wage or about two-thirds of what a child of this age would earn if she worked full-time. Schultz (2001) finds that the program's net effect on enrollment is positive and statistically significant. Skoufias and Parker (forthcoming) estimate that the labor force participation of children aged 12–15 is reduced 15–25 percent relative to preprogram labor force participation and that children in the program are much more likely to attend school and to spend more time on school activities. The estimated increase in the education achievement of children dominates the enrollment gains from increased provision of schools.

Nicaragua's Red de Protección Social is a conditional cash program modeled after Progresa. An evaluation of recipient households in a pilot program against a randomly selected group of comparable households shows that the program had a significant and substantial effect on school enrollment and led to a substantial reduction in child labor within the target population. In the Mexico case these gains occur even at the earliest ages, suggesting that a Progresa-type intervention may hold promise for the poorest countries with the worst educational outcomes in the region.

Bourguignon and others (2003) also find that such incentives increase schooling in Brazil's Bolsa Escola (although it is less successful in mitigating poverty). But is this increase in schooling accompanied by a decrease in child labor? Almost always the answer is yes and almost always by less than the increase in schooling. In some of the poorest regions, even with subsidies, schooling becomes possible for children only if they can also do a little work to finance their schooling and, presumably, their consumption.²²

Coercive Measures

Coercive measures have been hotly debated in international forums. Many people have proposed such policies as adding a social clause to the World Trade Organization framework, allowing it to take punitive action against countries whose exports are produced with child labor. There is not enough empirical work on such policies to draw firm conclusions, but the issue is too important to gloss over on those grounds. The best available theory and intuition will need to fill in until more empirical work is done.

Coercive measures have their place, but they need to be used much more carefully than collaborative policies. Hazardous labor ought to be banned outright. Although this may cause other forms of hardship to some very poor families in the short run, it makes little sense to allow such labor by children who cannot—or whose parents often cannot—properly assess the long-run

22. Many observers, familiar with the ground realities of the poorest regions of the world, have made the case for making school and work more flexible so that children can combine school with a little bit of work (Siddiqui 2001, p. 19), which may well be the only way that they will be able to get any education.

damage that such labor can cause. Even for nonhazardous labor there may be scope for legislative bans. This is typically closely associated with the theory of multiple equilibria. In both static and dynamic models there are often multiple equilibria, with children typically doing better in the equilibrium in which children do not work or work very little. If there are such multiple equilibria, and an economy is settled into an equilibrium with high child labor, a legislative ban can deflect the economy to the superior equilibrium and may be justified on that ground.

Such action, however, needs to be preceded by careful empirical evaluation. If there are no multiple equilibria, then such laws can exacerbate children's suffering, depriving children of the work that is essential for their survival. Or, if the law is effective only in some sectors, it can drive child labor underground to sectors that may be more harmful. Finally, such laws are typically implemented by fining employers who violate the law, as with India's Child Labor Deterrence Act of 1986. Such laws can perversely have the effect of increasing the amount of child labor. By making the employment of children more costly to firms, such laws lower children's wage (otherwise it is not worthwhile for firms to employ children). Children who were working to meet some minimum tolerable income target (for instance, to escape abject poverty), now have to work longer hours and often harder to reach that target.

Partial measures are, in general, a bad idea, and that includes global actions to deter child labor, such as proposals for changes in international labor standards.²³ The two major problems for economists are, first, that once an instrument of global action is created that can impede the flow of goods from nations that violate minimal labor standards, it will be used as a protectionist instrument by industrial countries, as with other measures in the past (Bhagwati 1995; Srinivasan 1996) and, second, that international action to stop child labor in the production of traded goods will simply drive children into the nontraded sector, which could be worse for them (Fallon and Tzannatos 1998).²⁴ In a study of India's garment export industry Stahl and Stalmarker (2002) found little evidence of bonded labor and the worst forms of child labor, suggesting that the export sector is not where such practices occur.

There is evidence for both these concerns. Basu (2001) discusses how the Sander's Amendment to the Tariff Act in the United States, meant to prevent forced child labor, has been used to block imports into the United States and

23. See, for example, Collingsworth and others (1994), Bhagwati (1995, 2002), Bhagwati and Hudec (1996), Rodrik (1996), Krueger (1996), Maskus (1997), Basu (1999b, 2001), Bachman (2000), Chau and Kanbur (2000), Kabeer (2000), Santoro (2000), Fung and others (2001), Bardhan (2001), Bagwell and Staiger (2000), Brown and others (2002), Krueger (2003), and Singh (2003).

24. In addition, work is often subcontracted out to the home-based sector (Mehrotra and Biggieri 2002), and it is difficult to bring that work under the law. This makes overall monitoring very difficult. As Standing (2001, p. 17) observes, "Informalization has spread everywhere, including within so-called formal enterprises."

settle other scores. There is also evidence that initial attempts to stop child labor in export industries, such as in carpet production in Nepal, have driven children into prostitution (UNICEF 1995).²⁵ Conversely, there is evidence that market integration may lead to less child labor. Edmonds and Pavnick (2002) found that rice prices rose with the opening up of the Vietnamese economy, causing child labor to decline. Hence, although there is scope for coordinated action among developing economies to raise labor standards (to discourage international capital from fleeing from one country to another), policies that use punitive action, like trade sanctions, to enforce labor standards should be approached with great caution.

It is not surprising that there is no single simple policy measure to end child labor. Its persistence through two centuries is clear evidence that there is no easy solution. Yet today we have a much better understanding of the causes of child labor and thus the opportunity to craft policies that can sharply reduce and ultimately eradicate it.

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25. For an excellent study of the general problem of trafficking in girls in Nepal see the International Program on the Elimination of Child Labour study by KC and others (2001).

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Child Labor: Lessons from the Historical Experience of Today's Industrial Economies

Jane Humphries

Child labor was more prevalent in 19th-century industrializers than it is in developing countries today. It was particularly extensive in the earliest industrializers. This pattern may be a source of optimism signaling the spread of technologies that have little use for child labor and of values that endorse the preservation and protection of childhood. Today and historically, orphaned and fatherless children and those in large families are most vulnerable. Efficient interventions to curb child labor involve fiscal transfers to these children and active policies toward street children. Changes in capitalist labor markets (including technology), family strategies, state policies, and cultural norms are examined to shed light on the causes, chronology, and consequences of child labor.

Fifty years ago it might have been assumed that just as child labor had declined in the industrial world in the late 19th and early 20th centuries, so, too, it would eventually disappear elsewhere. But child labor has not faded away (for estimates of child labor, see the International Labour Organization's LABPROJ database; for data on industrial countries, see Lavalette 1999). Endemic in today's poor countries, child labor seems to have reemerged in industrial countries as well, raising questions about its importance in national and regional economies and in family economic strategies. What have historians of today's industrial countries learned that may help answer these questions?

The first part of this article overviews the extent and settings of child labor in Western Europe and the United States in the past. Historians must rely on a quantitative record that is patchy and difficult to interpret. As a result, it may not be possible to say with confidence whether the era of proto-industry or the early factories saw the high-water mark of child labor, and the nature and time path of decline remains debated. Nonetheless, broad trends emerge that put the experience of today's poor countries into historical perspective and provide an empirical backdrop for the analysis in the second and third parts of the article, which seek to explain why child labor increased during industrialization and declined thereafter.

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Four types of explanation are offered. The first focuses on developments within capitalist labor markets. It examines the effects of technology as well as managerial and trade union strategies on children's work. The second focuses on the parental decision to send children to work. Historical analyses discuss this decision in terms of family strategies and parent-child relations. Economic analyses focus on the possibility of divergent interests within households and the potential for agency problems with implications for underinvestment in children's human capital. Both historians and economists ask whether parents are altruistic or selfish. They seek to determine whether child labor always follows from parental egoism or whether there are conditions in which caring parents would send their children out to work. The third type of explanation relates to the legal and political stance of the state. The fourth focuses on social norms and beliefs about appropriate behavior.

I. CHILD LABOR DURING THE INDUSTRIAL REVOLUTION

How extensive was child labor in Western Europe and the United States in the past? Were children concentrated in particular jobs, or did they work in most occupations and sectors? How important were they to the industries in which they worked, and how much did they contribute to economic growth and development?

Investigating the importance of children's work involves difficult conceptual problems of defining work and determining who is a child. Measuring the extent of child labor in the past is particularly difficult because the data are often inadequate. The summary presented here supplements evidence from early censuses and industrial surveys with material from less conventional sources, such as household budgets and the memoirs and diaries of working people.

The earliest censuses in what are now industrial economies began too late to capture the extent of child labor during industrialization. They measured a phenomenon already in decline, and they undercounted child workers, especially outside child-intensive industries, such as textiles. In 1851, when the British census first recorded the occupations of young people, 97 percent of children age five to nine were without a "specified occupation"; beginning in 1881 the census no longer bothered to count working children in this age group. But by 1851 the Industrial Revolution was already more than 70 years old in Britain, and child labor had been the subject of (albeit imperfect) regulation for almost half a century. Not surprisingly, few very young workers were recorded, although children age 10–14 still often worked. The first relevant censuses in France and the United States were not conducted until the very end of the 19th century, by which point they, too, recorded few young children at work. For the era of industrialization, then, historians must rely on industrial surveys, household data, and other fragmentary evidence. What do such sources suggest?

Child labor was important in the early phases of industrialization, when large-scale production was a novelty, especially in textiles and mining. It was

particularly important to the early starters on the path of industrial progress, notably Britain, Belgium, France, the western parts of Prussia, and the United States. For these early starters the intensive use of child labor in the key sectors of the Industrial Revolution was superimposed on children's employment in proto-industry and occurred in a cultural setting predisposed to "making children useful." The reduced wage costs must have played a role in the competitiveness of the key industries in the Industrial Revolution, although no study has measured the exact contribution of child labor.

A recent survey of the evidence on industry and mining in Britain reveals astonishingly high relative employment levels of children (under age 13) and young people (age 13–18) in textiles and coal mining in the early 19th century (Tuttle 1999). Children and young people made up one- to two-thirds of all workers in many textile mills in 1833, and they regularly represented more than a quarter of the workforce in mines in 1842.

Although Britain was exceptional in the intensity of children's work, the evidence for other early industrializers shows that child labor was not uncommon. A study of French workers in 1839–43 revealed that children under the age of 16 made up 12.1 percent of the labor force (Heywood 1988). Another, albeit not necessarily comparable, inquiry for Belgium in 1843 counted 10,514 child workers, or 19.5 percent of the workforce (De Herdt 1996). Goldin and Sokoloff (1982) estimate that in the Northeastern United States, women and children made up about 40 percent of the manufacturing labor force in 1832.

Household budgets for Britain from the precensus era provide further evidence that industrialization was associated with a boom in child labor (Horrell and Humphries 1995). Though children's contributions were always important, their relative contributions and participation rates were highest in the 1820s and 1830s. According to Horrell and Humphries, more than 10 percent of 5–9-year-old children and more than 75 percent of 10–14-year-olds were in the labor force. These participation rates exceed the rates recorded in the mid-Victorian censuses (which covered all children, not just children in working class families) and those estimated for working-class mothers.

Working-class autobiographies also suggest an increase in child participation rates in Britain during industrialization (Humphries 2003b). Boys age 9–13 were more likely to work if born after 1790 than before and even more likely to work if born after 1820. In contrast, only a small proportion of five-, six-, and seven-year-olds worked in the late 18th and early 19th century. Boys age 14 and older almost always worked, both early and late in the Industrial Revolution.

Child labor was strategically crucial to the transition to factory production. Domestic industry and mining used large numbers of child workers, but it was factory jobs that witnessed the largest increase in child labor (Horrell and Humphries 1995; see also Galbi 1997).

U.S. household data for the end of the 19th century reveal the relatively high incidence of child labor among children of textile workers (Goldin and Parsons 1989). Autobiographical evidence for Britain from the precensus period also

suggests that the children of factory workers started work at relatively young ages and had relatively high participation rates (Humphries 2003a). As population and employment in the factory districts grew in the early stages of the Industrial Revolution, the absolute number of children in work and the aggregate child participation rate rose.

Child labor in the early factories in Britain was associated with the apparently large-scale and long-distance movement of pauper apprentices. These wards of the state worked in isolated water-powered mills and endured punishing work and living regimes (Dunlop and Denman 1912). The potential for abuse spurred the passing of the Health and Morals of Apprentices Act in 1802, the first legal protection afforded to child workers (Engerman 2003). Orphaned and abandoned children also figured in the early factory labor force in France (Chassagne 1986) and Japan (Saito 1996). In the United States in the 18th century, the institution of pauper apprenticeship conveyed thousands of destitute and abandoned children into the labor force, although most were destined for agriculture and trades rather than factories (Murray and Herndon 2002).

The importance of child labor in the early mills and mines should not detract from its presence in other sectors, including agriculture, miscellaneous manufacturing, and services, where it was often hidden by the familial and informal nature of employment. Europe and the United States remained primarily rural and agricultural through the 19th century, and agriculture provided most children's jobs as it did adult jobs (Sjoberg 1997). The most common first job in working-class autobiography was that of farm boy. Bird scarers, shepherds, and ploughboys were also common (Humphries 2003b; Maynes 1995). Where the family farm predominated, children's work was ubiquitous, though often hidden from census enumerators (Heywood 2001). Historians have used school attendance registers to reveal the regularity with which the sons and daughters of small farmers were withdrawn from school to help, as well as the wholesale absence of children in agricultural districts at harvest or haymaking time (Coombs and Radburn 1995). Such work was tolerated, even approved, because of its family context or seasonal duration, and a blind eye was often turned in its direction even after legal prohibition. Farm service, common across Europe, in which young people aged between 12 and 14 were sent to live and work away from home, evaded censure because of its family setting and parallels with apprenticeship. But a rosy interpretation is sometimes at odds with reported experience (Humphries 2003b). Generally, the larger, more commercial, and more capitalist the setting of children's agricultural work, the less tolerant both contemporaries and historians have been in judging it, with the gang work performed in the eastern counties of England in the mid-19th century representing the nadir (Kitteringham 1975).

In industry, too, child labor was entrenched in traditional sectors and small-scale production units as well as factories and mines. A common first job, often taken at a very young age in proto-industrial families, was winding bobbins for

hand loom weavers (Humphries 2003b). In miscellaneous manufacturing, children were important in silk, bricks, small-scale metal manufactures, garments, and footwear. In services, boys were employed running errands, delivering messages in offices, and working as monitors in schools. For girls, child-minding and domestic service remained the foremost employment in most European countries in the 19th century (Coninck-Smith, Sandin, and Schrumpf 1997). It remains unclear whether work in these more traditional jobs was less intense or harsh than work in factories or mines.

Although children's participation was not sustained at the levels characteristic of the crucible of the Industrial Revolution, child labor did not rapidly disappear, as some historians have suggested (Nardinelli 1990). Child labor was not a dinosaur, perfectly adapted to early industrial conditions but then driven rapidly to extinction when times changed.

Tuttle (1999) notes that in all British textile industries, the proportion of the workforce under age 18 was close to 50 percent for the entire period 1835–50, long after the initial phase of factory production, when rural water-driven mills relied on child paupers. Children also worked in most mines from 1800 to 1850, often representing 20–50 percent of workers. Children remained an important part of the workforce in more traditional jobs in agriculture, manufacturing, and services as well. Autobiographical evidence suggests that only the cohort born after 1850 was able to delay entry into work.

The decline of child labor began in Britain and other early starters around 1850. As with the boom in child labor, which affected young but not the youngest children disproportionately, the withdrawal of child workers was also age-specific. The youngest child workers, age five to nine, never very common in the labor force, were the first to go, disappearing from the workforce by the time modern census enumeration began. The withdrawal of children age 10–14 came later, accelerating after 1870. In 1851, 30 percent of 10–14-year-olds worked; by 1901 the figure had fallen to just 17 percent (Lavalette 1999). This withdrawal of children by age represents the first stage in the “adulthood” of the labor force, as Cunningham (2000) calls it. The systematic undercounting of child workers in the censuses of the mid-19th century means the decline may be underestimated. When the U.S. census finally counted child workers at the end of the 19th century, it found only 17 percent of 10–14-year-olds gainfully employed (Trattner 1970). The French census of 1896 found only 20 percent of children this age working (Heywood 1988). Most of the working children in this age band would have been 13 or 14. The era of extensive child labor was over.

Superimposed on the disappearance of young children from the labor force was a redistribution of older working children. By the late 19th century, children in the industrial economies no longer participated in the key industries in which they had been so important (Winstanley 1995). Children also began to withdraw from miscellaneous manufacturing industries (Schrumpf 1997). They were not involved in the newer industries developing in the early 20th century

and the interwar years. But the retreat of children from industry did not signal the death knell of child labor. For one thing, the retreat was uneven; for another children were removed to “a distinct and marginalized children’s labor market” (Cunningham 2000:409; see also Childs 1992; Solberg 1997).

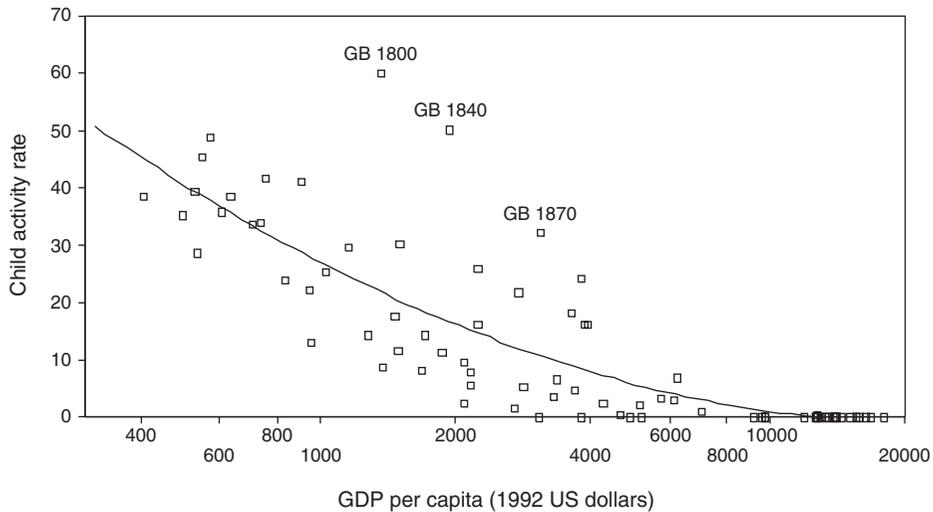
In textiles and mining in the heyday of child labor, although some children did the same work as grown-ups (as Tuttle 1999 notes), most children held distinct jobs. But they were distinct jobs within key industries. By the early 20th century, children had been excluded from such industries and were increasingly confined to the service sector and to child-only jobs. Thus by the 1911 census in Britain, more than one-quarter of employed boys under age 15 worked as messenger boys. As Cunningham (2000) notes, these jobs were not only reserved for children but also marginal to the economy (see also Childs 1992).

It is important not to overemphasize this transition. Earlier censuses had also recorded large numbers of boys in industrial service, many of whom were messengers or office boys (Booth 1886). Messenger boys were also numerous among autobiographers, representing 7 percent of an early industrial sample of 506 boys whose first job was known, the second most commonly recorded job (Humphries 2003b). But there is no doubt that this shift represents a distinct and important second stage in the adulting of the labor force and one not confined to the vanguard economies. In Norway, children worked in agriculture, tobacco, and glass manufacture in 1875; by 1912 they worked mainly as newspaper boys (Schumpf 1997). By the 20th century much of children’s work was part-time and thus not incompatible with school attendance. As half-timers in the mills, they clung on in a traditional industrial job, but most part-timers worked in the service sector, working in shops, delivering goods, and running errands.

The history of child labor illustrates the danger involved in drawing simple parallels between the industrializing economies of the 19th century and developing economies today. Once considered a paradigm case, the British Industrial Revolution now appears to be shot through with peculiarities (Crafts 1985). One such peculiarity is the extent and duration of child labor, which was greater in Britain than in any other 19th-century industrializer or indeed developing area today. Belgium, another early industrializer whose transition was also heavily based on coal and textiles, ranks a distant second (De Herdt 1996).

Historical comparisons are problematic because of the difficulties of measuring child participation and converting 19th-century income levels into 1992 U.S. dollars. Nevertheless, the gap between the level of child labor in 19th-century Britain and developing economies today is sufficiently large as to dominate the likely effects of computational errors (see figure 1, which compares historical and present-day experience). The greater use of child labor in the British case complements current reinterpretations of the Industrial Revolution as involving, at least in its early stages, an increase in labor input (“an industrious revolution”) rather than an increase in productivity (Crafts 1985; De Vries 1994). The apparent restraint shown by today’s developing economies in comparison with the first industrial nation affords grounds for guarded optimism.

FIGURE 1. Child Labor and GDP per Capita



Note: 1870 data are for boys only.

Source: Krueger (1997); historical observations based on Crafts (1985), Horrell and Humphries (1995), and Humphries (2003b).

II. EXPLAINING THE INCREASE IN CHILD LABOR

What explains the importance of child labor during the Industrial Revolution, particularly for early starters? Why was the phenomenon so widespread in Britain, the first industrial economy?

Development of the Capitalist Labor Market

The older literature, with its fixation on the employment of children in mills and mines, emphasized technology. Steam power and machinery allowed women and children to take over work that had previously required the strength and skill of men (Nardinelli 1990). Industrial technologies differed in terms of opportunities to employ children (Horrell and Humphries 1995; Goldin and Parsons 1989). For some of these technologies, child labor appeared essential. Early wooden textile machinery that had to be close to the ground may have dictated child-intensive employment (Tuttle 1999). The narrowness of underground passages in both British and Belgian thin-seam pits hindered the mechanization of transport and so maintained the demand for child drawers, who dragged the coal from the face to the surface (Humphries 1981). But the child intensity of technology cannot be taken as exogenous. As Bolin-Hort notes, “The relationship between technology and child labor was reciprocal rather than one-sided” (1989:17). Certainly some early machinery was specifically

constructed to be used by children to reduce labor costs, as the study of British patents reveals (MacLeod 1988).

The importance of child labor varied significantly across regions, even when the same technology was used (Bolin-Hort 1989). The Waltham system of textile production in New England in the mid-19th century employed young women rather than children, whereas high proportions of children worked in Lancashire. In a sample of 43 Manchester mills, 22.3 percent of the workforce was under age 14 and 32.4 percent under age 16; in 29 mills in Glasgow, 35.6 percent the workforce was under age 14 and 48.3 percent under age 16 (Bolin-Hort 1989). In Alsace in the 1820s, more than a third of mill workers were under age 16 (Heywood 2001).

Firms combined the same technology with different compositions of adults and children. In the Ghent cotton industry, the large firm of Voortmans recruited women and children (Scholliers 1996). In 1842 just 3.7 percent of Voortmans' labor force was under age 15; by 1859 that proportion had risen to 10 percent. But although Voortmans' use of child labor was exceptional for Ghent, it was modest in comparison with elsewhere. Technology was only one item in a list of important determinants of the proportion of child workers; the list included the availability of children, industrial organization, the employment strategy of manufacturers, and the strength of labor organizations representing men.

The organization of the labor process had both direct implications for the demand for child labor and indirect implications through its influence over technology, employment strategies, and labor relations. Goldin and Sokoloff (1982) argue that in the Northeastern United States, innovations such as a more elaborate division of labor, a more disciplined working environment, and a larger scale may have been just as important as technological change in creating the surge in the demand for female and child labor associated with industrialization. In Britain organizational change promoted the employment of women and children by breaking down customary age and gender divisions in the workplace and undermining the power of labor organizations to defend such customary barriers (Berg and Hudson 1992). The neglect of organizational initiatives in promoting child labor is consistent with researchers' overemphasis on factory production of textiles, for these innovations were particularly important in miscellaneous manufacturing, such as boot, shoe, glass, and paper manufacturing, where children's work has been underestimated.

Far from always following the substitution of machinery for muscle power, children's work was often the consequence of failed or incomplete mechanization. Thus the expansion of child labor in coal mining was the result of increasing output in the absence of changed transport technology. In a swathe of diffused and workshop-based industries outside the celebrated example of textile production, partial mechanization created new jobs for boys and girls. Lathes and presses, along with many simple machines, needed boys to feed them.

Manufacturers' strategies also increased child labor. The older literature documents the turning of British manufacturers to child labor in the context of the labor shortages of the Napoleonic wars (Hammond and Hammond 1925). The bellicose background of early industrialization in Europe may have contributed to the intensive use of child labor. In Britain one in 10 able-bodied men was in military service in 1794 (one in 6 by 1809); in France, Russia, and Austria probably about one in 14 prime-age men was under arms in the early 19th century (Cookson 1997). Military participation on this scale was totally new, and the effect on labor markets must have been substantial.

Manufacturers fended off government regulation of child labor by appealing to the need to keep labor costs low to compete internationally (Engerman 2003). Children's work was a necessary evil, essential to the competitive success of the key industries of the Industrial Revolution. Evaluation of the manufacturers' claim awaits counterfactual analysis of competitiveness without child labor.

Employers' strategies to reduce costs affected child employment levels. If employers had market power and children could be substituted for adults, their employment depressed adult wages. At the level of the household economy, this triggered a vicious circle, with lower adult wages increasing the need for children to work to maintain subsistence. The management of Voortmans pursued just such an employment strategy, making it effective even in a densely populated region, without recourse to paternalism (Scholliers 1996).

Labor relations also deserve mention. An older generation of historians emphasized the role that the emasculation of labor organization played in the boom in child labor. The Hammonds' (1925) chapter "The War on Trade Unions," which ends with the assertion that "the Combination Laws and the employment of children on a great scale are two aspects of the same system" (142), immediately precedes the chapters on child labor. Recent work has emphasized organized labor's resistance to the introduction of women workers and been less inclined to see trade unions as heroic. Perhaps the strategies of adult male workers should be reexamined in the light of the greater threat posed by competition from children and organized labor's inability to contain the surge in child employment (see also Cunningham 2000).

Family Strategies

Economic historians have studied the supply of child labor in the context of the household economy, analyzing the decision to send a child to work as part of a "family strategy." A family strategy involves a family acting as a single unit in the interests of all members. How these interests are identified and how possibly heterogeneous preferences are combined remains unclear. If parents do not care enough about the future welfare of their children, agency problems in human capital formation could occur within the household. In particular, selfish parents would prefer that their children work while the parents are alive and able to benefit from their children's labor. Children would overwork, and there

would be underinvestment in their health, education, and training. Intervention to influence the household allocation of child labor and lifetime consumption of parents and children would be justified. Options include bans on child labor, compulsory schooling, or educational subsidies that relax the tradeoff between the current consumption of parents and the current education and future consumption of children.

But even altruistic parents may send their children to work. If the payoff to child labor in terms of the return to the physical investment of their earnings exceeds the return to human capital, the optimal strategy would involve child labor. If parents are too poor to meet the necessary expenditures of the household and cannot borrow against the future earnings of their children, dissavings in the form of child labor may be necessary for survival. Even if the family is not so impoverished, borrowing rates that are higher than lending rates shift the tradeoff between the value of schooling and child labor in favor of work, because the family receives the income flows earlier.

Which of these scenarios holds matters, because the optimal policy intervention differs in each case. If the family is so poor that children have to work, legislation would be difficult to enforce and could reduce children's well-being. In contrast, if parents are selfish, the case for intervention must rest on there being greater private than public returns to education, and subsidies to education would be the preferred policy. The same would be true in the third scenario, in which subsidies could offset capital market imperfection.

Economists infer the altruism or selfishness of family members from outcomes in consumer goods markets. If parents are unhappy about children working, then controlling for prices, child labor should be associated with lower parental consumption. The intuition is that parents will equate the marginal utility of consumption to the marginal utility of child leisure, which is higher if children work.

Historians lack the household and consumption data needed for econometric investigation of the relationships between parents and children. A few studies have explored the links between child labor and household poverty, but the construction put on the findings depends on the assumptions. Goldin and Parsons (1989) use household data to investigate whether poor parents were altruistic toward their children in the United States in the late 19th century. They assume perfect capital markets, allowing resources to move freely across time and generations, and perfect labor markets, allowing families to move freely from one industrial center to another in response to labor and capital market conditions and parental preferences. Altruism (or costlessly enforceable intergenerational contracts) is combined with the capital and labor market assumptions in the rejected model. The negative correlation found between adult and child earnings can then be interpreted as indicating that parents were willing to accept large reductions in their own wages to secure employment in areas having abundant opportunities for child labor. The high savings out of children's earnings are held to be inconsistent with parents using child

labor to offset borrowing difficulties alone. Goldin and Parsons conclude that parents did not have strong altruistic concerns for their children.

The presence of industries with a high demand for child labor reduced the future wealth position of the offspring. Child labor had the obvious, almost definitional, negative effect on schooling attainment. At the same time the family provided little in the way of offsetting physical asset transfers (in the form of gifts and bequests) to compensate children for their lost schooling and future earnings. The increased family income was apparently absorbed in higher current family consumption. (Goldin and Parsons 1989:657).

Horrell and Humphries (1995) do not explicitly consider the issue of altruism, though their findings are suggestive. They obtained expenditure data for a subset of families in the budget data set. These families were not saving—indeed, some ran deficits, which they financed by pawning or borrowing. Several received poor relief. Spending on food and rent dominated the budgets (Horrell 1996). These families were closer to subsistence than those in the sample investigated by Goldin and Parsons, and assumptions of perfect capital markets and household mobility are implausible. Thus the finding that fathers' earnings were negatively correlated with the likelihood of participation suggests that poverty was driving child labor. However, the high participation rates of children in the relatively prosperous factory districts suggests that in some situations the desire for consumer goods played a role (Horrell and Humphries 1995).

Traditionally, historians have explored parental altruism by examining evidence on the nature of the parent–child relationship. Parents have received bad press in much of the historical literature. “The further back in history one goes, the lower the level of child care, and the more likely children are to be killed, abandoned, beaten, terrorized and sexually abused,” according to Lloyd deMause (1974:1); deMause may have been extreme in his denunciation of child-rearing in the past, but he was not alone in the 1970s and 1980s, when many historians perceived children as badly treated and parental love as fickle (Shorter 1977; Stone 1977; Badinter 1981). These historians considered the 18th century to have been an important turning point in the way in which children were perceived and treated.

Recently, historians have been less hasty to condemn parents and more careful to distinguish between practices that can be unambiguously condemned and those that are considered cruel or harmful today but were considered appropriate in the past. Pollock (1983) uses diaries and autobiographical material on parent–child relations to argue strenuously against any cultural shift or indeed the systematic ill treatment of children in the past. On the basis of working-class evidence given to various public inquiries, she concludes that parents largely did not send children to work for selfish reasons. In her view, poverty lay behind child labor.

In contrast, many observers during industrialization suggested that selfish and greedy parents sent their children to work, often instead of working themselves, using the children's earnings to buy goods such as alcohol and tobacco (for a summary of such views see Pinchbeck and Hewitt 1973; Pollock 1983; Nardinelli 1990). Of course, many of these commentators themselves

employed children or shared the background and interests of employers who used child labor. In projecting these views, they sought to exculpate themselves and their peers by shifting the blame for what was increasingly seen as a reprehensible practice.

Working-class autobiographies of the period provide rare evidence from the child's perspective. Few children supported the charge of parental exploitation, instead seeing their parents as kind and caring. What, then, did these children think forced their entry into work?

Custom and practice undoubtedly played a role. Historians have condemned parents for expecting nothing better for their children than they experienced themselves (see Pinchbeck and Hewitt 1973), thereby locking the working class into a low-skill and early work intergenerational equilibrium. But investigation of the autobiographical evidence suggests that the main determinant of children's age at starting work was the family's economic circumstances, with father's earnings crucial (Humphries 2003b). Men in trades and clerical and service occupations constituted an aristocracy of labor, earning more than unskilled workers and enjoying greater regularity of earnings. Predictably, their children were withheld from the labor market longer than those of other workers (Humphries 2003b). Other workers could not always earn enough to ensure their family's subsistence without help from their children. Recent definitive estimates of real earnings show that solid increases did not occur until after 1850 (Feinstein 1998), a finding that is consistent with the apparent maintenance of high levels of child participation well into the 19th century.

Industrialization involved the rise and fall of sectors, technological change, shifts in the location of work, and an intensification of the business cycle. Even for skilled workers, earnings did not go up without interruption, as Feinstein's (1998) data show. Many fathers experienced short-term unemployment and stagnant wages. But it was hard to distinguish a temporary situation from something more permanent and to decide on an accommodation. Responding appropriately to fluctuations was often expensive, involving migration or retraining, and it was hampered by imperfect capital markets and lack of information. A holding strategy involved putting more family members to work, finding jobs for children. When hard times persisted, stopgaps became permanent. Sending children to work became normal and widely adopted by other desperate families. The generation of children sent to work early in response to shifts in the demand for labor had less opportunity to accumulate human capital, therefore becoming less productive and so less able to support its own children. In this way, demand shocks in the labor market echoed through the generations to hold the economy at low levels of productivity and high rates of child labor. Such added-worker effects characterized the prolonged competition between hand trades and factory production, promoting and intensifying child labor (Lyons 1989; Humphries forthcoming).

Mothers were described as caring for their children, though the extent to which their love was manifest in working to help support their children varied

across Europe. Child labor may have been more extensive where married women pursued exclusively domestic roles, though children's child care responsibilities surely offset this pattern (Horrell and Humphries 1995; Cunningham 2000). Compared with French and German mothers, few British mothers appear to have contributed to family income by participating in the labor market—in contrast to their children (Horrell and Humphries 1995; Maynes 1995). This substitution of children's labor for that of their mothers was embedded in a family strategy that both responded to local economic and demographic conditions and reflected cultural values. Its potential importance in the modern world makes it deserving of more careful study.

Whether or not they worked outside the home, mothers, unlike fathers, were almost never depicted as consuming the fruits of their children's labor. The custom for children to surrender their earnings to their mothers ensured that children's earnings were recycled through the household accounts, to be spent in children's interests. How mothers weighed the claims of older and younger children and of working and dependent children remains unclear.

In a few cases, children did blame parents, in particular fathers, for contributing to their families' poverty and so to early working. Drinking was a cause of misery for many working families, and alcoholic fathers were often associated with children's early working. But children did not always see their fathers' drinking as selfish. Fathers were driven to drink by their inability to provide, the physical demands of their hard jobs, and the grimness of their working lives. Drinking was also a response to bereavement (Humphries 2003b). Alcohol has addictive and stimulant characteristics, which may explain its overpowering of fathers' altruistic intentions. These links between selfishness and drinking are consistent with evidence associating lack of altruism with stimulant and addictive goods consumed mainly by men.

Abandonment destined families for poverty (Humphries 1998; Horrell, Humphries, and Voth 2001). In contrast to drinking, it was rarely condoned. Being without a father (perhaps even a nonaltruistic father) appears to have had a large and significant effect on the age at which children started working, according to British autobiographies, advancing children's entry into the labor market by more than 15 months (Humphries 2003b).

Family size also affected family poverty and therefore child labor. Large families increased the need for children to supplement fathers' earnings. In Britain industrialization proceeded against a backdrop of historically rapid population growth and increased average family size. In 1821 children under the age of 9 made up 28 percent of the population, and young people 10–19 represented another 21 percent (Wrigley and Schofield 1981). This proportion probably increased throughout the 18th century. The pressure created by the rising dependency rate has been somewhat neglected by economic historians, but its potential as an explanation of the pattern and extent of child labor in Britain is considerable. Many boys cite the presence of large numbers of dependent siblings as having pushed them into the labor force; their impressions

appear borne out in the autobiographical evidence on age at starting work (Humphries 2003b). Britain's unusual demographic experience may well have contributed to the exceptional reliance on child labor.

The Role of the State

The state usually enters the story of child labor only as an agent in its decline. But in Britain the state by both action and inaction facilitated the boom in child labor. This is not to suggest that the state adopted a conscious strategy in support of child labor, although several apocryphal stories repeated in the classic British accounts suggest as much (Hammond and Hammond 1925; Mantoux 1927). More likely the boom in child labor was the unintended consequence of policies such as legislation weakening labor organization (the Combination Acts, the repeal of the Statute of Artificers) and the miserly treatment of the wives and children of soldiers. Most important in this context was the operation of poor relief. The Old Poor Law arguably inhibited the indiscriminate growth of child labor by occasionally subsidizing poor families with many children and channeling children into more acceptable forms of work through pauper apprenticeship. It also treated single mothers relatively generously (Snell and Millar 1987). The retreat of the Old Poor Law in the face of rising expenditures in the late 18th century and the transition to the New Poor Law, although not eliminating fiscal transfers, emphasized the conditionality of assistance on children's working with negative implications for human capital formation (Horrell, Humphries, and Voth 2001). In a world in which orphaned and fatherless children are legion, perhaps this is the most pertinent finding from the past.

Cultural Context

The idea of a change in parent-child relations in the 18th century is firmly established in the literature, with harshness in the medieval and early modern periods giving way to kinder treatment later on. Such a shift in values has intriguing implications for the historian of child labor. It suggests that countries that industrialized early, before this transition was completed, might be expected to have used child labor more intensively than countries that industrialized later.

III. EXPLAINING THE DECREASE IN CHILD LABOR

Motivated by the need to discourage child labor in the developing world, economists have looked mainly to the past to understand what caused child labor to decline.

Development of the Capitalist Labor Market

Chief among the usual suspects is technology: the demand for child labor allegedly faded as more advanced industrial technologies replaced the need for

unskilled labor of children (Goldin and Parsons 1989; Nardinelli 1990). As Cunningham observes, “It is assumed that technology has its own built rationale and that it always acts in favor of adult and in opposition to child labor” (2000:417). But earlier technology had developed to facilitate the substitution of child for adult labor. Why should it suddenly have changed direction unless reversed by a shift in the interests of management or labor? There has to be a motive for its development and introduction.

In France in the 1840s and in some industries in Britain in the mid-19th century, employers campaigned for a reduction in child labor (Humphries 1981; Weissbach 1989; Dupree 1995). Their motives were both strategic and philanthropic. By promoting protective labor legislation, employers who had already dispensed with child labor or who had technology that obviated the need for child labor sought to gain a competitive advantage over other employers for whom child labor remained essential (Marvel 1977; Humphries 1981). Others were convinced that child labor was morally wrong (see Hammond and Hammond 1925, ch. 8) or that it was in the collective interest to develop a healthier and more educated workforce.

But an account of changes in the capitalist labor market, which deals only with employers’ strategies, is unbalanced. Managerial strategies may also have shifted toward an intensive labor process in which the strength and power of adults was needed (Cunningham 2000). Moreover, by the mid-19th century male labor had also begun to reorganize defensively within revamped institutions. An extensive literature suggests how strong trade unions, protective labor legislation, and campaigns for family wages led to the rise of the male-breadwinner family. This phenomenon is traditionally presented from a feminist perspective that focuses on the exclusion of female labor. But the timing of women’s retreat from the labor market does not coincide with the growing strength of organized labor (Creighton 1996). Reoriented to provide a political-economic explanation of the decline of child labor, male unionists’ campaign for family wages slots neatly into the chronology of adulting.

Family Strategies

Clark Nardinelli’s influential book (1990) gave family strategies a neoclassical twist. Heavily influenced by the New Household Economics, Nardinelli argued that because working families in the early 19th century had the opportunity not to send their children out to work but chose to do so, child labor must have been the best option. Ignoring the possibility of heterogeneous preferences and agency problems by assuming a unitary household, Nardinelli explained the decline of child labor in terms of families’ rational responses to changes in relative prices and incomes. Technology rendered child labor unproductive, and economic growth eventually trickled down to raise adult male earnings. Thus the boom in child labor hinged on a fortuitous coincidence of a transient technology and low adult wages. It declined when technology advanced and adult wages rose, allowing children to attend school instead of work.

The policy implications of this hypothesis are profound. According to Nardinelli, low adult wages cause child labor. There is no remedy to the problem, except to wait for economic growth, which, with Chicago School optimism, Nardinelli believes inevitable provided it is not stymied by well-meaning but inappropriate government intervention.

Nardinelli's analysis of the causes of the decline of child labor is consistent with his chronology of events, which describes a rapid decline in child labor starting before the Factory Acts and coinciding with strong growth in the real earnings of adult males. The decline in child labor, however, is disputed by evidence that children's involvement in productive activities was more extensive and more enduring than Nardinelli suggests. Moreover, Feinstein's (1998) definitive series delays sustained growth in real earnings until the mid-19th century, which is out of sync with Nardinelli's account.

A newer view fits neatly with a later and more gradual decline in children's work and with an explanation that draws on the socioeconomic construction of the male-breadwinner family in the second half of the 19th century. The growth in adult earnings in the later 19th century was not independent of the ongoing struggle—not only in capitalist labor markets but also within Parliament and the press—between opponents and proponents of child labor. This struggle was but one aspect of a campaign to defend the integrity of the working class family.

One variable that emerged as an important determinant of age at starting work that is often forgotten in stories about the decline of child labor is family size. Fertility peaked in Britain in the 1820s, but large families remained standard among some occupational groups and very common among the working class at large.

The Role of the State

An older generation of historians explained the decline of child labor almost solely in terms of the Factory Acts (Hutchins and Harrison 1903). Neoclassical economics is predisposed to deem intervention unnecessary if not mischievous. Is legislation possible only when the majority of powerful employers has already dispensed with child labor? Does it harm children by pushing them into more hazardous but less visible work and reducing family incomes?

Moehling (1999) uses a “difference-in-differences-in-differences” procedure to isolate the effects of child labor laws on children's participation by state in the United States between 1880 and 1930. Child labor fell precipitously during this period, but the decline was not driven by the legislative success of the child labor movement. The occupation rate of 13-year-olds did decline in states that enacted a minimum working age of 14, but so did the occupation rates of children not covered by the restrictions (Moehling 1999). Legal prohibitions emerge as consequences rather than causes of the decline in children's work.

In contrast, other legislation is widely agreed to have had some effect. The classic case is the 1833 Factory Act, whose impact even Nardinelli acknowledges. Cunningham (2000) provides a list of child labor laws that historians

have deemed effective, including the 1864 act that reduced children's participation in potteries (Dupree 1995), the 1872 Mines Regulation Act (Church 1986), the 1874 act in France (Weissbach 1989), and the measures taken by the National Recovery Administration in the United States in 1933 (Trattner 1970). Data from the 1960 census suggest that child labor laws and compulsory schooling increased educational attainments of children in the United States between 1915 and 1939 (Lleras-Muney 2002).

Chang (2002) scrutinized the historical record to establish the time it took for legislation to have an effect. He argues that the child labor standards demanded of the developing world require a swifter eradication of children's work than was achieved by today's industrial countries. Chang takes the industrial countries' stance on child labor as an example of his more general argument that today's wealthy countries industrialized and became rich using policies and institutions that were often the opposite of those they now thrust on developing economies. Industrial countries are attempting to kick away the ladder by which they rose to prosperity, denying poor countries the same route to the top.

Although Chang has a point, his description of historical events should not go unchallenged. First, regulation became comprehensive over a shorter time period than Chang suggests, certainly less than the centuries he cites. Second, wealthy countries industrialized at different times and made different demands on child workers, with implications for legislative progression. Third, the early starters made more extensive use of child labor, suggesting that even among the now rich countries, later entry into the race for prosperity involved different standards of acceptable conduct. Yet this did not kick away the ladder to development for Europe's late industrializers. Fourth, though some of the policies and institutions that rich countries now condemn can be linked to economic development (tariffs, for example, may have helped infant industries develop), the contribution of child workers to economic growth has not been established.

An alternative way of curbing child labor is by requiring school attendance. Unlike child labor laws, compulsory schooling does not encourage a move into unregulated and perhaps less desirable work. Case studies suggest that the desire to limit child labor was sometimes a motive for compulsory schooling (Hogan 1985). For several European and non-European countries, the decline in child labor appears correlated with the introduction of compulsory education (Weiner 1991). In Britain, for example, the decline in the participation rate of 10–14-year-olds gathered momentum after the introduction of compulsory schooling in 1870. But the importance of compulsory education has not yet been demonstrated in a study that controls for changes in other possible explanatory variables. Given the important policy implications that ride on the validity of this link, more research is needed.

School subsidies, in principle an attractive option, have not been studied historically. The popularity of charity schools is suggestive, but working-class parents' apparent preference for schools whose curriculum and setting were

under their jurisdiction over free state schools implies that they valued the right to control children's schooling (Gardner 1984). Sunday schools, an enormously important deliverer of 19th century education, pose a recurrent dilemma: how to evaluate an educational institution designed to accommodate child labor. Perhaps the considerable achievements of Sunday Schools, part-time and seasonal education, reading rooms and mutual improvement societies, ragged schools (free schools for poor children), and apprenticeships have been undervalued because of a distaste for institutions that remained wedded to children's ongoing involvement in productive activities (Silver 1977; Snell 1999).

Cultural Context

A cultural account of the decline of child labor could be built around the diffusion to the working class of the transition in parent-child relations that historians have documented for the elite (for a dissenting view, see Nardinelli 1990). More specifically, the political-economic campaigns of the later 19th century for protective labor legislation, the integrity of the family, and the family wage could themselves have influenced values and attitudes. The theory of cognitive dissonance suggests that the routine expression of ideas and beliefs is intolerable unless they are adopted. Victorian working men embraced the schooled child along with a nonworking wife as hallmarks of a desirable and respectable family life that went with (indeed required) higher adult male pay. Their wage demands became inseparable from a package of ideas about proper family structure that went to the heart of contemporary views of enlightened and civilized society. Their claim was eventually supported by groups of men from other ranks of society—employers, politicians, journalists, philanthropists—prepared to sacrifice some immediate self-interest to accommodate the diffusion of a family structure that had powerful appeal (Creighton 1999).

IV. CONCLUSIONS

Countries in which child labor is common today bear a greater resemblance to industrial countries on the eve of industrialization than to those same countries 50–100 years later, when child labor began to decline. Among 19th-century industrializers, child labor was more prevalent in early starters, and it appears to have been more prevalent in both early and late industrializers than it is in developing economies today. This difference may be a source of optimism signaling the spread of technologies that have little use for child labor and values that endorse the preservation and protection of childhood. But the historical record warns that technological and cultural developments are not independent of underlying economic conditions. Whether such technology and values can survive the impact of the AIDS epidemic, famines, and civil and regional conflicts on family structures and the supply of child labor remains to be seen.

Child labor is hard to document, let alone measure, particularly in the very sectors and jobs in which it is likely to be prevalent, namely, family farms and businesses, the informal sector, and part-time and seasonal work. Historical experience warns against focusing only on public forms of employment and assuming that as children are removed from the visible sectors they will also withdraw from the darker corners of the economy. On the other hand, historians have been too ready to assume that familial or informal employment is intrinsically more benign than work in factories. What are needed are comparative analyses of forms of child labor, which might provide criteria for a normative ranking of jobs for use in a world in which some kind of economic contribution from children is tolerated. The ways in which learning and work were combined in the past are also worth more attention.

Historians' finding that poverty was the main determinant of child labor should not be cause for resignation. Welfare-improving intervention appears possible at low incomes. Moreover, all poor children are not equally at risk. Orphaned and fatherless children and those in large families are the most vulnerable. Efficient interventions to curb child labor involve fiscal transfers to fatherless children and large families and active policies toward street children.

Historians disagree about whether it is possible to regulate the demand for child labor without harming the very children whose protection was intended. Perhaps the lesson here is that interventions must be customized to suit particular circumstances. Compulsory schooling and legislation banning child labor were successful and apparently welfare improving in some times and places but not others. The discrediting of technological determinism by historians and its replacement with more nuanced accounts of the decline in child labor also suggests the importance of close scrutiny of circumstances and context.

The documentation of the interplay of interests that over time led to the adulating of the labor force has resonance with Basu's theoretical account of a labor market with multiple equilibria, some involving child labor (Basu 1999). Policymakers can try to encourage a movement from equilibria that involve child labor to those that do not. The effectiveness of such policies depends on understanding the institutional configuration of the labor market, including how child labor fits into family strategies—that are themselves embedded in historically and culturally determined ideas about mothers' and fathers' roles—and evolving relations among employers, workers, and the state.

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Child Farm Labor: The Wealth Paradox

Sonia Bhalotra and Christopher Heady

This article is motivated by the remarkable observation that children of land-rich households are often more likely to be in work than the children of land-poor households. The vast majority of working children in developing economies are in agricultural work, predominantly on farms operated by their families. Land is the most important store of wealth in agrarian societies, and it is typically distributed very unequally. These facts challenge the common presumption that child labor emerges from the poorest households. This article suggests that this apparent paradox can be explained by failures of the markets for labor and land. Credit market failure will tend to weaken the force of this paradox. These effects are modeled and estimates obtained using survey data from rural Pakistan and Ghana. The main result is that the wealth paradox persists for girls in both countries, whereas for boys it disappears after conditioning on other covariates.

This article is motivated to explain the remarkable observation that on average children in land-rich households are more likely to work and less likely to attend school than children in land-poor households. This phenomenon is referred to here as the wealth paradox. We observe this tendency in household survey data for rural areas of both Ghana and Pakista. Land is the most important store of wealth in agrarian societies and a substantial fraction of households do not own land; this challenges the commonly held presumption that child labor involves the poorest households (for example, U.S. Department of Labor 2000, Basu and Van 1998).

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Child labor in export industries, such as carpets, garments, and sports equipment, has captured public attention and stirred a debate on trade sanctions and international labor standards (see Basu 1999 for a survey). Yet, obscured from the public eye, the vast majority of working children in developing economies are engaged in agricultural labor, predominantly on farms operated by their families (see International Labour Organization [ILO] 1996).¹

The available theoretical and empirical literature on child labor is not well equipped to explain the wealth paradox. The theoretical literature has emphasized credit market imperfections (e.g., Ranjan 1999, Jafarey and Lahiri 2002) to the relative neglect of labor market imperfections. Indeed, a well-functioning labor market is central to the seminal work on the economics of child labor by Basu and Van (1998). This article suggests that labor market failure may explain the wealth paradox. It argues that the effects of labor market imperfections are reinforced by ill-functioning land markets, whereas credit market failure creates an opposing effect.

Ownership of productive assets such as land can affect child labor in various ways. It can have a negative wealth effect, with large landholdings generating higher income, making it easier for households to forgo the income that child work brings. Capital market imperfections that result in lower interest rates for households that can offer land as collateral reinforce the wealth effect, allowing large landowners to borrow more to meet insurance needs or finance their children's education.

In the absence of perfect labor (and land) markets, land ownership can also have the opposite effect. Owners of land who are unable to productively hire labor on their farms have an incentive to employ their children. Because the marginal product of labor is increasing in farm size, this incentive is stronger among larger landowners. The value of work experience will also tend to increase with farm size, an especially relevant factor if the child stands to inherit the family farm. This dynamic effect will reinforce the current-period effect. Overall, if incentive effects are large enough to overwhelm the wealth effect, what appear to be paradoxical patterns in the data may emerge, that is, asset-rich households may have more children in work than asset-poor households.

Let us look more closely at the nature of these market imperfections. Given perfect markets, landowners would be expected to hire adult labor and send their own children to school. However, the problem of moral hazard with hired labor may generate a preference for family labor. Weather variability makes agricultural output stochastic, and (often unobservable) differences in soil quality make it difficult to use the output of neighboring farms as a yardstick, making it relatively easy for agricultural workers to shirk. The distinction

1. This is an important difference between child labor today and child labor in, for example, industrializing Britain. Britain had few small family farms by the time child labor became prevalent (Humphries 2002).

between hired and family labor aside, children may be easier to supervise and discipline, mitigating moral hazard.

What is the evidence? Deolalikar and Vijverberg (1987) present evidence that family and hired labor are not perfect substitutes. Direct evidence of moral-hazard in the rural labor market is found in Foster and Rosenzweig (1994). Further evidence of imperfections in the rural labor market arises from analysis of data from the Peruvian Sierra, which shows that the marginal product in own-farm work (for adults) is not equal to the market wage (Jacoby 1993).

Another problem with hiring workers is that landowners may face periodic labor shortages, because labor needs in agriculture tend to be seasonal and geographically concentrated. The wage labor market is not very well developed in most village economies; in Sub-Saharan Africa (including Ghana), it is incipient. An active land market would mitigate the effects of labor market imperfections: large landowners that could not productively hire labor could sell their land rather than employ their children on it. If land could easily be bought and sold, the incentive to gain specific work experience would be weaker. In these ways, land market failure reinforces labor market failure.²

Recognition of the dual role that land plays as a source of wealth and an opportunity for productive employment is crucial. It makes clear that the effects on child labor of land redistribution may be very different from the effects of income redistribution.

The empirical model presented here was motivated by the need to separate the wealth effect from the other (substitution) effects of farm size. It departs from most other specifications in the literature by including both land size in acres and a measure of permanent income. Although the data do not permit the labor market, credit market, and inheritance effects (through experience and education) of farm size to be disentangled, separation of the wealth effect from the various substitution effects is an important step forward. The empirical specification also improves on existing work in controlling for alternative forms of land tenancy and in instrumenting both of the key variables of interest, income and farm size.

The article is organized as follows. Section I briefly surveys the relevant literature. Section II presents the theoretical model. Section III describes the data by gender and country. It presents the remarkable data on child work and school participation rates by land ownership. An empirical specification is discussed in section IV. The results are presented in section V, and section VI concludes.

2. The Panos Institute in London commissioned a journalist to interview farmers and government officials to gauge their reactions to a nontechnical summary of this article. There was some overall support for its claims. A landless agricultural worker said he sent his children to school because this was the only way they could earn their livelihood, given that he had no assets with which to support them. A landowner in the same province said he found it difficult to find hired labor at times and that his own children were more reliable workers and likely to benefit from the work experience.

I. RELEVANT LITERATURE

Modeling: Causes of Child Labor

The literature on child labor has not devoted much attention to labor market failure. Basu and Van (1998) assume that subsistence poverty drives child labor, and the mechanics of their model depend on a well-functioning labor market. Basu (2000) extends this analysis to consider the effects of an adult minimum wage on child labor. These articles make an important contribution in highlighting the role of poverty and analyzing the effects of policies that have been much discussed. But these policies are of limited relevance to the majority of rural households, whose main income derives from self-employment (see Bhalotra 1999).³ Other authors have emphasized that child labor can arise as a result of credit market constraints (Ranjan 1999, Jafarey and Lahiri 2002) or problems of intergenerational contracting (Baland and Robinson 2000). Eswaran (2000) and Cigno and others (1999) model child labor as codetermined with fertility.

Modeling: The Agricultural Household

The fact that the great majority of working children in developing economies work on household-run farms and enterprises motivates modeling decisionmaking in the peasant household. Although not focused on child labor, relevant models of the peasant household exist in the literature. Rosenzweig and Wolpin (1985) use an overlapping generations model incorporating returns to specific experience to show that the existence of extended families, the cost advantages of family relative to hired labor, and the weakness of the land market may all be manifestations of an optimal implicit contract between generations that maximizes the gains from farm-specific experientially obtained knowledge. The canonical model of the consuming and producing agricultural household is probably that of Strauss (1986). Benjamin (1992) extends that model to show that if consumption and production decisions are separable, total labor usage on the household farm will be independent of household composition. However, if labor markets are imperfect, separability is violated and farm labor usage is a function of household composition. Extending this idea, Cockburn (2000) and Bhalotra and Heady (1998) argue that, in the nonseparable case, child labor is a function of the stock of land and other assets. In his application to rural Ethiopia, Cockburn finds that land fertility decreases labor for girls, whereas land slope increases it. Boys' work is found to be decreasing in the number of oxen and bull, ploughs, and sickles owned by the household. Credit market failure and second-period relative returns are not considered.

3. A separate problem is the difficulty of enforcing minimum wage or other legislation in a rural setting, where the legal infrastructure is underdeveloped and the political infrastructure may be captured by powerful groups in society, such as employers.

This article develops a theoretical model that clarifies the role of labor and land market failure as distinct from the role of credit market failure. It thereby integrates the different sorts of market failure into one model. Allowing two periods enables the effects on future wages of the current decision on whether to work or attend school to be analyzed and for those effects to be related to land size through inheritance. The roles of inheritance and the limitations of land markets appear not to have been previously discussed in the context of child labor. To the extent that inheritance laws favor sons over daughters, incorporation of this feature into a model of child labor holds the potential to explain the marked gender differentials in child labor and schooling evident in many developing economies. The main contributions, however, are to highlight the seemingly neglected fact that most working children are employed on family-run farms and enterprises and to identify the paradoxical pattern in data from two very different countries, Ghana and Pakistan, that appear to contradict the commonly held view that poverty drives child labor.

Evidence: Studies of Child Labor

Early empirical work on child labor consisted largely of case studies that interviewed working children. An advantage that large representative household surveys have over these studies is that they provide information on children who do and do not work, thereby making it possible to investigate the decision to work. Since these large survey data have become widely available in the past decade, economists have estimated participation equations for child work and schooling for a range of countries.⁴

Many of these studies include as a regressor a measure of household income or consumption, the adult wage rate, or assets. That the results have been mixed is not surprising, for the following reasons. Where the regressor is an index of assets, the net effect on child labor may be positive, negative, or zero, because it is a compound of wealth and substitution effects of opposite signs. Where the regressor is income or consumption, it is, in principle, endogenous, a problem that most previous studies have not addressed. The facts that the expected effect of income on child labor is negative and that simultaneity will tend to create a positive bias may explain the small or insignificant income effects obtained in many studies.

Another problem with the evidence on the effects of household living standards on child labor is aggregation bias. Most studies aggregate across age, gender, rural and urban regions, landowners and the landless, and types of child work. Aggregation may obscure negative income effects that affect some subgroups but not others.

4. For a partial review and assessment of the literature, see Bhalotra and Tzannatos (2002). More recent research includes Edmonds (2001), Edmonds and Pavcnik (2002), Emerson and Portela (2002), and Freije and López-Calva (2001).

To identify the effects of living standards on child labor, the empirical specification presented here addresses each of these three issues.⁵ It includes measures of both permanent income and size of landholding, both of which are treated as potentially endogenous. Comparison of estimates with and without instrumental variables on the data underlines the importance of instrumental variables. Gender-specific models are estimated for each country, with the sample restricted to children in rural areas who live in households that own or operate land. Failing to select out the landless households would bias the coefficient on farm size. Indeed, every other variable in the equation was wiped out by the stunning explanatory power of farm size when the equation was estimated on a sample including landless households.

Previous work has concentrated on the participation decision. This model looks at hours, because these data exhibit substantial variation, with many children working less than 10 hours a week.

II. A TWO-PERIOD MODEL OF CHILD LABOR

The appendix sets out a model of the peasant household in an economy with imperfect markets for labor, land, and credit. Allowing two periods enables us to capture the impact of child work in period 1 on productivity in period 2. This effect arises through both the gain in work experience and the possible lowering of educational attainment. The model specifies the effects of farm size on child labor, which, in addition to a wealth effect, includes substitution effects arising from market imperfections.⁶

The model is solved to give an expression for the quantity of child labor supplied in period 1:

$$(1) \quad L_{c1} = h(A_0, K_0, w_{b1}, w_{b2}, p_{r1}, p_{r2}; Z, e),$$

where subscripts 1 and 2 refer to periods 1 and 2, L_c is child labor, A_0 is owned land, K_0 is initial financial wealth, w_b is the wage of hired labor, p_r is the price of rented land, Z refers to exogenous taste shifters, and e refers to unobservable characteristics and optimization errors. The first-order conditions can similarly be solved to describe other endogenous variables, such as period 1 consumption, X_1 , in terms of the exogenous variables. Like equation 1 these will be demand equations that depend on prices and initial wealth (denoted by

5. Bhalotra (2001) takes the bolder approach of arguing that the question of whether poverty compels child labor cannot be addressed by estimating the income effect on child labor, because a negative effect would only indicate that child leisure (or schooling) is a normal good. This article proposes that the sign of the wage elasticity of child hours of work provides the more evident test of the poverty hypothesis. It is estimated on data for children in wage work in rural Pakistan.

6. To focus on the problem of market imperfections, the model presentation suppresses the important distinction between boys and girls, as well as other influences on child labor. The empirical model is, however, sensitive to these influences.

land [A_0] and other financial wealth [K_0]). Because estimation of equation 1 faces the problem that K_0 is unobservable, the demand equation for X_1 can be inverted to write K_0 as a function of X_1 . Because X_1 is observable, it is convenient to substitute out for K_0 in equation 1 to obtain⁷

$$(2) \quad L_{c1} = h_2(A_0, X_1, w_{b1}, w_{b2}, p_{r1}, p_{r2}; Z, e).$$

Because information on the rental price for land (p_{r1}, p_{r2}) is lacking, the equation is conditioned on the quantity of rented land (A_r) to get

$$(3) \quad L_{c1} = h_2(A_0, X_1, w_{b1}, w_{b2}, A_{r1}, A_{r2}; Z, e).$$

This equation forms the basis of the estimates. Consumption (X_1) and rented land (A_r) are treated as potentially endogenous (see section IV). X is expected to capture (negative) income effects on child labor associated with both land and other financial capital. Land owned will generate the incentive and collateral effects described in the introduction.⁸ Because these are of opposite signs, the sign of the coefficient on land is ambiguous a priori. The following section describes what can be learned about imperfections in different markets based on the estimated coefficient on land in equation 3.

The Role of Market Imperfections

The model allows imperfections in each of the labor, land, and credit markets. This section explores the role played by each in determining the level of child labor. In every case considered, the negative wealth effect of land is taken to be captured by X_1 . Conditioning on X_1 , the expected sign of the land coefficient will depend on which market imperfections dominate. If both land and labor markets are imperfect, households with land to farm will have an incentive to employ child labor. As this incentive is stronger the larger the plot of land, land size will have a positive effect on child labor. At the same time, land size will be associated with weaker credit constraints and, to that extent, less child labor.

Consider imposing the assumption of perfect land markets. The positive incentive effect of land disappears even if the labor market is imperfect, because land for which hired labor cannot be found can be rented out. The negative collateral effect of land persists as long as the credit market is imperfect. Hence the coefficient on

7. See Browning (1998), who introduces the term *m*-demands to describe equations in which the demand for one good depends on the demand for a reference good and all prices in the model. These can be derived directly from the marginal rate of substitution condition or from pairs of Marshallian demands by inverting the Marshallian demand for the reference good and using it to eliminate total expenditure from the Marshallian demand for the index good. As long as the reference good is normal, it serves as an adequate representation of utility. An early application of these ideas is found in Bhalotra (2002), where variations in child consumption are modeled as a function of adult consumption.

8. The dynamic inheritance effects referred to there will reinforce the incentive effect. For ease of exposition, these are not explicitly discussed in the next section, where the discussion is in terms of signs and not magnitudes.

land is zero if the credit market is perfect and negative if the credit market is imperfect. The case of perfect labor markets is analogous to that of perfect land markets. The positive incentive effect of land disappears because labor can be hired out. This holds whether or not land markets are perfect. The coefficient on land is therefore zero or negative, depending on whether the credit market is perfect or not. If credit markets are assumed to be perfect, there is no negative collateral effect of land. Land has a positive incentive effect if and only if both land and labor markets are imperfect. In this case the land coefficient is zero if either the land market or the labor market is perfect, and it is positive if both of these markets are imperfect.

The preceding discussion suggests that the relative size of credit versus land and labor market imperfections can be discerned by observing the estimated coefficient on land. Consider the three possibilities:

- If the estimated coefficient on land size is zero, then either all markets are perfect or the credit market is perfect and either the land or labor market is perfect. Alternatively, it is possible that all three markets are imperfect, and the positive and negative land effects offset one another.
- If the estimated coefficient on land is positive, either all three markets are imperfect or the credit market is perfect but both land and labor markets are imperfect. In this case both the land and labor markets can be inferred to be imperfect.
- If the coefficient on land is negative, either all three markets are imperfect or credit markets are imperfect, and either the land or the labor market is perfect. In this case the credit market can be inferred to be imperfect.

III. DATA AND DESCRIPTIVE STATISTICS

The data are drawn from the rural samples of the Ghana Living Standards Survey for 1991/92 and the Pakistan Integrated Household Survey for 1991. Both are large, nationally representative surveys collected by the respective national governments in cooperation with the Living Standards Measurement Study unit of the World Bank. The Ghana survey collects employment data on people 7 years old and older; the Pakistan survey collects data on people 10 years and older. The data structure and the definition of work are sufficiently similar across the two surveys to allow comparison of the data sets.

Activity Rates and the Work-School Tradeoff

In Ghana 41 percent of boys and 34 percent of girls work on the household farm (table 1). In Pakistan, the corresponding participation rates are 22 percent for boys and 28 percent for girls. Farm work is, on average, a half-time job for children, although there is wide dispersion in work hours around the mean (table 2).

In Ghana three-quarters of boys and two-thirds of girls who work on the household farm also attend school. In Pakistan just half the boys and 10 percent of girls employed on the household farm attend school. Combining farm work and school thus appears easier in Ghana than in Pakistan; it appears to be especially

TABLE 1. Participation in School and Work Activities by Boys and Girls in Pakistan and Ghana (percent)

Activity	Boys in Pakistan	Girls in Pakistan	Boys in Ghana	Girls in Ghana
<i>Total participation rates</i>				
Household farm work	22.1	28.1	40.5	34.4
Household enterprise work	2.3	1.6	1.8	2.5
Wage work	6.2	11.9	0	0
School	72.8	30.5	76.5	68.9
None of the above activities	14.0	42.4	12.7	20.1
Domestic work	n.a.	99.4	89.8	96.2
<i>Participation in a single activity</i>				
Farm work only	8.6	21.1	10.6	9.8
Enterprise work only	0.64	1.2	0.3	1.2
Wage work only	3.2	6.8	0	0
School only	61.3	27.6	45.0	43.3
<i>Participation in more than one type of work</i>				
Farm and enterprise work	0.91	0.09	0	0
Household farm wage work	2.1	4.1	0	0
Household enterprise and wage work	0.25	0.27	0	0
<i>Participation in work and school</i>				
Farm work and school	10.5	2.7	29.9	24.6
Enterprise work and school	0.50	0	1.5	1.3
Wage work and school	0.74	0.73	0	0
Number of children	1,209	1,096	1,718	1,542

n.a., Not applicable.

Note: Figures are percentages of relevant age group. Data are for rural areas only. They cover 7–14-year-olds in Ghana and 10–14-year-olds in Pakistan.

difficult (or not preferred) for Pakistani girls. A simple unconditional correlation of probabilities suggests that in Pakistan the probability of attending school is 0.4 lower for boys and 0.3 lower for girls if the child is engaged in farm work.⁹ In Ghana the probability of being in school is 0.1 lower for boys and 0.006 lower for girls. These marginal effects are significant in every case except that of Ghanaian girls. Heady (2003) finds that working affects school performance in Ghana. His results are an important supplement to school attendance effects. The data required to investigate school performance in Pakistan were not available.

A striking difference between Ghana and Pakistan is that a significant fraction of children in Pakistan are engaged in work outside the household, whereas child participation in wage work in Ghana is close to zero. School attendance in Pakistan shows a much greater gender differential than in Ghana. In both countries a substantial proportion of children, especially girls, neither work nor go to school. If the main concern is with low educational attainment (and the

9. Although the effect of hours of farm work is negative and significant, it is small: a one-hour increase in farm work reduces the probability of school attendance by 0.03 for girls and 0.015 for boys.

TABLE 2. Weekly Hours of Child Farm Work in Ghana and Pakistan

Group	Household farm work	Wage work
Boys in Ghana	15.5 (13.3), <i>N</i> = 696	n.a.
Girls in Ghana	15.4 (12.9), <i>N</i> = 531	n.a.
Boys in Pakistan	22.5 (18.5), <i>N</i> = 267	44.9 (22.3), <i>N</i> = 61
Girls in Pakistan	13.3 (13.8), <i>N</i> = 308	30.9 (15.6), <i>N</i> = 73

n.a., Not applicable.

Note: Data are for rural areas only. They cover 7–14-year-olds in Ghana and 10–14-year-olds in Pakistan. Hours are values reported for the reference week, conditional on participation in the activity during the reference week. Figures in parentheses are standard deviations around the means. *N* is the number of working children.

gender gap in such attainment), policies designed to discourage child labor may be less important than policies that directly promote school attendance.¹⁰

Land Scarcity, Land Use, and Poverty

Land is scarcer in Pakistan than in Ghana. Likely related to this, the wage labor market is better developed in rural Pakistan, where 36 percent of adult men work for wages, in contrast to rural Ghana, where just 22 percent of adult men do so. These figures suggest both a higher marginal productivity of child labor and greater difficulty in hiring adult labor in Ghana. They lead us to expect more children to be employed on household farms in Ghana than in Pakistan, a prediction borne out by the data (table 1).

This does not imply that children are better off in Pakistan. Working children in Pakistan are less likely to be in school than child workers in Ghana (table 1). Compared with other developing economies, Pakistan has a relatively high rate of child wage employment, with 10 percent of 10–14-year-olds working. Households that send children to wage work are poorer on average than households that employ children on the family farm.

Pakistan has a higher incidence of poverty than Ghana.¹¹ The two countries also exhibit very different patterns of land use. Renting and sharecropping are more common in Pakistan; the use of communal land is more common in Ghana. A household in Ghana may own more than one plot of land, with ownership divided evenly between husbands and wives (see, for example, Udry 1996, Iversen 2000). Such land ownership patterns are uncommon in Pakistan.

The Wealth Paradox

In Pakistan, where 33 percent of households own land, the probability of working at all or working on a farm is substantially higher among landowners than among the landless (table 3). This pattern is reflected in school attendance rates of girls,

10. Ravallion and Wodon (2000) find support for this contention in Bangladesh.

11. Ray (2000) estimates that 27 percent of households in Pakistan and 14 percent in Ghana fall below the median income per adult equivalent.

TABLE 3. Participation Rates by Land Owned (Percent)

Land ownership	Percentage of households	School		Farm work		All work	
		Boys	Girls	Boys	Girls	Boys	Girls
<i>Pakistan</i>							
Own land = 1	33	76.7	27.6	31.0	36.4	33.0	43.9
Own land = 0	67	70.7	32.7	17.0	22.9	24.4	32.9
Marginal	9	77.8	24.6	29.1	36.5	31.6	47.8
Small	12	73.0	26.7	34.1	38.0	36.6	44.0
Large	9	79.1	29.6	31.1	36.5	31.8	39.7
<i>Ghana</i>							
Own land = 1	44	81.9	75.7	49.7	46.8	52.9	50.5
Own land = 0	56	73.5	66.7	55.6	48.8	57.6	51.4
Marginal	12	80.3	76.6	44.3	43.9	47.5	47.7
Small	19	83.7	79.7	45.9	47.1	50.7	51.2
Large	13	80.5	69.7	58.5	48.5	59.7	51.5

Note: Classification of land categories follows the system used by Indian census: marginal = less than 1 ha; small = 1–3 ha; large = more than 3 ha (1 ha = 2.7 acres). “All work” refers to participation in work on household farms, work on household enterprises, or work on the wage labor market. It is not the inverse of school attendance because some children neither work nor attend school.

which are higher among landless households. For boys the wealth effect appears to dominate, and school attendance is higher among landowning families.

In Ghana, where 44 percent of households own land, the children of landowning households are more likely to attend school and less likely to work than the landless. There is thus no apparent paradox, although the difference in probabilities is smaller than might have been expected.

Once the size of landholdings is examined to allow for likely nonlinearities arising from the fact that the sizes of both the wealth and the substitution effects are a function of land size, the wealth paradox is apparent in Ghana as well (table 3). In Pakistan nonlinearity is evident: most of the increase in work participation with land owned occurs in moving from marginal to small landholdings. After that, there is a small decrease, leaving work participation rates in the large landowning class similar to those in the marginal landowning class. For boys this is mirrored in school attendance. For girls farm labor participation is bell-shaped in land size (like that of boys), but wage labor participation is decreasing in land size. Their total work participation decreases monotonically with land size (and their school attendance increases). This is consistent with the finding that income effects for girls are typically larger than for boys (e.g., Ravallion and Wodon 2000, Behrman and Knowles 1999).

In Ghana the probability of both working at all and working on a farm increases steadily with land size for boys and girls. School participation increases from marginal to small but then, surprisingly, decreases from small to large farms. The fact that school participation does not mirror work participation in Ghana as well as it does in Pakistan is consistent with the fact that it is easier to combine work and school in Ghana.

Farm households often operate land without owning it. In Pakistan this is done by leasing land or sharecropping. In Ghana farmers can also use “free farms” or village farms. Work and school participation rates of children who work on farms operated by their families differ from those of children who work on farms owned by their families (table 4). It is convenient to think of land used as reflecting opportunities in the way that land owned does but without the corresponding wealth (and inheritance) effect. In line with this, the paradoxical patterns are stronger than in table 3. The farm employment rates of Pakistani girls are higher on large farms than on small farms. For all work, girls’ employment displays a bell-shaped relation with land size similar to that observed for boys. This effect is mirrored in school attendance. Remarkably, school attendance rates of girls and boys in large-farm households are lower than in marginal-farm households. In Ghana participation rates are similar to those for land owned, but school attendance decreases steadily as the size of land operated rises.

Overall, there is considerable support for the notion that landholdings, whether owned or operated, increase the probability that children work and decrease the probability that they attend school. This wealth paradox seems more evident for girls than for boys. These data are truly remarkable, given that poverty in rural economies is associated with low levels of landownership and child labor is associated with poverty. Because child labor on the household-run farm is easily the most common form of child labor, these data deserve investigation.

TABLE 4. Participation Rates by Land Operated (Percent)

Land operated	Percentage of households	School		Farm work		All work	
		Boys	Girls	Boys	Girls	Boys	Girls
<i>Pakistan</i>							
Use land = 1	43	72.0	25.2	32.9	39.1	35.0	46.5
Use land = 0	57	73.5	35.7			20.7	28.0
Marginal	9	74.5	28.3	24.5	39.0	28.6	51.0
Small	20	71.0	21.9	34.8	35.7	36.3	42.9
Large	15	72.0	27.6	34.4	43.1	36.2	48.7
<i>Ghana</i>							
Use land = 1	90	77.8	71.1	52.4	47.5	55.1	50.7
Use land = 0	10	89.2	76.3	n.a.	n.a.	9.6	15.8
Marginal	27	84.3	79.1	44.8	42.7	48.8	46.7
Small	40	77.0	71.0	54.2	48.3	57.0	51.4
Large	23	72.7	62.8	57.4	51.4	58.6	53.2

n.a., Not applicable.

Note: Classification of land categories follows the system used by the Indian census: marginal = less than 1 ha; small = 1–3 ha; large = more than 3 ha (1 ha = 2.7 acres). “All work” refers to participation in work on household farms, work on household enterprises, or work on the wage labor market. It is not the inverse of school attendance because some children neither work nor attend school. Land operated includes land owned and land used under rental or sharecropping arrangements. For Ghana the data also include free or village land farmed.

IV. EMPIRICAL MODEL AND ESTIMATION ISSUES

It is unusual to have data that span an individual's childhood (period 1) and adulthood (period 2), making it difficult to obtain structural estimates of a dynamic model. The analysis here is limited by the single cross-section of data used for each country. Separate equations are estimated for boys and girls in each country, giving four sets of estimates. All reported standard errors are robust (see White 1980, for example) and adjusted to permit observations within clusters (primary sampling units) to be correlated (see Deaton 1997, for example).

The dependent variable is hours of child work on the family farm. Because there is considerable variation in hours, this measure is preferable to the participation measure used in most previous research. Because many children do not participate in farm work, the tobit estimator is used.¹² If data on all rural households are used, a dummy for land ownership has such enormous explanatory power that all other regressors are completely insignificant. Because land ownership is a very significant determinant of child labor in rural areas of both countries, the models are run on the subsample of households that own or operate a family farm. These households constitute 46 percent of households in Pakistan and 90 percent of households in Ghana. Farm size is then included among the regressors, and dummy variables are used for type of land tenancy.

Main Variables

The key regressor, land size (A_t), is defined as acres of farm land owned or operated by the household. A quadratic term is included to allow the sizes of the wealth and substitution effects to vary with land size. The theoretical model distinguishes land owned (A_0) from rented land (A_r). In the empirical model, dummy variables distinguish the two. A further distinction is made in the empirical model between sharecropping land (Pakistan and Ghana), use of free or village land (Ghana) and number of plots of land (Ghana). No previous study has considered the effects of the mode of operation of land on child labor, so the coefficients on these variables are of interest.¹³ Household consumption (X_1) is proxied by food expenditure per capita, which includes the imputed

12. Tobit estimates are often sensitive to deviations from normality. The benefits of using the hours variation in the data seemed to outweigh this potential problem, but the results are subject to this caveat. To investigate the sensitivity of the results to alternative estimators, we estimated probit models as well as OLS models of hours of work conditional on participation (with a selection correction term from the probit). The main results were qualitatively similar.

13. One rationalization for having tenants sharecrop the land rather than renting the land out or hiring wage labor is that it improves the landlord's access to labor by making available the labor of the tenant's family in addition to the labor of the tenant (see Basu 1997).

value of home-produced consumption.¹⁴ This measure is expected to be relatively smooth (see Altonji 1986).¹⁵ All equations include a set of province dummies, which are expected to capture any effects of interprovince differences in wages and prices. The wage of hired labor (w_b) is proxied by the going agricultural wage rate for men in the community, a statistic provided by village leaders identified as respondents in the community questionnaires of both surveys.

Instrumental Variables

If decisions about consumption (X_1) and labor supply (for example, L_c) are made simultaneously, then X_1 is endogenous in the equation for L_c . Moreover, child labor contributes to resources available for consumption. Most previous studies ignore this problem. Because the data do not offer a relevant natural experiment, X_1 is instrumented. It is difficult to find a valid instrument for income in a model of (child) labor supply. In the wider literature, commonly used instruments for income are education or occupation. Because this study looks at farming households, there is little variation in occupation in the sample. Although there is sufficient variation in the educational attainments of adults in the sample, this is too restrictive an exclusion restriction: parental education has a significant influence on child labor, holding household resources constant. Previous studies that have used education as an instrument assume no effect of education on (own) tastes for work, which seems unreasonable (see Pencavel 1986, for example). Here, household consumption is instrumented using the unemployment rate at the community level together with indicators of the level of infrastructural development of the community (for example, the presence of a railway line, a market, electricity, piped water). So as not to lose the within-community variation in income, interactions of these variables with the education of the household head are also included.

Total land operated (A_t) is endogenous by virtue of including A_r (land rented or sharecropped). If land owned (A_0) is assumed to be exogenous, as is typically the case, then A_0 is a valid instrument for A_t . Land owned is usually inherited, the buying and selling of land being limited by a weak land market (see, for example, Swain 2001, Rosenzweig and Wolpin 1985). An index of inequality in land distribution within the community is used as another instrument for A_t . Communities in which there is greater inequality in land ownership are expected to have more rental arrangements over land.

The generalized residuals procedure is used as this has been shown by Smith and Blundell (1986) to give consistent estimates when the dependent variable is

14. There is no need to assume an equivalence scale because size and detailed household composition variables are included in the equations. Food expenditure is preferred to total expenditure, because total expenditure includes expenditures on durables, which are not as smooth.

15. Although we expect that the rural economies analyzed are characterized by imperfect capital markets, some evidence suggests that poor households achieve a degree of consumption smoothing (see Townsend 1994).

censored. Suppressing individual subscripts, let the main equation, for hours of work (H), be written as

$$(4) \quad H^* = Z\beta + X\gamma + e,$$

where hours (H) is a censored endogenous variable, Z is a vector of exogenous variables, and X is the endogenous variable. The auxiliary equation describing Y in terms of exogenous variables Z_1 (Z_1 includes Z) is

$$(5) \quad Y = Z_1\pi + u.$$

The error terms e and u are assumed to be jointly normally distributed. Let $e = u\alpha + \varepsilon$. Substituting for e in equation 4 gives the conditional model

$$(6) \quad H^* = Z\beta + X\gamma + u\alpha + \varepsilon,$$

where u is an estimate obtained by ordinary least squares (OLS) estimation of equation 5 and equation 6 can be estimated by the standard tobit procedure. A test of $\alpha = 0$ is a test of the null hypothesis that X is exogenous.

Other Variables

Because the incentive to put a child to work on the farm depends on the size of the farm relative to the size of the available pool of family labor, household size and composition appear as regressors. Given farm size, household size is expected to have a negative impact on child work. The educational level of each parent is expected to affect preferences over child labor, although if household resources are not fully represented by X_1 then the educational variables will also capture resource effects. These variables may also have direct effects if the marginal benefit of educating a child is increasing in the education of the parents or if parental education has a positive effect on the child's job opportunities (which will affect the dynamic returns to education versus work). To the extent that womens' education reflects their bargaining power (by virtue of being an asset that they can take with them if they leave the household), inclusion of mothers' education as distinct from fathers' education goes some way toward relaxing the common preference assumption implicit in equation 1. For this reason, and also as a measure of household insecurity, an indicator is also used for whether the household has a female head. The fraction of households headed by women is substantially larger in Ghana than in Pakistan; in both countries they exhibit different characteristics from households headed by men. Religion and ethnicity of the household are included to capture attitudinal differences in the valuation of school and work. This is expected to be especially relevant for girls, toward whom attitudes tend to reflect greater heterogeneity.

Turning from household-specific to child-specific characteristics, the equations include a quadratic in child age. The simplicity of the theoretical structure is relaxed by allowing parents to have preferences over children that depend on the relationship of the child to the household head and on birth order. For

evidence of birth order effects, see Das Gupta (1987) and Butcher and Case (1994). As for the relation of the child to the household head, there is recent evidence that adult altruism has a biological or genetic basis (see Bishai and others 2003, Case and McLanahan 2000). Other relationships include niece, nephew, grandchild, and sibling; in addition, in Ghana, it is not unusual to find foster children in the household.

The surveys contain some useful information at the community level. As a proxy for school costs (C : see model in the Appendix), dummy variables are introduced for whether primary, middle, and secondary schools are present in the community in which the child lives. Also included is an indicator for public transportation in the community, because it may affect access to school. A comparison of means across these subsamples and a comparison of means across the two countries can be found in Bhalotra and Heady (2001).

V. RESULTS

Estimates of a parsimonious model corresponding to equation 3, in which the only variable in the vector Z is household size, are presented in table 5. Estimates of marginal effects for a model with a larger set of control variables are presented for the probability of working (table 6) and for the hours of work conditional on working (table 7). The standard marginal effects are multiplied by 0.1 for per capita food expenditure (X_1) because it is in logarithms and for household composition variables because these are proportions; as a result, the effects of a 10 percent change in these variable can be read directly off the table.

For landholdings (A_t) the Smith-Blundell test did not reject exogeneity, and there was no significant difference between the instrumental variable and OLS estimates. Exogeneity was rejected for food consumption (X_1) in each of the samples except that of boys in Ghana (the residual term is significant in columns 1, 2, and 4; see section IV). The first-stage regression explains 31 percent of the variation in consumption in Pakistan and 29 percent in Ghana, and the instruments are jointly significant at 1 percent and 10 percent, respectively. The results change significantly (and in the expected direction) in the absence of instruments, underlining the importance of using instrumental variable methods in studying the impact of household resources on child work.

Farm Size and Consumption Effects

Consider first the parsimonious model in table 5. In Ghana farm size has a highly significant positive effect for both boys and girls. The effect for girls is linear and, for a range of households, 50 percent larger than for boys. The effect for boys is weakly quadratic. Boys from larger households work significantly more, whereas girls' farm labor is independent of household size. Per capita household consumption has an unexpectedly positive effect on child work, even after correcting for its endogeneity.

These coefficients become more plausible once other controls are introduced (tables 6 and 7). The effects of farm size, consumption, and household size

TABLE 5. Child Work on the Household Farm: Marginal Effects of the Parsimonious Model

Variable	Boys in Pakistan	Girls in Pakistan	Boys in Ghana	Girls in Ghana
<i>Participation probabilities</i>				
Log consumption	-0.026***	-0.010	0.012***	0.0095**
Acres $\times 10^2$	0.026	0.15**	0.41***	0.60***
Acres ² $\times 10^4$			-0.31*	-0.30
Household size	-0.021***	-0.013***	0.0098***	-0.0069
Residual (log consumption)	0.022***	0.017**	-0.006	-0.000053
<i>Hours conditional on work</i>				
Log consumption	-0.68***	-0.18	0.22***	0.16**
Acres $\times 10^2$	0.68	2.70**	7.40***	10.20***
Acres ² $\times 10^4$			-5.50*	-5.10
Household size	-0.54***	-0.25***	0.18***	-0.12
Residual (log consumption)	0.59***	0.030**	-0.11	-0.0009
Sample size	513	473	1272	1127
Log likelihood	-969.82	-901.27	-2,895.3	-2,278.3

*Significant at the 12 percent level.

**Significant at the 10 percent level.

***Significant at the 5 percent level.

Note: Marginal effects evaluated at sample means based on tobit estimates. Dependent variable is hours of child labor on the household farm. "Participation probabilities" refers to marginal effects for the probability of being censored; "hours conditional on work" refers to marginal effects conditional on censoring. Regressions included region, religion, and ethnicity dummies. Some regions in Ghana were dropped because they coincided with ethnic groups. If the *t*-test on the residual of log consumption is significant, the null of exogeneity of consumption is rejected. Blank cells indicate that the variable was insignificant and was dropped from the equation in the specifications that are reported.

become insignificant for boys. For girls a significant positive effect of farm size persists, and consumption and household size both take the expected negative sign and are significant. The coefficients on land size should be read together with the coefficients on the indicator variables for the mode of operation of land, many of which are significant. The number of farms operated has a strong positive effect on hours of work of similar magnitude for boys and girls. Because this result is obtained when controlling for acres of land operated by the household, it suggests not a size effect but an effect associated with the subdivision of land, an effect that merits further microlevel research.

For Pakistan the parsimonious equations in table 5 show a positive linear effect of farm size on girls' work. Farm size takes a positive sign for boys' work, but the effect is insignificant. Household consumption has the expected negative effect on child work, but it is significant only for boys. The absence of an income effect on girls' work is somewhat surprising. It may be related to the

TABLE 6. Child Participation on the Household Farm: Marginal Effects

Variable	Boys in Pakistan	Girls in Pakistan	Boys in Ghana	Girls in Ghana
<i>Child characteristics</i>				
Age	0.081***	0.033***	0.15***	0.15***
Age squared			-0.0041	-0.0047*
Child of head	0.12*	0.15**	-0.066**	-0.006
<i>Household resources</i>				
Ln per capita food expenditure	-0.051***	-0.017	0.0048	-0.021***
Acres $\times 10^2$	0.069	0.20*	-0.071	0.36***
Acres ² $\times 10^4$			-0.00015	-0.014**
<i>Farm organization</i>				
Number of farms			0.046***	0.048***
Rent	-0.031	0.12**	0.14***	0.14***
Sharecrop	0.11***	0.06	-0.040	0.011
Free farm	n.a.	n.a.	0.14***	0.16***
Village farm	n.a.	n.a.	0.031	0.20***
<i>Household structure</i>				
Household size	-0.024***	-0.011	-0.0055	-0.020***
Female head	0.39***	0.22**	0.036	0.080*
Males <5-7	-0.079***	-0.031	-0.0041	-0.038***
Males 5-9	-0.059*	-0.090***		
Males 15-19	-0.049	-0.051	-0.0065	-0.016
Males 20-59	0.0043	-0.077**	-0.0057	0.024
Males >60	-0.014	0.062	0.026	0.030
Females <5-7	-0.037	0.011	0.022	-0.029**
Females 5-9	0.015	-0.014		
Females 15-19	-0.13***	-0.054	-0.013	-0.0084
Females 20-59	0.019	0.003	0.00014	0.0006
Females >60	-0.079	-0.25***	0.0086	0.17
<i>Parents' education</i>				
Mother middle/secondary	-1.55***	-2.17***	-0.093***	-0.028
Father secondary	0.12	-0.52***	-0.039	0.029

Community variables

Primary school, girls	0.11	-0.17	-0.043	-0.064
Primary school, boys	0.040	0.39***		
Middle school			-0.093***	-0.067*
Secondary school			-0.099**	-0.128***
Public transport	-0.048	-0.095**	-0.030	-0.12***
Ln male wage	0.008	-0.010	0.004	0.020***
Residual (log consumption)	0.041***	0.028*	0.0017	0.034***
Sample size (number of censored observations)	471 (323)	436 (284)	1,263 (720)	1,122 (702)
Log likelihood	-847.78	-776.32	-2,694.92	-2,129.33

*Significant at the 12 percent level.

**Significant at the 10 percent level.

***Significant at the 5 percent level.

n.a., Not applicable.

Note: Tobit marginal effects for probability of being censored. Regressions included region, religion, and ethnicity dummies. Marginal effects are evaluated at sample means based on tobit estimates. Dependent variable is hours of child labor on the household farm. “Participation probabilities” refers to marginal effects for the probability of being censored; “hours conditional on work” refers to marginal effects conditional on censoring. Regressions included region, religion, and ethnicity dummies. Some regions in Ghana were dropped because they coincided with ethnic groups. If the *t*-test on the residual of log consumption is significant, the null of exogeneity of consumption is rejected. Blank cells indicate that the variable was insignificant and was dropped from the equation in the specifications that are reported.

TABLE 7. Hours of Child Farm Work Conditional on Participation: Marginal Effects

Variable	Boys in Pakistan	Girls in Pakistan	Boys in Ghana	Girls in Ghana
<i>Child characteristics</i>				
Age	1.86***	0.46***	2.33***	2.25***
Age squared			-0.063	-0.069*
Child of head	2.70*	2.09**	-1.02**	-0.083
<i>Household resources</i>				
Ln per capita food expenditure	-1.16***	-0.24	0.073	-0.31**
Acres $\times 10^2$	1.60	2.90*	1.10	5.40***
Acres ² $\times 10^4$			-0.0024	-0.20**
<i>Farm organization</i>				
Number of farms			0.71***	0.70***
Rent	-0.70	1.74**	2.09***	2.14***
Sharecrop	2.62***	0.78	-0.62	0.15
Free farm	n.a.	n.a.	2.22***	2.32***
Village farm	n.a.	n.a.	0.47	2.96***
<i>Household structure</i>				
Household size	-0.54***	-0.16	-0.085	-0.30***
Female head	9.02***	3.06**	0.55	1.18*
Males <5-7	-1.8***	-0.44	0.063	-0.56***
Males 5-9	-1.35*	-1.27***		
Males 15-19	-1.11	-0.71	-0.10	-0.24
Males 20-59	-0.098	-1.09**	0.088	0.36
Males >60	-0.32	0.88	0.39	0.44
Females <5-7	-0.86	0.16	0.34	-0.43**
Females 5-9	0.35	-0.20		
Females 15-19	-2.86***	-0.76	-0.20	-0.12
Females 20-59	0.43	0.045	0.0021	0.0096
Females >60	-1.81	-3.53***	0.13	0.25
<i>Parents' education</i>				
Mother middle/secondary	-35.45***	-30.58***	-1.43***	-0.41
Father secondary	2.75	-7.26***	-0.6	0.43

<i>Community variables</i>				
Primary school, girls	2.43	-2.41	-0.67	-0.94
Primary school, boys	0.90	5.43***		
Middle school			-1.43***	-0.98*
Secondary school			-1.53**	-1.88***
Public transport	-1.11	-1.34**	-0.46	-1.72***
Ln male wage	0.19	-0.14	0.06	0.30***
Residual (log consumption)	0.95***	0.40*	0.027	0.49***
Sample size (number of censored observations)	471 (323)	436 (284)	1,263 (720)	1,122 (702)
Log likelihood	-847.78	-776.32	-2,694.92	-2,129.33

*Significant at the 12 percent level.

**Significant at the 10 percent level.

***Significant at the 5 percent level.

n.a., Not applicable.

Note: Tobit marginal effects conditional on censoring. Regressions included region, religion, and ethnicity dummies. Marginal effects are evaluated at sample means based on tobit estimates. Dependent variable is hours of child labor on the household farm. “Participation probabilities” refers to marginal effects for the probability of being censored; “hours conditional on work” refers to marginal effects conditional on censoring. Regressions included region, religion, and ethnicity dummies. Some regions in Ghana were dropped because they coincided with ethnic groups. If the *t*-test on the residual of log consumption is significant, the null of exogeneity of consumption is rejected. Blank cells indicate that the variable was insignificant and was dropped from the equation in the specifications that are reported.

fact that boys work considerably longer hours than girls on average (table 2). For both boys and girls, hours of work fall significantly with household size. When additional regressors are included (tables 6 and 7), all of these effects persist except the effect of household size on girls' work, which becomes insignificant. For both boys and girls, the significant coefficients take signs consistent with our theoretical framework. As in Ghana, the distinction between renting or sharecropping and ownership is significant.

Discussion of Results

The main result is that the hypothesis that farm size has a positive effect on child labor cannot be rejected. That these results hold for both Ghana and Pakistan is striking. The effect is statistically significant for girls. With a larger data sample, it may be significant for boys' work: the interpretation of a coefficient for boys that is not significantly different from zero is ambiguous.

The finding that girls' hours of work are increasing in farm size signals imperfections in land and labor markets. It is consistent with imperfect credit markets, the effects of which are overwhelmed by land and labor market effects. Why is the result stronger for girls than for boys? One possibility is that girls are less of a perfect substitute for hired workers than are boys. Another explanation is that the returns to education for boys are more favorable than for girls, with the gender difference in education returns overwhelming any gender difference in experience returns.¹⁶ This effect may be reinforced by social attitudes toward girl's work, which often harden with status in rural areas, land being an important correlate of status. A third possibility is that parents prefer to invest in sons because boys traditionally look after their parents in their old age (except, possibly, among the Akan in Ghana).

Substitution effects are often larger for girls (and women) than for boys (and men). In member countries of the Organisation for Economic Cooperation and Development, for example, female labor supply appears to be more elastic than male labor supply (see Killingsworth and Heckman 1986).

The other key variable in the analysis is household consumption, X_1 , which is insignificant for two of the four samples and has the expected negative effect on child work for boys in Pakistan and girls in Ghana (the elasticities are -0.66 for Pakistani boys and -0.20 for Ghanaian girls). Consider the marginal effects reported in tables 6 and 7. In Pakistan an increase in consumption of 10 percent is associated with a reduction in the probability of boys' work of 5 percentage

16. The greater the returns to work experience relative to the returns to school, the greater the probability that a child works, other things being equal. If the relative return to experience is increasing in farm size (for example, because the child who works in period 1 inherits the farm in period 2), the coefficient on farm size may be positive. In this sense these dynamic effects reinforce the incentive effect, having the same sign. Returns to experience would be expected to be larger for boys if they are more likely than their sisters to inherit the farm. The fact that the farm size coefficient is more positive for girls indicates that the returns to education are even more favorable for boys than for girls.

points. Conditional on working, the same change in expenditure is expected to reduce hours of work by 1.2 per week (average hours are 15 per week). The corresponding effects for girls in Ghana are 2 percentage points and 0.3 hours per week. (Weaker income effects would have emerged had simultaneity bias not been accounted for.)

Effects on Schooling and Wage Work

The equations were reestimated with the dependent variable defined as school attendance (probit) and school hours (tobit). In Ghana there is no wealth paradox in schooling: acreage of farm land is insignificant in the equations for both boys and girls (table 8).¹⁷ In Pakistan, however, the wealth paradox is evident for school attendance just as for farm labor, for girls and not boys. Girls in households with larger farms are less likely to attend school and, conditional on attendance, more likely to spend fewer hours at school. Land tenancy type has significant effects in both countries. The measure of income is positive and statistically significant in the schooling equations for boys and girls in Ghana and Pakistan. Thus income effects on school attendance and school hours are larger and more precisely determined than income effects on child labor. This is a fairly pervasive finding in the data for developing economies (see Bhalotra and Tzannatos 2002, for example).

Children in Ghana do not engage in wage labor. A substantial fraction of children in Pakistan do. Is the increase in farm work associated with increasing farm size observed for girls associated with a reduction in wage work, or does it reflect an increase in total work? To investigate this, the equations for Pakistan were reestimated with the dependent variable defined as the sum of hours in wage and farm work.

A table of results is available from the authors; only the main finding is reported here. Total hours of work of girls increases with increasing farm size. Indeed, the marginal effect on farm size is larger. These results are consistent with the results for schooling: the evidence is unambiguous that other things equal, girls in Pakistan are more likely to work and less likely to attend school when they come from land-rich households.

Other Covariates

Children from larger households are not more likely to work or to work harder than other children (tables 6 and 7). Land tenure type (mode of operation) has significant effects on child labor for a given acreage. No other study of child labor appears to have investigated this variable. Female headship significantly increases child labor in every case except that of boys in Ghana. The size of this effect is much larger in Pakistan than in Ghana, although the proportion of

17. The tobit results are discussed but not reported herein; they are available from the authors.

TABLE 8. Child Participation in School: Marginal Effects

Variable	Boys in Pakistan	Girls in Pakistan	Boys in Ghana	Girls in Ghana
<i>Child characteristics</i>				
Age	-0.045***	-0.022**	0.128***	0.284***
Age squared			-0.005***	-0.014***
Child of head	-0.074	-0.135*	-0.031	-0.009
<i>Household resources</i>				
Ln per capita food expenditure	1.163***	0.83***	0.321***	0.239***
Acres $\times 10^2$	-0.001	-0.002***	0.001	-0.002
Acres ² $\times 10^4$			0.00	0.00
<i>Farm organization</i>				
Number of farms			-0.007	0.001
Rent	0.007	0.133**	-0.032	-0.11*
Sharecrop	0.024	-0.013	0.008	0.06
Free farm	n.a.	n.a.	0.09***	0.026
Village farm	n.a.	n.a.	-0.163***	-0.198***
<i>Household structure</i>				
Household size	0.036***	0.015**	0.007	0.012*
Female head	-0.251		-0.031	0.058
Males <5-7	0.812***	0.066	-0.065	-0.208
Males 5-9	0.327	-0.058		
Males 15-19	-0.356	-0.434	-0.451***	-0.215
Males 20-59	0.305	0.009	-0.729***	-0.813***
Males >60	0.118	-0.507	-0.756***	-0.254
Females <5-7	0.947***	0.412	-0.089	-0.24
Females 5-9	0.362	0.043		
Females 15-19	0.408	0.859***	0.065	-0.401*
Females 20-59	-0.659	-0.486	-0.683***	-0.713***
Females >60	-0.051	0.143	-0.848***	-0.695***
<i>Parents' education</i>				
Father primary education	0.049	0.024	0.104***	0.187***
Father middle school education	0.189***	0.341***		

Father secondary school education	0.108	0.354***	0.15***	0.232***
Mother middle or secondary education	-0.245	0.321**	0.111***	0.11***
<i>Community variables</i>				
Primary school girls	0.022	-0.457***	0.177***	0.046
Primary school boys	-0.018	0.12		
Middle or secondary school	0.003	-0.028	0.029	0.041
Public transport	0.09*	0.002	-0.064*	-0.086*
Ln male wage	-0.411***	-0.087	0.041	-0.023
Residual (log consumption)	-1.144***	-0.856***	-0.277***	-0.172*
Sample size (observed probability)	462 (0.73)	420 (0.26)	1373 (0.76)	1230 (0.67)
Log likelihood	-209.69	-161.31	-573.38	-613.78

*Significant at the 12 percent level.

**Significant at the 10 percent level.

***Significant at the 5 percent level.

n.a., Not applicable.

Note: Probits with dependent variable defined as unity if the child is in school and as zero otherwise. Estimates are marginal effects. Standard errors are suppressed to conserve space. Regressions include region, religion, and ethnicity dummies (not shown). Blank cells indicate that the variable was insignificant and was dropped from the equation in the specifications that are reported.

households headed by women is much larger in Ghana (30 percent versus less than 3 percent).

In Pakistan the age–gender composition of the household has some interesting and large effects; the corresponding effects in Ghana are weak. Father’s secondary education significantly reduces girls’ work in Pakistan but has no effect on the labor of the other three groups. Mother’s secondary education tends to reduce child hours of work in both countries. In Ghana this effect is restricted to boys; in Pakistan it is significant for boys and girls and of similar magnitude. These findings reinforce a growing literature on the importance of female education in achieving positive outcomes for children across a range of countries (see Sen 1999, Bhalotra and Tzannatos 2002, for example).

VI. CONCLUSIONS AND POLICY IMPLICATIONS

In both Ghana and Pakistan the daughters of land-rich households are more likely to work than the daughters of land-poor households, even after controlling for household resources and other relevant household, child, and community characteristics.¹⁸ Introducing control variables mitigates the paradoxical patterns in the data for boys. The estimates are consistent with the hypothesis that the wealth paradox can be explained in terms of imperfections in land and labor markets. This effect appears to dominate any effect of credit market imperfections.¹⁹

The analysis has significant implications for public policy:

- Given that the majority of working children in developing economies work on family-run farms, some of the policies that have recently received attention from economic theorists and journalists interested in child labor (minimum wage legislation, trade sanctions) have limited direct relevance to the problem.
- The results highlight the gender differential in work and school participation and identify gender differences in the determinants of child labor. They are a useful guide to interventions designed to close the gender gap. In Pakistan, where the gender gap is enormous, closing the gap would substantially reduce overall child work participation rates.
- In a dynamic model of child labor, the decision to send a child to work today depends not only on current considerations, such as the marginal productivity of child work on the farm, but also on expected returns to work compared with alternatives, such as school attendance. The finding

18. In Pakistan (but not in Ghana) girls’ school attendance is also decreasing with acreage of farmland.

19. Recall that the estimates are based on a sample of households that own or operate land. Incorporating landless households into the analysis may strengthen the wealth paradox at the same time as it enhances the opposing effect of liquidity constraints.

that farm size increases child labor suggests that at given levels of household income, the return to work relative to the return to school is a significant determinant of child labor, especially among girls. A natural policy implication is therefore to invest in raising the returns to education. For girls, in addition to general investments in improving school supply, such measures may include providing subsidies to parents conditional on girls attending school, reducing labor market discrimination against women and girls, and raising awareness to reduce inhibiting social norms.

- Policies that improve the functioning of labor and land markets in rural areas will reduce child labor, especially that of girls. Given the recent expansion of microcredit programs, it is pertinent to note that developing rural financial markets may have positive spillover effects, encouraging development of land and labor markets.²⁰ The growth of rural factor markets will not only counter the substitution effects highlighted here, it may also generate overall income growth and reduce rural inequalities.
- The marginal effects associated with acreage of farmland are small. Though the effects of land tenancy type are larger, it is difficult to see how policy interventions can directly affect land contractual forms. The largest marginal impact in the estimated equations is associated with post-primary education of mothers (remarkably, this is the case for both boys and girls in both Pakistan and Ghana). Policy resources are most effectively directed here. Research conducted using representative household survey data from developing economies suggests that educated women have fewer children and invest more in their quality (or human capital). Investing in women's education would not only directly reduce child labor and increase schooling of the current generation, it would also have beneficial impacts on the next generation of children. Other variables that have relatively large marginal effects on child labor include female headship, fathers' education (secondary and higher), and household income.

APPENDIX. MODEL SPECIFICATION

Consider a peasant household containing parents and children. Assume for simplicity that parents always work and that the household does not hire out labor. Assume, as is common in the human capital literature, that children do not bargain with their parents.²¹ Divide the life span of the household into two

20. Credit may facilitate lumpy purchases, such as purchases of land. By creating alternative ways of storing wealth, it may encourage land sales. On the more general subject of interlocked factor markets and rural power structures, see, for example, Basu (1997) and Ray (1998).

21. Young children's only fallback option would seem to be to run away from home. This may be thought especially unlikely among land-owning households because children may expect to inherit the land if they remain attached to the household.

periods. In the first period, parents produce output on the farm using land, their own labor, and possibly their children's labor. During this period the children may also attend school. In the second period, the children have grown up and may even have left the family home, but incomes continue to be pooled and the household continues to value their consumption as part of the household's total.

In the first period, subscripted 1, household income (Y) is given by a farm production function:

$$(A1) \quad Y_1 = f_1(A_0, A_{r1}, L_{p1}, L_{c1}, L_{b1}) - w_{b1}L_{b1} - p_{r1} \cdot A_{r1},$$

where A is land, L is labor, w is a wage, and p is a price. Subscripts o and r distinguish owned and rented land area; subscripts p , c , and b denote parents, children, and hired-in labor. Under imperfect labor markets, hired labor is not a perfect substitute for family labor. Similarly, under imperfect land markets, owned and rented land are not perfect substitutes. For this reason the types of land and labor appear as distinct arguments in the production function in equation A1.

In the second period, the children may have left home, and their contribution to family income is separate from household farm production. Household income is then given by

$$(A2) \quad Y_2 = f_2(A_0, A_{r2}, L_{p2}, L_{b2}) + w_{c2}(S, L_{c1}) \cdot L_{c2} - w_{b2} \cdot L_{b2} - p_{r2} \cdot A_{r2},$$

where w does not have to be an explicit wage: if the child grows up to work on his or her own farm, w is the marginal product. In the second period the child's wage is allowed to be a function of his or her first-period labor supply (L_{c1}) and schooling (S). Equation A2 therefore captures the dynamic effects of child labor on both the accumulation of work experience and the reduction in educational capital.

The household utility function is assumed to be time separable:

$$(A3) \quad U = U_1(X_1, L_{p1}, L_{c1}, S) + U_2(X_2, L_{p2}, L_{c2}),$$

where X is consumption. The household inherits some (positive or negative) financial wealth, K_0 , from a period zero that is not modeled. Financial wealth in period 1, K_1 , is then given by

$$(A4) \quad K_1 = K_0 + Y_1 - X_1 - C(S),$$

where $C(S)$ is the cost of schooling, and the price of consumption is normalized to unity. The financial wealth available to the household in period 2, K_2 , will depend on K_1 , but it will also depend on the household's access to financial services. Under imperfect capital markets, the interest rate facing the household, r , will depend on its wealth. For households with negative financial wealth (debt), the interest rate will also depend on characteristics that affect their perceived

creditworthiness, including personal characteristics (Z) and ownership of land (A_O).²² The interest rate, r , is therefore a function of A_O , K_1 , and Z , implying the following budget constraint for period 2: $X_2 = Y_2 + K_1 \cdot (1 + r[K_1, A_o; Z])$, which can be written as

$$(A5) \quad X_2 = Y_2 + g(K_1, A_o; Z).$$

The household attempts to maximize the utility function A3, subject to the technological and financial constraints described in A1, A2, A4, and A5. This gives equation 1 in the text.

First-Order Conditions

The first-order conditions relevant to the child labor decision are as follows:

$$(A6) \quad \partial U_1 / \partial X_1 - \lambda_1 = 0$$

$$(A7) \quad (\partial g / \partial K_1) \cdot \lambda_2 - \lambda_1 = 0$$

$$(A8) \quad (\partial U_1 / \partial L_{c1}) + (\partial F_1 / \partial L_{c1}) \cdot \lambda_1 + \lambda_2 \cdot (\partial W_{c2} / \partial L_{c1}) \cdot L_{c2} \leq 0$$

$$(A9) \quad (\partial U_1 / \partial S) - (dC/dS) \cdot \lambda_1 + \lambda_2 \cdot (\partial W_{c2} / \partial S) \cdot L_{c2} \leq 0$$

where λ_1 and λ_2 are the Lagrange multipliers on A4 and A5, and the inequalities in A8 and A9 become equalities when child labor and schooling, respectively, are positive. The work–leisure choice is made with reference to equation A8, which states that the value of the marginal product of child labor in the first period plus the value of the wage increase in the second period (arising from work experience) must be less than or equal to the marginal (dis)utility of work. Equation A9 has a similar interpretation for the choice between leisure and school attendance. Combining equations A8 and A9 gives

$$(A10) \quad \begin{aligned} & ([\partial U_1 / \partial L_{c1}] - [\partial U_1 / \partial S]) + \lambda_1 \cdot ([\partial F_1 / \partial L_{c1}] + [\partial C / \partial S]) \\ & = \lambda_2 \cdot L_{c2} \cdot ([\partial W_{c2} / \partial S] - [\partial W_{c2} / \partial L_{c1}]), \end{aligned}$$

which is the relevant condition if hours of child leisure are fixed and one is interested in the reallocation of an hour of child time from work to school. Note that child labor supply in period 1 will be zero if equation A8 is satisfied by an inequality when evaluated at zero hours. This would be equivalent to the implicit wage being below the reservation wage.

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Conditional Cash Transfers, Schooling, and Child Labor: Micro-Simulating Brazil's Bolsa Escola Program

François Bourguignon, Francisco H. G. Ferreira, and Phillippe G. Leite

A growing number of developing economies are providing cash transfers to poor people that require certain behaviors on their part, such as attending school or regularly visiting health care facilities. A simple *ex ante* methodology is proposed for evaluating such programs and used to assess the Bolsa Escola program in Brazil. The results suggest that about 60 percent of poor 10- to 15-year-olds not in school enroll in response to the program. The program reduces the incidence of poverty by only a little more than one percentage point, however, and the Gini coefficient falls just half a point. Results are better for measures more sensitive to the bottom of the distribution, but the effect is never large.

During the 1990s many developing economies adopted a new type of redistribution programs. Programs such as Food for Education in Bangladesh, Bolsa Escola in Brazil, and PROGRESA (Programa de Educación, Salud y Alimentación) in Mexico are means-tested conditional cash transfer programs. As the name indicates, they share two defining features, which jointly set them apart from most other programs. First, these programs include means tests, defined in terms of a maximum household income level, above which households are not eligible to receive the benefit.¹ Second, they include a behavioral conditionality that requires that members of participating households regularly undertake some prespecified action. The most common such requirement is for children between 6 and 15 years of age to remain enrolled in and actually attend school. In Mexico's PROGRESA, additional requirements, such as obligatory pre- and post-natal visits for pregnant women or lactating mothers, apply to some households.

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1. For verification and enforcement reasons, the means test is often specified in terms of a score based on responses to a questionnaire, a home visit by a social worker, or both. In some countries, the score is calibrated to be approximately equivalent to a predetermined level of household income per capita. See Camargo and Ferreira (2001) for a discussion of the Brazilian case.

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Implementation of these programs has generated considerable interest, both in the countries in which they have been implemented and in the international academic and policymaking communities. Accordingly, a great deal of effort has been placed on evaluating their impact. Two types of approach have been used to evaluate the effects of these programs on the various aspects of household welfare they seek to affect. *Ex post* approaches consist of comparing observed beneficiaries of the program with nonbeneficiaries, possibly after controlling for selection as beneficiaries if truly random samples are not available. Important work has recently been done on these techniques, and they have been applied to social programs in various countries.²

Ex ante methods consist of simulating the effect of the program on the basis of a model of the household. These models can vary widely in complexity and coverage. Arithmetic simulation models simply apply official rules to determine whether a household qualifies for the program and to calculate the amount of the transfer to be made. They use data commonly available in typical household surveys. More sophisticated models include some behavioral response by households.

Ex ante and *ex post* evaluation methods are complements rather than substitutes. To begin with, they have different objectives. *Ex post* methods are meant to identify the actual effects of a program on various dimensions of household welfare. They attempt to do so by observing people participating in the program and comparing them with people in a carefully constructed comparison group, selected to provide a suitable proxy for the desired counterfactual “how would participants have fared had they not participated?” In some sense, these are the only “true” evaluations of a program.

Even when comparison groups are perfectly believable proxies for the counterfactual, however, *ex post* evaluations leave some policy-relevant questions unanswered. These questions typically refer to how the program’s impact might change if some aspect of the program design—the level of the means test, the nature of the behavioral conditions imposed, the level of the transfer benefits—changed. It is difficult enough to obtain an actual control group to compare with a single program design in reality. It is likely to be impossible to test many different designs in experimental conditions.

Ex ante methods are valuable tools exactly because it is easier to experiment on computers than on people. These methods are essentially prospective, because they rely on a set of assumptions about what households are likely to do when faced with the program. They also permit direct counterfactual analysis

2. This literature relies heavily on matching techniques and draws extensively on the early work by Rubin (1977) and Rubin and Rosenbaum (1985). For a survey of recent applications, see Heckman and Vytlacil (2002). For a study of the effects of the Food for Education program in Bangladesh, see Ravallion and Wodon (2000). Several important studies of PROGRESA were undertaken under the auspices of the International Food Policy Research Institute (IFPRI). See, in particular, Parker and Skoufias (2000) and Schultz (2000).

of alternative programs for which no ex post data are available. They are thus indispensable when designing or reforming a program.

Simulation models of redistribution schemes based on micro data sets are widely used in industrial countries, especially to analyze the effect of the numerous and often complex cash transfer instruments found there. Given the progress of direct cash transfers in developing economies, building the same type of models there may become necessary.³ However, the specific behavioral conditionality that characterizes these programs requires modifications and a focus on different aspects of household behavior.

This article takes a step in that direction by proposing a simple ex ante evaluation methodology for conditional means-tested transfer programs and applying the method to the new federal design of Bolsa Escola in Brazil. It addresses both objectives of the program: reducing current levels of poverty and inequality, and providing incentives for reducing future poverty, through increased school enrollment among poor children today.

The next section describes the Bolsa Escola program. Section II presents the simple econometric model used for simulating the effects of the program. Given the conditionality of Bolsa Escola, the model essentially deals with the demand for schooling and therefore draws on the recent literature on child labor. Section III deals with the estimation of the model. Section IV covers the simulation of program effects and compares the program with alternative program designs. Section V summarizes the article's main findings.

I. MAIN FEATURES OF THE BOLSA ESCOLA PROGRAM

The Brazilian national Bolsa Escola program was created in April 2001 within the broader context of the social development initiative known as Projeto Alvorada. The law of April 2001 made uniform in terms of coverage, transfer amounts, and associated conditionality programs pioneered in the federal district and in the city of Campinas (São Paulo) in 1995 and later extended to several other localities.⁴ It also provided federal funding for the program. Responsibility for monitoring, however, was left to municipal governments.

The rules of the program are simple. Households with monetary income per capita of less than 90 Reais (R\$) per month—equivalent to half the minimum wage when the law was introduced—and with children age 6–15 qualify for the

3. See, for instance, Harding (1996). On the need for and problems associated with building the same type of models in developing countries, see Atkinson and Bourguignon (1991).

4. Studies of these programs include Abramovay and others (1998), Rocha and Sabóia (1998), and Sant'Ana and Moraes (1997). A comprehensive assessment of different experiences with Bolsa Escola across Brazil can be found in World Bank (2001). Much less has been written on the federal program, for the good reason that its implementation in practice is only just beginning. The description here draws on the Web site of the Ministério da Educação (www.mec.gov.br/home/bolsaesec).

program, provided that children attend school regularly.⁵ The minimum rate of school attendance is set at 85 percent, and schools are supposed to report attendance rates of program beneficiaries to municipal governments. The monthly benefit is R\$15 per child attending school, up to a maximum of R\$45 per household. Transfers are generally paid to the mother on presentation of a magnetic card that greatly facilitates the monitoring of the program.

Management of the program is essentially local, but control is maintained at two levels. At the federal level the number of beneficiaries claimed by municipal governments is checked for consistency against local aggregate indicators of affluence. In case of discrepancy, local governments have to adjust the number of beneficiaries on the basis of income per capita rankings. At the local level, responsibility for checking the veracity of self-reported incomes is left to municipalities.

It is estimated that some 10 million children (in 6 million households) will benefit from this program. This represents about 17 percent of the population, reached at a cost of less than 0.5 percent of gross domestic product (GDP) (0.3 percent based on national accounts and 0.45 percent based on household income reported in the National Household Survey, PNAD, the main annual household survey in Brazil). Of course, the figure is considerably higher when expressed in terms of targeted households. Even so, it amounts to no more than 5 percent of the income of the bottom two deciles.

II. A SIMPLE FRAMEWORK FOR MODELING AND SIMULATING BOLSA ESCOLA

The effects of such a transfer scheme on the distribution of income could be simulated by simply applying the program's rules to a representative sample of households (from the PNAD, for example). For a program that has a change in household behavior as one of its explicit objectives, however, such an arithmetic simulation would clearly be inappropriate. After all, Bolsa Escola aims not only to reduce current poverty by targeting transfers to the poor but also to encourage school enrollment by poor children not currently enrolled and to discourage school evasion by those who are. Any *ex ante* evaluation of such a policy must therefore go beyond simply counting the additional income accruing to households under the assumption of no change in schooling behavior. Simulating Bolsa Escola thus requires some structural modeling of the demand for schooling.

A large body of literature exists on the demand for schooling in developing economies and the related issue of child labor. The main purpose of that literature is to explain why parents might prefer their children to work, within or outside the household, rather than attend school. Various motives have been

5. R\$90 is equal to about US\$30, at August 2002 exchange rates.

identified and analyzed from a theoretical point of view,⁶ and numerous empirical attempts have been made at testing the relevance of these motives, measuring their relative strength, and evaluating the likely effects of policies.⁷

The empirical analysis is difficult for various interrelated reasons. First, the rationale behind the decision to send a child to work or school is by itself intricate. In particular, it is an inherently intertemporal decision, and it will differ depending on whether households behave as in the unitary model or internal bargaining takes place. Second, it is difficult to claim exogeneity for most plausible explanatory variables, yet no obvious instrument is available for correcting the resulting biases. Third, fully structural models that would permit a rigorous analysis of policies are complex and therefore hard to estimate while maintaining a reasonable degree of robustness. The econometric literature on child labor and schooling often relies on reduced-form models that permit the significance of particular variables, but not always more structural hypotheses, to be tested. Few models would allow for the *ex ante* evaluation of a conditional transfer program like Bolsa Escola.⁸

In light of these difficulties, the aims of this article are modest and the approach is operational. The article does not attempt to estimate a fully structural model of the demand for schooling based on some representation of the intrahousehold labor allocation. Instead, it seeks simply to obtain orders of magnitude for the likely effects of transfer programs of the Bolsa Escola type. The structural aspects of the modeling exercise are limited to the strict minimum, so as to depart as little as possible from standard reduced-form models of child occupation.

Four crucial simplifying assumptions are made. First, the model ignores the issue of how the decision about a child's time allocation is made within the household, bypassing the discussion of unitary versus collective decisionmaking models of the household. Instead, the model of occupational choice is treated as a reduced-form reflection of the outcome of whatever decisionmaking process took place within the household.⁹ Second, the decision to send a child to school is assumed to be made after all adults within the household have made their occupational decisions, and it is assumed not to affect those decisions. Third, the issue of siblings in the same household and the simultaneity of the corresponding decision is not addressed. The model that is discussed is thus supposed to apply to all school-age children within a household. Fourth, the composition of the household is assumed to be exogenous.

6. See the well-known survey by Basu (1999) as well as Baland and Robinson (2001).

7. Early contributions to that literature include Rosenzweig and Evenson (1977) and Gertler and Glewwe (1990). For more recent contributions and short surveys of the recent literature, see Freije and Lopez-Calva (2001) and Bhalotra (2000). On policy see Grootaert and Patrinos (1999).

8. This is true even for an explicit structural model, such as Gertler and Glewwe (1990).

9. For a discussion of how intrahousehold bargaining affects labor supply behavior by members, see Chiappori (1992) or Bourguignon and Chiappori (1994).

Under these assumptions, let S_i be a qualitative variable representing the occupational choice made for a child in household i . This variable takes the value 0 if the child does not attend school, 1 if the child goes to school and works outside the household, and 2 if the child goes to school and does not work outside the household. When $S_i = 0$ the child is assumed to work full-time, either inside or outside the home, with earnings observed only for work done outside the household. Similarly, $S_i = 2$ allows for the possibility that children may be employed in domestic activities at the same time they attend school. The occupational choice variable S_i is modeled using the standard utility-maximizing interpretation of the multinomial logit framework,¹⁰ so that

$$(1) \quad S_i = k \text{ iff } S_k(A_i, X_i, H_i; Y_{-i} + y_{ik}) + v_{ik} > S_j(A_i, X_i, H_i; Y_{-i} + y_{ij}) + v_{ij} \text{ for } j \neq k$$

where $S_k(\cdot)$ is a latent function reflecting the net utility of choosing alternative k ($= 0, 1$ or 2) for decisionmakers in the household. A_i is the age of child i ; X_i is a vector of the child's characteristics; H_i is a vector of the characteristics of the household the child belongs to (size, age of parents, education of parents, presence of other children at school age, distance from school, and so forth); Y_{-i} is the total income of household members other than the child; and y_{ij} is the total contribution of the child toward the income of the household, depending on the child's occupational choice j . v_{ij} is a random variable that stands for the unobserved heterogeneity of observed schooling/labor behavior. If all non-income explanatory variables are collapsed into a single vector Z_i and linearized, equation 1 can be written as

$$(2) \quad U_i(j) = S_j(A_i, X_i, H_i; Y_{-i} + y_{ij}) + v_{ji} = Z_i \cdot \gamma_j + (Y_{-i} + y_{ij})\alpha_j + v_{ij}.$$

This representation of the occupational choice of children is very parsimonious. In particular, by allowing the coefficients γ_j and α_j to differ without any constraints across the various alternatives, it allows all possible tradeoffs between the schooling of the child and the child's future income on one hand and the household's current income on the other. The model also implicitly treats the child's number of hours of work as a discrete choice. Presumably that number is larger in alternative 0 than in alternative 1, because schooling takes some time away. This may be reflected in the definition of the child's income variable, y_{ij} , as follows. Denote the observed market earnings of the child as w_i . Assume that these are determined in accordance with the standard Becker-Mincer human capital model. Then

10. Several authors model the joint labor/schooling decision for children as a binomial or sequential probit rather than a multinomial logit (see, for instance, Canagarajah and Coulombe 1997 and Grootaert and Patrinos 1999). Because this specification has no direct utility-maximizing interpretation, it is not convenient for the kind of simulation undertaken here. A multinomial probit would be more appropriate, but its estimation is cumbersome.

$$(3) \quad \text{Log } w_i = X_i \cdot \delta + m \text{ Ind}(S_i = 1) + u_i,$$

where X_i is the set of individual characteristics defined earlier, including standard Mincerian variables such as age and schooling achieved; u_i is a random term that stands for unobserved earnings determinants; and $\text{Ind}(\)$ is an indicator function that takes the value of 1 if children both attend school and work outside the household. The second term on the right-hand side takes into account the fact that the number of hours worked is likely to differ systematically across occupational categories 0 and 1. Children who attend school and work outside the household presumably have less time available and may thus earn less. Based on equation 3, the child's contribution to the household income, y_{ij} , in the various alternatives j is defined as

$$(4) \quad y_{i0} = Kw_i; y_{i1} = My_{i0} = MKw_i; y_{i2} = Dy_{i0} = DKw_i \text{ with } M = \text{Exp}(m),$$

where y_{ij} is assumed to measure the value of the output of both market and domestic child labor. Thus, domestic income is proportional to actual or potential market earnings, w_i , in a proportion K for people who do not attend school. Going to school while still working outside the household means a (proportional $1 - M$) reduction in domestic and market income. Going to school without working outside the household means a reduction in the proportion $1 - D$ of total child income, which in that case is purely domestic. The proportions K and D are not observed. However, the proportion M is taken to be the same for domestic and market work and may be estimated on the basis of observed earnings from equation 3.

Replacing equation 4 in equation 2 yields

$$(5) \quad U_i(j) = S_j(A_i, X_i, H_i; Y_{-i} + y_{ij}) + v_{ji} = Z_i \cdot \gamma_j + Y_{-i} \alpha_j + \beta_j \cdot w_i + v_{ij},$$

with $\beta_0 = \alpha_0 K; \beta_1 = \alpha_1 MK; \text{ and } \beta_2 = \alpha_2 DK$.

If all coefficients $\alpha, \beta,$ and γ are known, as well as the actual or potential market earnings, w_i , and the residual terms, v_{ij} , then the child's occupational type selected by household i is

$$(6) \quad k^* = \text{Arg max}[U_i(j)].$$

Equation 5 represents the utility of household i under occupational choice j [$U_i(j)$] in the benchmark case. If the Bolsa Escola program entitled all children¹¹ going to school to a transfer T , equation 5 would be replaced by

$$(7) \quad U_i(j) = Z_i \cdot \gamma_j + (Y_{-i} + BE_{ij}) \cdot \alpha_j + \beta_j \cdot w_i + v_{ij} \text{ with } BE_{i0} = 0 \text{ and } BE_{i1} = BE_{i2} = T.$$

This simply adds a positive transfer amount T to the household's income term, which is independent of the child's occupation (Y_{-i}), provided that the child is

11. It is simpler to discuss the estimation problem under this simplifying assumption. The means test is reintroduced, without any loss of generality, at the simulation stage.

attending school (that is, in states $j = 1$ or $j = 2$, but not in state $j = 0$). Note that this is what makes this transfer conditional: in solving its occupational problem, the household knows that T will accrue only if the household is in states 1 or 2 (that is, the child attends school) and that the transfer will be 0 otherwise. An unconditional transfer, conversely, would add to family income Y independent of state j .

Under these assumptions, equation 7 is the full reduced-form model of the occupational choice of children. It allows for simulations of the impact of Bolsa Escola transfers on those choices. All that remains is to obtain estimates of $\beta, \gamma, \alpha, w_i$, and the v_{ij} s.

Estimation of the Discrete Choice Model

Assuming that the v_{ij} s are independently and identically distributed across sample observations with a double exponential distribution leads to the well-known multilogit model. However, some precautions must be taken in this case. In this model, the probability that household i will select occupational choice k is given by

$$(8) \quad p_{ik} = \frac{\text{Exp}(Z_i \cdot \gamma_k + Y_{-i} \alpha_k + w_i \cdot \beta_k)}{\sum_j \text{Exp}(Z_i \cdot \gamma_j + Y_{-i} \alpha_j + w_i \cdot \beta_j)}$$

Taking regime $j = 0$ as a reference, the preceding probability may be written as

$$(9) \quad p_{ij} = \frac{\text{Exp}[Z_i \cdot (\gamma_j - \gamma_0) + Y_{-i} \cdot (\alpha_j - \alpha_0) + w_i (\beta_j - \beta_0)]}{1 + \sum_{j=1}^2 \text{Exp}[Z_i \cdot (\gamma_j - \gamma_0) + Y_{-i} \cdot (\alpha_j - \alpha_0) + w_i (\beta_j - \beta_0)]}$$

for $j = 1, 2$ and $p_{i0} = 1 - p_{i1} - p_{i2}$

The difficulty is that the multinomial logit estimation permits identifying only the differences $(\alpha_j - \alpha_0), (\beta_j - \beta_0)$, and $(\gamma_j - \gamma_0)$ for $j = 1, 2$. Yet inspection of equations 6 and 7 indicates that because the Bolsa Escola transfer is state contingent, meaning that the income variable is asymmetric across alternatives, it is necessary to know all three coefficients $(\alpha_0, \alpha_1, \text{ and } \alpha_2)$ to find the utility maximizing alternative k^* .

This is where the only structural assumption made so far becomes useful. Call \hat{a}_j and \hat{b}_j the estimated coefficients of the multilogit model corresponding to the income and the child earning variables for alternatives $j = 1, 2$, the alternative 0 being taken as the default. Then equation 5 implies the following system of equations:

$$(10) \quad \begin{aligned} \alpha_1 - \alpha_0 &= \hat{a}_1 \\ \alpha_2 - \alpha_0 &= \hat{a}_2 \\ (\alpha_1 M - \alpha_0) K &= \hat{b}_1 \\ (\alpha_2 D - \alpha_0) K &= \hat{b}_2 \end{aligned}$$

M is known from equation 3. It follows that arbitrarily setting a value for K or D allows one to identify α_0, α_1 , and α_2 and the remaining parameter in the pair (K, D) . The identifying assumption made in what follows is that children working outside the household and not attending school have zero domestic production, that is, $K = 1$. In other words, it is assumed that the observed labor allocations between market and domestic activities are corner solutions in all alternatives.¹² It then follows that

$$(11) \quad \alpha_1 = \frac{\hat{a}_1 - \hat{b}_1}{1 - M}, \alpha_0 = \alpha_1 - \hat{a}_1, \alpha_2 = \alpha_1 + \hat{a}_2 - \hat{a}_1 \text{ and } D = \frac{\hat{b}_2 + \alpha_0}{\alpha_2}.$$

Of course, a test of the relevance of the identifying assumption is that α_0, α_1 , and α_2 are positive. One could also require that the value of D be in the interval $(0, 1)$.

For completeness it remains to indicate how estimates of the residual terms $v_{ij} - v_{i0}$ may be obtained. In a discrete choice model these values cannot be observed. It is known only that they belong to some interval. The idea is then to draw them for each observation in the relevant interval, that is, in a way consistent with the observed choice. For instance, if observation i has made choice 1, it must be the case that

$$Z_i \cdot \gamma_1 + Y_{-i} \cdot \hat{a}_1 + \hat{b}_1 \cdot w_i + (v_{i1} - v_{i0}) > \text{Sup}[0, Z_i \cdot \gamma_2 + Y_{-i} \cdot \hat{a}_2 + \hat{b}_2 \cdot w_i + (v_{i2} - v_{i0})].$$

The terms $v_{ij} - v_{i0}$ must be drawn so as to satisfy that inequality. All that is missing is a complete vector of child earnings values, w_i .

Estimation of Potential Earnings

The discrete choice model requires potential earnings for each child, including those who do not work outside the household. To be fully rigorous, one could estimate both the discrete choice model and the earnings equation simultaneously by maximum likelihood techniques. This is a rather cumbersome procedure, however.

We adopt a simpler approach, which has the advantages of transparency and robustness. It consists of estimating equation 3 by ordinary least squares (OLS) and then generating random terms u_i for nonworking children by drawing in the distribution generated by the residuals of the OLS estimation.

Correcting the estimation of the earnings function for possible selection bias was problematic for several reasons. First, instrumenting earnings with a selection bias correction procedure requires finding instruments that affect earnings but not the schooling/labor choice. No such instrument was readily available. Second, the correction of selection bias with the standard two-stage procedure is awkward in the case of more than two choices. Lee (1983) proposed a

12. This assumption could be weakened using some limited information on hours of work available in the survey.

generalization of the Heckman procedure, but that procedure is justified and efficient only in a rather unlikely particular case (see Schmertmann 1994, Bourguignon and others 2001, Dahl 2002). For both of these reasons, failing to correct for possible selection bias in equation 3 did not seem too serious a problem, whereas trying to correct for selection using standard techniques and no convincing instrument led to rather implausible results.

Simulating Programs of the Bolsa Escola Type

The model given in equations 6 and 7 does not provide a complete representation of the choice faced by households in the presence of a program such as Bolsa Escola, because it takes into account the conditionality on the schooling of the children but not the means test. Taking into account both the means test and the conditionality leads to choosing the alternative with maximum utility among the following three conditional cases:

$$\begin{aligned}
 U_i(0) &= Z_i \cdot \gamma_0 + \alpha_0 Y_{-i} + \beta_0 w_i + v_{i0} \\
 U_i(1) &= Z_i \cdot \gamma_1 + \alpha_1 (Y_{-i} + T) + \beta_1 w_i + v_{i1} && \text{if } Y_{-i} + M w_i \leq Y^0 \\
 (12) \quad U_i(1) &= Z_i \cdot \gamma_1 + \alpha_1 Y_{-i} + \beta_1 w_i + v_{i1} && \text{if } Y_{-i} + M w_i > Y^0 \\
 U_i(2) &= Z_i \cdot \gamma_2 + \alpha_2 (Y_{-i} + T) + \beta_2 w_i + v_{i2} && \text{if } Y_{-i} \leq Y^0 \\
 U_i(2) &= Z_i \cdot \gamma_2 + \alpha_2 Y_{-i} + \beta_2 w_i + v_{i2} && \text{if } Y_{-i} > Y^0
 \end{aligned}$$

The conditions associated with modalities 1 and 2 stand for the means test, where Y^0 is the income threshold. These conditions are defined in terms of monetary income, which explains why the contribution of the child to domestic production in the case $S = 2$ is not taken into account.

As previously mentioned, what matters is the differences between the utilities corresponding to the three cases, so that one needs to know only $(\beta_j - \beta_0), (\gamma_j - \gamma_0)$ and $(v_{ij} - v_{i0})$, but all three coefficients α_j . In this system, one can see how the introduction of Bolsa Escola might lead households to move from choice 0 (no schooling) to choices 1 or 2, or from choice 1 to choice 2. A household might move from choice 1 to choice 2 if it did not qualify for the transfer T when the child both worked and attended school but qualified if the child stopped working.

A wide variety of programs may be easily simulated using this framework. Both the means test Y^0 and the transfer T could be made dependent on characteristics of either the household (H) or the child (X). In particular, T could depend on age or gender. Some examples of such alternative designs are simulated and discussed in section IV.

Two important limitations of the framework are worth nothing, both arising from the set of assumptions. The first is that we cannot model the effects (on the occupational choice) of the ceiling of R\$45 on transfers to any single household. The reason is that by ignoring interactions among children in the same household, the model effectively assumes that all households consist of a single child,

from a behavioral point of view. In the nonbehavioral part of the welfare simulations (reported in section IV), however, each child is treated separately and the R\$45 limit applied.

The second limitation has to do with the exogeneity of nonchild income Y_{-j} . This exogeneity would clearly be a problem if there were more than one school-age child. It is also unrealistic when only adult income is taken into account. The presence of the means test might affect the labor supply behavior of adults, because there are circumstances in which it might be in the family's interest to work slightly less to qualify for Bolsa Escola. Note, however, that this effect might be muted if the means test is based not on current income but on some score-based proxy for permanent income, as appears to be the case in practice.

III. DESCRIPTIVE STATISTICS AND ESTIMATION RESULTS

The model (equations 3 and 12) was estimated on data from the 1999 PNAD household survey, a survey based on a sample of about 60,000 households representative of the national population.¹³ Although all children age 6–15 qualify for participation in the program, the model is estimated only for 10- to 15-year-olds, because school enrollment below age 10 is nearly universal.¹⁴ At the simulation stage, however, transfers are simulated for the universe of qualifying 6- to 15-year-olds.

Among 10- to 15-year-old children in Brazil in 1999, 77 percent were enrolled in school and did not work (table 1). About 17 percent both worked and were enrolled in school; 6 percent were not enrolled in school. These figures conceal considerable variation across ages: school attendance consistently declines—and work increases—with age. Just 2.6 percent of 10-year-olds, but 13.6 percent of 15-year-olds, were not in school. About 90 percent of 10-year-olds were enrolled in school and did not work, whereas fewer than 60 percent of 15-year-olds did so. From a behavioral point of view, it is thus clear that most of the action is to be found among the oldest children.

It is important to stress that the PNAD survey contains data on school enrollment, not school attendance. It is therefore not possible to model the Bolsa Escola's minimum 85 percent attendance condition as a separate constraint to enrollment. The results would no longer be valid if a significant number of enrolled children had attendance rates regularly below 85 percent. The latest administrative data from the Secretaria do Programa Nacional de Bolsa Escola

13. The survey does not cover rural areas in the states of Acre, Amapá, Amazonas, Pará, Rondônia, or Roraima.

14. Answers to schooling questions in the PNAD reveal that almost all children under the age of 10 attend school. Another reason to limit the estimation of the behavioral model to children age 10 and older is that the incidence of child labor at lower ages is probably measured with much greater error, because PNAD interviewers are instructed to pose labor and income questions only to people age 10 and older.

TABLE 1. Percent of Children Ages 10–15 Attending School, Working, or Both

Status	10	11	12	13	14	15	Total
Not attending school	2.6	2.3	3.4	5.9	8.5	13.6	6.1
Attending school and working	8.0	11.0	14.0	18.3	22.5	27.1	16.8
Attending school and not working	89.4	86.7	82.6	75.8	69.0	59.3	77.1

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

(the agency that runs the federal program) indicate that less than 3 percent of beneficiaries failed to meet the 85 percent frequency requirement in the latest quarter for which data were available (July–September 2002). In the absence of the relevant data, the model assumes that this is also true for nonbeneficiaries.

The mean individual and household characteristics of children, by occupational category, reveal that children not going to school are both older and less educated than those enrolled (table 2). As expected, households with school dropouts are on average poorer, less educated, and larger than households in which children attend school. Dropping out of school and working are relatively more frequent among nonwhite children and children in the northeast. Both forms of behavior are least common in metropolitan areas and most common in rural areas. Interestingly, households in which children both work and go to school are generally in an intermediate position between those whose children specialize but are often closer to the group of dropouts.

A remarkable feature of table 2 is the observed amount of children's earnings when they work and do not attend school. With age-specific averages ranging from about R\$80 to R\$130 per month, children's earnings represent about half the minimum wage, an order of magnitude that seems reasonable. These amounts are much higher than the R\$15 transfer granted by the Bolsa Escola program for children enrolled in school. Note, however, that observed earnings are not a good measure of the opportunity cost of schooling, because school attendance is evidently consistent with some amount of market work, an issue addressed later.

Because of the great behavioral variation across age groups even within the 10–15-year range (as revealed, for instance, in table 1), the model is estimated separately for each age, as well as for the pooled sample of all 10- to 15-year-olds (tables 3 and 4). Doing so allows the interaction between a child's age, the last grade completed, and, by subtraction, the age out of school to be taken fully into account. This specification allows for considerably more flexible estimation of the age effects than the simple introduction and interaction of dummy variables. The simulations reported in the next section rely on the age-specific models; this section report only the joint estimation results, both for ease of discussion and because the larger sample size allowed for more precise estimation in this case.

TABLE 2. Characteristics of Children Ages 10–15 and Their Households (Sample Means)

Characteristic	Not attending school	Working and attending school	Attending school	Total
Age	13.6	13.2	12.3	12.51
Years of schooling	2.9	3.9	4.1	3.97
Household per capita income (R\$)	87.7	110.5	203.4	180.75
<i>Observed children's earnings by age (R\$)</i>				
10	118.4	34.2	0.0	38.04
11	98.3	44.6	0.0	50.51
12	100.7	51.0	0.0	57.20
13	78.5	66.9	0.0	68.72
14	101.1	83.9	0.0	87.97
15	128.3	109.1	0.0	113.93
Years of schooling of more educated parent	3.1	3.9	6.3	5.72
Age of older parent (years)	46.0	46.3	44.9	45.18
Number of household members	5.8	5.9	5.2	5.39
White (%)	37.1	40.9	51.6	48.9
Male (%)	52.8	65.2	46.9	50.3
<i>Region (%)</i>				
North	6.1	5.6	6.0	5.9
Northeast	40.3	45.6	29.9	33.2
Southeast	32.8	26.1	43.5	39.9
South	14.2	15.9	13.7	14.1
Center-west	6.7	6.7	6.9	6.9
Metropolitan area	18.2	12.8	30.9	27.1
Urban nonmetropolitan area	47.5	37.9	53.0	50.1
Rural area	34.3	49.3	16.1	22.8
Proportion of universe	6.1	16.8	77.1	100.0
Population	1,199,252	3,335,102	15,265,102	19,799,456

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

The results of the OLS estimation of the earnings function (equation 3) for the pooled sample reveal that the geographical variables, race, and gender have the expected signs and the same qualitative effect as for adults; the racial dummy is less significant (table 3).¹⁵ The coefficient on the log of the (dropout) median earnings of children of a given age in their state is positive and both statistically and economically significant. This is an important variable, included as a proxy for the spatial variation in the demand for child labor of different ages. It is

15. Analogous results for each of the age-specific models (for 10-, 11-, 12-, 13-, 14-, and 15-year-olds) are available from the authors on request.

TABLE 3. Log Earnings Regression for Reported Earnings of Children Ages 10–15

Item	Coefficient	SE	$P > z $
Number of observations	2,431	n.a.	n.a.
R^2	0.35	n.a.	n.a.
Dummy (Working and Studying)	-0.3444	0.0360	0.0000
Age	-0.0571	0.0539	0.2900
Years of schooling	0.2528	0.0515	0.0000
Age minus years of schooling squared	0.0106	0.0025	0.0000
Male	0.2002	0.0304	0.0000
White	0.0588	0.0305	0.0540
Urban nonmetropolitan	-0.1020	0.0374	0.0060
Rural	-0.1089	0.0455	0.0170
Log of median of earnings by state	0.5984	0.0424	0.0000
Intercept	0.5325	0.3573	0.1360

n.a., Not applicable.

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

TABLE 4. Occupational Structure Multinomial Logit Model: Marginal Effects and p -Values for Children Ages 10–15

Item	Working and attending school		Attending school	
	Marginal effect	$P > z $	Marginal effect	$P > z $
Total household income	0.0000	0.0920	0.0000	0.0090
Children's earnings (predicted)	-0.0004	0.0000	-0.0004	0.0000
Household size	0.0076	0.0000	-0.0038	0.0000
Age	0.0045	0.0000	-0.0705	0.1160
Years of schooling	0.0543	0.0000	0.0013	0.6880
Age minus years of schooling squared	0.0024	0.0000	-0.0014	0.7470
White	-0.0066	0.6370	0.0076	0.0000
Male	0.1238	0.0000	-0.1103	0.0000
Years of schooling of most educated parent	-0.0085	0.0000	0.0162	0.0000
Age of oldest parent	-0.0009	0.0800	0.0018	0.3270
Number of children below age 5	0.0006	0.0000	-0.0166	0.0000
Rank of child (oldest to youngest)	0.0199	0.0690	-0.0217	0.0000
Urban nonmetropolitan	0.0569	0.3960	-0.0810	0.0000
Rural	0.2282	0.0000	-0.2606	0.0000

Note: Pseudo $R^2 = 0.1903$; number of observations = 43,296.

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

constructed as the median of the distribution of earnings for children exactly 10 (or 11, 12, 13, 14, 15, as appropriate) years old, in their state in Brazil, excluding the child studied, provided there are at least two elements in this vector.¹⁶ This variable is the identifying instrument and will not appear in the multinomial logit model (12). The intuition is that demand conditions in the age and spatially specific labor market facing the child affect the child's occupational decision only through the potential earnings variable.

Median earnings are computed for age-specific distributions in each state, which explains why the linear experience term (*Age*) in table 3 is insignificant. In an alternative (unreported) specification for the pooled sample that omits the *median earnings by state* variable, an additional year of age increases earnings by about 40 percent. But there is clear nonlinearity in the way age affects earnings, reflected in changes in the coefficient estimates when the model is estimated separately. Indeed, these nonlinearities and interactions between age and other determinants are the reason why the separate specification was preferred for the simulations using the model. All regional dummies were also all insignificant and were dropped. The effect of previous schooling is positive and significant.

The estimate for *M* (the coefficient for *dummy WS* in table 3) reveals that, as expected, the fact that a child goes to school and works outside the household reduces total earnings relative to a comparable child who only works. If one interprets this coefficient as reflecting fewer hours of work, then a child going to school works on average 34 percent less than a dropout, for the pooled sample. This seems like a reasonable order of magnitude.

The results from the estimation of the multinomial logit for occupational choice also appear plausible. Marginal effects and the corresponding *p*-values for the pooled sample are reported in table 4.¹⁷ The reference category is *not studying* ($j = 0$) throughout. Once parental education is controlled for, household income (net of the child's) has a positive but very small effect on the schooling decision, whereas the child's own (predicted) earnings have a negative effect. Household size reduces the probability of studying, compared with the alternatives.¹⁸ Previous schooling at a given age has a positive effect. White children are more likely than nonwhite children to be attending school and not working. Boys are less likely than girls to be in school only but more likely to be working and studying, which suggests a possible pattern of specialization in domestic work by girls and market work by boys. Parents' education has

16. When fewer than three working children of a particular age were included in the 1999 PNAD sample for the state, the dropout median in the region (north, northeast, southeast, south, center-west) was used.

17. Analogous results for each of the age-specific models (for 10-, 11-, 12-, 13-, 14-, and 15-year-olds) are available from the authors on request.

18. To the extent that household size reflects a larger number of children, this is consistent with Becker's quantity-quality tradeoff.

the expected positive effect—on top of the income effect—on children's schooling.

In view of this general consistency of both the earnings and the discrete occupational choice models, the question arises of whether the structural restrictions necessary for the consistency of the proposed simulation work (positive α_1 and α_2 , and $0 < D < 1$) hold. Using equation 11 for the pooled sample yields

$$\alpha_1 = (0.0001 + 0.0120)/(1 - \text{Exp}[-0.3444]) = 0.0415, \alpha_0 = 0.0414, \alpha_2 = 0.0417, \\ D = (-0.0101 + 0.0414)/0.0417 = 0.7510.$$

The coefficients of income in the utility of alternatives $j = 1$ and 2 are thus positive, consistent with the original model. They are very close to each other, however, suggesting that income effects are likely to be small. According to the value obtained for parameter D , children who are in school but do not work outside the household are estimated to provide domestic production for about three-quarters of their potential market earnings. This is very close to the estimated value for $M [= \text{Exp}(-0.3444) = 0.709]$. Because M denotes the average contribution to household income from children both studying and working as a share of their potential contribution if not studying, this implies that the estimated value of nonmarket work by children studying (and not working outside the household) is similar to the market value of work by those studying (and working outside the household). If there were little selection on unobservables into market work, this is exactly what one would expect.

For each of the age-specific models, the values implied for M and D , as well as for all α and β parameters, reveal some variation across age groups, due at least in part to the loss of precision of the estimation in the smaller subsamples (table 5). With the exception of a value for D just greater than 1 in the 11-year-old sample, all of the parameters conform to the theoretical restrictions. Overall, the estimates obtained from both the multinomial discrete occupational choice model and the earnings equation thus seem remarkably consistent with rational

TABLE 5. Implied Values for Structural Parameters in Occupational Choice Models (Pooled and Age-Specific)

Age (years)	M (percent)	α_0	α_1	α_2	D (percent)	β_0	β_1	β_2
10–15	70.9	0.0414	0.0415	0.0417	75.1	0.0414	0.0294	0.0313
10	33.6	0.0548	0.0547	0.0552	84.6	0.0548	0.0184	0.0467
11	61.3	0.0960	0.0958	0.0960	102.4	0.0960	0.0587	0.0983
12	52.3	0.0300	0.0300	0.0302	98.5	0.0300	0.0157	0.0297
13	73.3	0.0848	0.0850	0.0851	85.9	0.0848	0.0623	0.0731
14	75.3	0.0683	0.0685	0.0686	80.7	0.0683	0.0516	0.0554
15	71.5	0.0418	0.0420	0.0421	64.1	0.0418	0.0301	0.0270

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999 and authors' calculations.

utility-maximizing behavior. The simulations run on the basis of these models and the identifying structural assumptions about the parameter K can thus be expected to yield sensible results.

IV. AN EX ANTE EVALUATION OF BOLSA ESCOLA AND ALTERNATIVE PROGRAM DESIGNS

Bolsa Escola and many conditional cash transfer programs like it aim to reduce current poverty (and sometimes inequality) through targeted transfers and to reduce future poverty by increasing the incentives for the poor to invest in human capital. Their success in reducing future poverty is impossible to evaluate, even in an ex ante manner, without making strong assumptions about the future path of returns to schooling. Whether increased school enrollment translates into greater human capital depends on the trends in the quality of the educational services provided, information that is not included in this data set.¹⁹ Moreover, whether more human capital, however measured, will reduce poverty in the future depends on what happens to the rates of return to it between now and then. This is a complex general equilibrium question, which goes well beyond the scope of this exercise.²⁰

The results may reveal something about the intermediate target of increasing school enrollment. Although this is not sufficient to establish whether the program will have an impact on future poverty, it is at least necessary.²¹ An ex ante evaluation of impact on this dimension of the program thus requires simulating the number of children that may change schooling and working status because of it.

This is done by applying to the original data the decision system 12—with behavioral parameter values (α, β, γ, M , and D) estimated from equations 9–11—and policy parameter values (T and Y^0) taken from the actual specification of Bolsa Escola. System 12 is then used to simulate a counterfactual distribution of occupations on the basis of the observed characteristics and the restrictions on residual terms for each child. This is done using the models estimated separately by age. Comparing the vector of occupational choices thus generated

19. The evidence on educational outcomes from an ex post evaluation of a municipal Bolsa Escola program in Recife is not conclusive. Applying a maths test to control and treatment groups, Lavinás and Barbosa (forthcoming) found that test scores of the two groups are not statistically significantly different. In addition, the Education Ministry's Sistema de Acompanhamento do Ensino Básico (SAEB) includes some information on outcomes, but the period covered is insufficiently long (see Albernaz and others 2002).

20. See Coady and Morley (2003) for a brave—and sensible—attempt at estimating the present value of the gains from the additional education acquired as a result of conditional cash transfer programs.

21. One could argue that it is not even necessary, because the transfers might, by themselves, alleviate credit constraints and have long-term positive impacts (through improved nutrition, for example). The focus here is on whether the conditional nature of these transfers has any impact on children's occupational choices (or time-allocation decisions).

with the original observed vector reveals that the program leads to some children moving from $S_i = 0$ to $S_i = 1$ or 2 and from $S_i = 1$ to $S_i = 2$. The corresponding transition matrix is shown in table 6 for all children ages 10–15, as well as for all children in the same age group living in poor households.²² In interpreting table 6, it is important to remember that the observed original vector corresponds to the actual situation in September 1999, before the introduction of the federal Bolsa Escola program being simulated. It is therefore an appropriate control sample for comparing with the counterfactual treatment population obtained from the simulations.²³

Despite the small value of the proposed transfer, table 6 suggests that 4 of every 10 children (ages 10–15) currently not enrolled in school would receive

TABLE 6. Simulated Effect of Bolsa Escola on Schooling and Work Status of Children Ages 10–15 (percent)

Status Actual	Simulated			Total
	Not attending school	Attending school and working	Attending school and not working	
<i>All households</i>				
Not attending school	60.7	14.0	25.3	6.0
Attending school and working	—	97.8	2.2	16.9
Attending school and not working	—	—	100.0	77.1
Total	3.7	17.3	79.0	100.0
<i>Poor households</i>				
Not attending school	41.3	21.7	37.0	8.9
Attending school and working	—	98.9	1.1	23.1
Attending school and not working	—	—	100.0	68.1
Total	3.7	24.7	71.6	100.0

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

22. A household was considered poor if its (regionally price-deflated and imputed rent-adjusted) per capita income was less than R\$74.48 in the reference month of the 1999 PNAD survey. For the derivation of the poverty line, see Ferreira and others (2003).

23. Several similar municipal programs, such as the Recife Scholarship Program, were in operation at the time. There were few of them, however, and they were usually very small, so that the frequency of beneficiaries of these programs in the national 1999 PNAD sample would have been tiny. The Recife program, for instance, reached an estimated 1,600 families by December 1999 (see Lavinás and Barbosa forthcoming). Several of these local programs remain in operation concurrently with the federal program, so that the inclusion of any income from them among other incomes in any family that might have been sampled in the PNAD 1999 is also appropriate in a comparison between the no-treatment control group and the counterfactual treatment sample. The point is that treatment, defined as the federal design of the Bolsa Escola program, came into being only in April 2001.

enough incentive from Bolsa Escola to change occupational status and enroll. Among them, slightly more than one-third would enroll in school but remain employed outside the household. The other two-thirds would cease work outside the household. The program would reduce the proportion of 10- to 15-year-old children outside school from 6.0 percent to 3.7 percent—a sizable effect.

The impact on children currently both studying and working would be much smaller. Barely 2 percent of these children would abandon work to dedicate themselves exclusively to their studies. As a result of this small outflow, combined with an inflow from occupational category $S_i = 0$, the number of children both studying and working would actually increase in the simulated scenario, albeit marginally.

The impacts are even more pronounced among the poor, the program's target population. According to the poverty line used, the incidence of poverty in Brazil is 30.5 percent. However, because there are more children in poor households—this being one of the reasons why they are poor—the proportion of 10- to 15-year-old children in poor households is much higher (42 percent). The second panel in table 6 shows that dropouts are much more frequent among poor children (8.9 percent versus 6.0 percent for the whole population). It also shows that Bolsa Escola is more effective in increasing their school enrollment. The decline in the proportion of dropouts is almost 60 percent, far higher than the 40 percent figure for the sample as a whole. The simulation thus suggests that Bolsa Escola could increase the school enrollment rate among the poor by about 5.2 percentage points. This increase comes at the expense of the *not attending school* category, whose numbers are more than halved, rather than of the *attending school and working* category, which actually becomes marginally larger.

That the impact of the program is stronger among the poor simply reflects the binding nature of the means test. Families that report monthly per capita incomes greater than R\$90 do not qualify to receive the transfer T . Nothing changes in the equations in system 12 that is relevant to them, and they thus do not respond to the program in any way. Therefore, all children changing occupational status in table 6 live in households with incomes lower than that threshold. Because the poverty line is about R\$75 a month, most of them are poor.

That said, a 60 percent reduction in the proportion of poor children outside school is by no means an insubstantial achievement, particularly in light of the fact that it seems to be achievable with fairly small transfers (R\$15 per child per month). This relatively large impact of small transfers is partly due to the fact that the value of the current contributions of children enrolled in school is a sizable proportion of their potential earnings when not attending school at all. Those proportions are exactly the interpretation of the parameters M (for those who work outside the household as well as study) and D (for those who work at home as well as study), estimated to be in the 70–75 percent range. Applying that factor to R\$100, as a rough average of the earnings of children in category

$j = 0$ (see table 2), leaves about R\$25 as the true monthly opportunity cost of enrolling in school. Consequently, the children who change occupation from not studying to studying in response to the R\$15 transfer must have average personal present valuations of the expected stream of benefits from enrolling greater than R\$10 (and less than R\$25). Those who do not must on average value education less than that.

Because the simulations suggest that Bolsa Escola, as currently formulated, still leaves some 3.7 percent of all 10- to 15-year-olds outside school, it is interesting to investigate the potential effects of changing some of the program parameters. This indeed was one of the initial motivations for undertaking this kind of *ex ante* counterfactual analysis. The exercise identifies the factual and counterfactual occupational distributions for all children and separately for poor households only (table 7). The impact of each scenario is then compared with that of the benchmark program specification in terms of poverty and inequality measures (table 8). Four standard inequality measures were selected: the Gini coefficient, the mean log deviation, the Theil- T index, and (one half of the square of) the coefficient of variation. For poverty, the three standard FGT (0, 1, 2) measures are reported, with respect to the poverty line used by Ferreira and others (2003). The results allow us to gauge impact in terms of the first objective of the program, namely, reducing current poverty (and possibly inequality).

Five alternative scenarios are presented. In scenario 1 the eligibility criteria (including the means test) are unchanged, but transfer amounts and the total household ceiling are both doubled. In scenario 2 the means test remains unchanged but transfer amounts and the total household ceiling are quadrupled (that is, doubled from scenario 1). In scenario 3 the uniform R\$15 per child transfer is replaced by an age-contingent transfer in which 10-year-olds receive R\$15, 11-year-olds R\$20, 12-year-olds R\$25, 13-year-olds R\$35, 14-year-olds R\$40, and 15-year-olds R\$45. In addition, the household ceiling is removed.²⁴ In scenario 4 transfer amounts remain unchanged, but the means test is raised from R\$90 to R\$120. Scenario 5 simulates a targeted transfer exactly as in Bolsa Escola but with no conditionality: every child in households below the means test receives the benefit, with no requirement to enroll in or attend school.

Three main results emerge from the analysis. First, comparison of scenario 5 with the actual Bolsa Escola program suggests that conditionality plays a crucial role in inducing the change in children's time-allocation decisions. The proportions of children in each occupational category under scenario 5 are almost identical to the original data (that is, no program). This is consistent with the very small marginal family income effect reported in table 4 and suggests that it is the conditional requirement to enroll in school in order to receive the

24. The means test remains R\$90.

TABLE 7. Alternative Specifications of Conditional Cash Transfer Program: Simulated Effects on Schooling and Work Status of Children Ages 10–15 (percent)

Status	Original	Bolsa Escola	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
<i>All households</i>							
Not attending school	6.0	3.7	2.9	2.2	2.8	3.2	6.0
Attending school and working	16.9	17.3	17.4	17.4	17.4	17.5	16.8
Attending school and not working	77.1	79.0	79.7	80.3	79.8	79.3	77.2
<i>Poor households</i>							
Not attending school	8.9	3.7	1.9	0.6	1.8	3.6	8.9
Attending school and working	23.1	24.7	25.1	25.4	25.2	24.9	23.0
Attending school and not working	68.1	71.6	72.9	74.0	73.0	71.4	68.2

Note: Scenario 1: Transfer = R\$30, maximum per household = R\$90, means test = R\$90. Scenario 2: Transfer = R\$60, maximum per household = R\$180, means test = R\$90. Scenario 3: Different values for each age, no household ceiling, means test = R\$90. Scenario 4: Transfer = R\$15, maximum per household = R\$45, means test = R\$120. Scenario 5: Bolsa Escola without conditionality.

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

TABLE 8. Simulated Distributional Effects of Alternative Specifications of Conditional Cash Transfer Program

Item	Original	Bolsa Escola	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Mean income per capita (R\$)	254.2	255.4	256.5	258.8	256.4	255.6	255.3
<i>Inequality measures</i>							
Gini coefficient	0.591	0.586	0.581	0.570	0.581	0.585	0.586
Mean of log deviation	0.692	0.659	0.636	0.601	0.639	0.658	0.660
Theil index	0.704	0.693	0.682	0.663	0.684	0.691	0.693
Square coefficient of variation	1.591	1.573	1.556	1.522	1.558	1.570	1.574
<i>Poverty measures (%)</i>							
Poverty headcount	30.1	28.8	27.5	24.6	27.7	28.8	28.9
Poverty gap	13.2	11.9	10.8	8.8	10.9	11.9	12.0
Total square deviation from poverty line	7.9	6.8	5.9	4.6	6.0	6.8	6.8
Annual cost of program (R\$ million)	n.a.	2,076	4,201	8,487	3,905	2,549	2,009

n.a., Not applicable.

Note: Scenario 1: Transfer = R\$30, maximum per household = R\$90, means test = R\$90. Scenario 2: Transfer = R\$60, maximum per household = R\$180, means test = R\$90. Scenario 3: Different values for each age, no household ceiling, means test = R\$90. Scenario 4: Transfer = R\$15, maximum per household = R\$45, means test = R\$120. Scenario 5: Bolsa Escola without conditionality.

Source: National Statistical Office, National Household Survey (IBGE, PNAD) 1999, and authors' calculations.

benefit—rather than the pure income effect from the transfer—that is the primary cause of the extra demand for schooling.

Second, scenarios 1 and 2 reveal that the occupational impact of the program is reasonably elastic with respect to the transfer amount. The proportion of unenrolled children drops by almost 1 percentage point (that is, some 25 percent) in response to a doubling of the transfers in scenario 1 and another 25 percent as transfers double again from scenario 1 to scenario 2. This effect is even more pronounced among poor families, among whom the R\$60 transfers in scenario 2 reduce the percentage of unenrolled children from 3.7 percent under the current program design to 0.6 percent. Scenario 3 suggests that it does not matter much, in aggregate terms, whether this increase in transfers is uniform across ages or rises with the age of the child. Scenario 4 suggests that occupational effects are less sensitive to increases in the means test than to the transfer amounts.

Results are considerably less impressive in terms of the poverty (and inequality) reduction. As currently envisaged, the program implies only a 1.3-percentage-point decline in the short-run incidence of poverty in Brazil, as measured by $P(0)$ (table 8). However, there is some evidence that the transfers are well targeted, because the inequality-averse poverty indicator $P(2)$ falls proportionately more than $P(0)$, from 8 percent to 7 percent. This is consistent with the inequality results: Whereas the Gini coefficient falls only half a point as a result of the scheme, measures that are more sensitive to the bottom, such as the mean log deviation, fall by a little more. Overall, however, the evidence in column 2 of table 8 falls considerably short of a ringing endorsement of Bolsa Escola as a program for alleviating current poverty or inequality.

The situation could be somewhat improved by increasing the transfer amounts (scenarios 1–3). Quadrupling the transfers to R\$60 per child, up to a ceiling of R\$180 per family, for instance, would reduce the Brazilian poverty headcount by 4.2 percentage points.²⁵ But program costs would climb from R\$2 billion to R\$8.5 billion, that is, from 0.2 percent to 0.85 percent of GDP. An increase in the means test would not help much, as indicated by scenario 4. This result is consistent with the earlier suggestion that the program already appears to be well targeted to the poor. If the program fails to lift many of the poor above the poverty line, it is because of the small size of the transfers rather than poor targeting.

These results contrast with the arithmetic simulations reported by Camargo and Ferreira (2001), in which a somewhat broader but essentially similar program would reduce the incidence of poverty (with respect to the same poverty line and in the same sample) by two-thirds, from 30.5 percent to 9.9 percent. These results held despite the fact that the absence of a behavioral component in that simulation weakened its power, by excluding from the set of

25. The simulated 2.2-percentage-point decline in the $P(2)$ is also quite respectable.

recipients households whose children might have enrolled in response to the program. The reason is simple: Camargo and Ferreira simulate much higher transfer levels, ranging from R\$150 to R\$220 per household (rather than child). The more sizable poverty reductions simulated under scenario 2 here, in which transfers are more generous, point in the same general direction.

V. CONCLUSIONS

This article proposes a microsimulation method for evaluating conditional cash transfer program designs *ex ante*. It simulates the impacts of the Brazilian Bolsa Escola program, which aims to reduce both current and future poverty by providing small, targeted cash transfers to poor households provided their children enroll in and attend school. It assesses two dimensions of the program: its impact on the occupational choice (or time allocation) decisions of children and the effects on current poverty and inequality.

A discrete occupational choice model (a multinomial logit) is estimated on a nationally representative household-level sample. The estimated parameters are then used to make predictions about the counterfactual occupational decisions of children under different assumptions about the availability and design of cash transfer programs. These assumptions are expressed in terms of different values for two key policy parameters: the means-test level of household income and the transfer amount.

Because predicted earnings values were needed for all children in the simulation, this procedure also required estimating a Mincerian earnings equation for children in the sample and using it to predict earnings in some cases. Because the income values accruing to each household are not symmetric across different occupational choices, standard estimation procedures for the multinomial logit are not valid. The identification assumption was made that children not enrolled in school work only outside the household and make no contribution to domestic work. Under this assumption, the estimation of the model generated remarkably consistent results: marginal utilities of income are always positive and very similar across occupational categories. As a fraction of time spent working by those not enrolled in school, time spent working by children enrolled in school is always in the (0, 1) interval and in the 0.70–0.75 range, whether work was done within or outside the household.

Using the estimated occupational choice model to simulate the official (April 2001) design of the federal Bolsa Escola program reveals considerable behavioral response from children to the program. About 40 percent of 10- to 15-year-olds not enrolled in school enroll in response to the program, according to the model. Among poor households this proportion is even higher (60 percent). The proportion of children in the middle occupational category (*studying and working in the market*) rises marginally.

The effect on current poverty reduction is less heartening. In its original design, the Bolsa Escola program reduces the incidence of poverty by only a

little more than 1 percentage point, and the Gini coefficient falls just half a point. Results are better for measures more sensitive to the bottom of the distribution, but the effect is never large.

Both the proportion of children enrolling in school in response to program availability and the degree of reduction in current poverty turn out to be rather sensitive to transfer amounts and rather insensitive to the level of the means test. This suggests that the targeting of the Brazilian Bolsa Escola program is adequate but that poverty reduction through this instrument, though effective, is not magical. Governments may be transferring cash in an intelligent and efficient way, but they still need to transfer more substantial amounts if they hope to make a dent in the country's high levels of deprivation.

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Targeting Child Labor in Debt Bondage: Evidence, Theory, and Policy Implications

Arnab K. Basu and Nancy H. Chau

Despite recent multilateral efforts to single out child labor in debt bondage as one of the worst forms of child labor, several important questions have yet to be addressed: How pervasive is the phenomenon? Are there systematic correlations between the incidence of children in debt bondage and the economic, legislative, and financial development indicators of the economy? How does an understanding of these correlates affect the way national and international policy measures aimed at targeting this form of child labor are perceived? This article addresses each of these questions. The empirical findings suggest strong correlation between the likelihood of the incidence of child labor in debt bondage with the stage of development of an economy, the stage of financial development, and enforcement of core labor rights. Building on this evidence, the article presents a theoretical model that highlights the drawbacks and merits of a number of policies aimed at putting checks on child labor in debt bondage.

The call to abolish child labor in debt bondage is of long standing. As early as 1956, the United Nations Supplementary Convention on the Abolition of Slavery outlawed the institution of debt bondage.¹ More recently, the 1999 adoption of the International Labour Organization (ILO) Convention on the Worst Forms of Child Labor aroused renewed interest in coordinating international actions to address the plight of children whose labor is pledged against outstanding household debt.

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1. The 1956 Convention defines *debt bondage* as “the status or condition arising from a pledge by a debtor of his personal services or of those of a person under his control as security for a debt, if the value of those services as reasonably assessed is not applied towards the liquidation of the debt or the length and nature of those services are not respectively limited and defined.”

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A number of international policy actions have been put in place to liberate children and poor households from debt bondage. These include law enforcement efforts, such as the training of inspectors to enforce child labor laws (IPEC 1997), and direct actions that assist governments and local nongovernmental organizations to liberate children from debt bondage and to provide education, small business loans, and other forms of assistance (InFocus Programme 2002).² A number of extranational initiatives are also in effect that condition international trade benefits on the extent of child labor and bonded labor practices.³

Despite these developments, the incidence of child labor in debt bondage remains an open question, along with its possible economic, legislative, and structural correlates on a cross-national basis. The first objective of this article is to provide a preliminary examination of the available evidence. In particular, how pervasive is the phenomenon of child labor in debt bondage? Are there systematic correlations between the incidence of children in debt bondage and indicators of economic, legislative, and financial development? Perhaps more important, how do national and international policy measures aimed at targeting this form of child labor fare once the phenomenon is understood in the context of a country's stage of economic, legislative, and financial development?⁴

Available cross-national evidence on the incidence of child labor in debt bondage is used to construct an index of the incidence of child labor in debt bondage for 163 countries. The data also cover respect for core labor rights (such as freedom of association and the right to organize); indicators of financial development and access to credit (interest rate gap, share of private credit to gross domestic product (GDP), and an estimated country-specific coefficient of consumption smoothing); macroeconomic variables; and country fixed factors.

The findings suggest systematic correlations between the incidence of child labor in debt bondage and the enforcement of core labor rights and the stage of development of an economy. Although the financial development indicators are

2. In November 2000 the ILO launched a \$3.5 million program to achieve the sustainable liberation of an estimated 75,000 men, women, and children in Nepal from bonded labor.

3. See USTR (1997) for a listing of General System of Preference (GSP) suspensions, partial suspensions, and reviews and Brenton (2000) for the GSP conditionality of the European Union. Further, Basu and others (2000) examine the effectiveness of product labeling programs aimed at promoting trade without inducing additional child labor employment.

4. For studies of interlinked credit-labor arrangements, see Braverman and Stiglitz (1982), Bardhan (1989), Basu (1987), Braverman and Srinivasan (1982), and Sadoulet (1992) and Genicot (2002). These studies highlight the efficiency implications of such arrangements, as when alternative sources of credits or insurance other than the landlord are not available or when the need to repay outstanding debt creates incentive to work that are otherwise absent. In this article the role of child labor in debt bondage is introduced explicitly, and the relative merits and drawbacks of policy interventions in terms of child labor employment and household welfare are emphasized.

at best imperfect proxies for the degree of access to consumption smoothing by agrarian households, countries with positive incidence of child labor in debt bondage nevertheless appear to have, on average, lower levels of financial sector development. In addition, child labor in debt bondage is found to be particularly prevalent in countries where agriculture is the mainstay economic activity.

Somewhat surprisingly, there is little cross-national evidence suggesting significant correlation of the incidence of child labor in debt bondage and the application of minimum age legislation to employment in agriculture. Indeed, in developed and developing economies alike, child labor in agriculture is frequently exempt from national minimum age legislation.

These findings form the building blocks of the theoretical model set out here. It identifies poverty and the absence of reliable legal and financial systems through which the poor can secure loans to safeguard against hunger or unexpected consumption needs as root causes of child labor in debt bondage.⁵ Consequently, child labor in debt bondage grows out of an institutional arrangement in which labor and credit contracts are interlinked and outstanding household debts are paid at least in part through the labor services of children.

The basic framework extends Basu and Chau (2002) and highlights the principal-agent problem confronting landlords-moneylenders and agrarian households.⁶ The findings illustrate how agrarian households respond to the need to service outstanding debts and to finance subsistence consumption by putting children to work.⁷

Four classes of policy actions are considered for eliminating child labor in debt bondage: enforcement of minimum age laws, direct transfers to remove children and agrarian households from bondage, alternative sources of credit, and alternative sources of employment during periods of low income. Two themes emerge from the examination of these policy options. Policy measures strong enough to eradicate debt bondage do not necessarily result in a lower incidence of child labor. Policy interventions should be evaluated based on

5. See, for example, Rosenzweig (1981), Grootaert and Kanbur (1995), Basu and Van (1999), and Grote and others (1999).

6. This article departs from Basu and Chau (2002) in two regards. First, the need to fulfill subsistence consumption is shown to be vital to child labor supply and to the equilibrium prevalence of debt bondage contracts. Second, this article also examines the effectiveness of a host of policy measures aimed at eradicating the institution of debt bondage.

7. Grote and others (1999) and Baland and Robinson (2000) study child labor in a context of credit market imperfections that put limits on education undertakings. The appeal of removing children from the workforce thus lies in overcoming the undersupply of educated laborers. Although this article also takes credit market imperfection as a starting point, child labor is a by-product of the principal-agent decision problem facing landlords and households. As will become clear, the policy implications found to be effective are accordingly those that tip the balance of the principal-agent relationship in favor of households.

whether they tilt the principal-agent link in favor of households rather than landlords and enhance outside options for households.

For example, efforts to enforce minimum age legislation have a direct negative impact on the demand price for child labor. Consequently, debt bondage becomes less attractive to landlords not because household demand for consumption smoothing is any less but because their ability to service outstanding debts during the harvest season is lower with tighter enforcement. So, although strict enforcement of child labor laws may well eradicate debt bondage, there is little guarantee that the incidence of child labor will decline (particularly when the need to finance subsistence consumption is important enough) or that household welfare will improve.

The second policy option addresses the supply side of the market for child labor in debt bondage. The analysis spells out how the availability of options outside the household and the well-being of households that choose to remain free of debt bondage are key determinants of the equilibrium terms of the credit-labor service contract between landlords and households. Any direct transfers that target only households in bondage, leaving the welfare of other households unaltered, have no impact on the equilibrium incidence of child labor in debt bondage. In fact, once landlords and households fully anticipate the possibility of direct transfers into the terms of the interlinked contract, not only will the equilibrium child labor incidence remain unaffected but landlords will effectively be the sole beneficiaries of any direct transfers that are intended for the indebted households.

The next two policy options explore the effectiveness of providing alternative source of credit and employment at times of poor labor market outcomes. As expected, the availability of an alternative source of credit curbs the implicit interest rate that landlords can charge and can completely replace debt bondage as a source of credit when interest rates are sufficiently low. However, little stands in the way of households that respond to easy credit terms by borrowing even more. Indeed, if the provision of alternative credit sources is the only policy to combat debt bondage, the incidence of child labor will always rise as households service the increase in debts by putting children to work in the spot labor market. The provision of productive labor employment opportunities has the virtue that it addresses both the consumption needs of poor households during periods of low income and households' need to put children to work. Indeed, productivity-enhancing lean season employment and the ensuing rise in adult productivity (and hence adult income) in the harvest season are key factors that contribute to ending the institution of debt bondage and child labor.

Thus, although the main findings are consistent with recent international efforts aimed at combating debt bondage, they also caution against wholesale implementation of policy measures without due consideration of the specific features of debt bondage. The following section presents the data and provides an account of the economic, legislative, and financial development characteristics

of countries with bonded child labor. Section II presents the basic theoretical model, section III turns to an examination of the policy implications of the theoretical setup, and section IV presents concluding comments.

I. CROSS-NATIONAL EVIDENCE ON DEBT BONDAGE

With few exceptions, there are no precise cross-national estimates of the incidence of child labor in debt bondage.⁸ An admittedly crude measure of the incidence of child labor in debt bondage was constructed using an indicator variable *bondchild*, where a value of one is assigned whenever incidences of child labor in debt bondage have been reported and a value of zero otherwise. The information on which the indicator is based comes from *Country Report on Human Rights Practices for 1998* (U.S. Department of State 1999) and the *Worldwide Report on the Worst Forms of Child Labor* (Global March against Child Labour 2000).

Table 1 summarizes the relevant statements in the *Country Report on Human Rights Practices for 1998* pertaining to Bulgaria, India, Iraq, and the United States and the corresponding values of *bondchild* assigned to each country.⁹ A potential drawback of relying solely on descriptive reports, however, is that data may be missing on the incidence of debt bondage in high-income countries. This potential sample bias is addressed by assigning countries to the *bondchild* = 0 group whenever the incidence of child labor (aged 10–14) is reported as zero based on the ILO data on economically active population adopted in the *World Development Indicators* (World Bank 2001). Table 2 lists the 163 countries included in the data set.

Three indicators are used to address whether a country adequately observes core labor rights. One deals with national legislation regarding the treatment of child labor in agriculture. The indicator variable *legexag* is constructed for each country and assigned a value of one whenever child agricultural labor is exempt from national minimum age legislations, as reported in ILO (2001). A second indicator variable, *enforce*, deals with the enforcement of core labor rights, based on the four-point scores in Organisation for Economic Co-operation and Development (OECD) (2000).¹⁰ It takes a value of zero for the two groups of countries in which enforcement of freedom of association and the right to

8. The exceptions include India, Nepal, and Pakistan, for which some information on the extent of child labor in debt bondage is available from estimates of government and nongovernmental organizations. It bears emphasis that data from difference sources tend to differ by wide margins. See, for example, Basu and Chau (2002) for an account of available survey evidence on all three countries.

9. To focus on the *source country* of debt bondage, observations of bonded child labor that involves the smuggling of children from another country are excluded. The United States is a case in point.

10. The question remains, however, of how to measure the enforcement of core labor rights (see, for example, Chau and Kanbur 2002).

TABLE 1. Human Rights Report Entry

Country	Statements	<i>Bondchild</i>
Bulgaria	“Cases of forced or bonded labour have not been reported.”	0
India	“An estimated 15 million children are working under bondage.”	1
Iraq	“No information about forced child labour is available.”	—
United States	“Alien smuggling organizations using Suriname as an intermediate destination to smuggle Chinese nationals, including women and girls, into the United States, where frequently they are forced into bonded labour situations.”	0

Source: U.S. Department of State (1999); Global March against Child Labor (2000).

organize is deemed adequate and a value of one for the two groups of countries in which more severe violations have been reported (OECD 2000).¹¹ The final indicator is an outcome measure that gives the share of economically active children aged 10–14 (World Bank 2001).¹²

Ideally, the indicator of credit market imperfection would capture the ease of access to consumption smoothing loans for poor agrarian households. However, in the absence of an obvious candidate that measures the size and scope of informal credit markets, three other indicators were constructed or taken from various sources. The variable *intspread* captures the average gap between official lending rate and the deposit rate during 1994–98 (World Bank 2001). The variable *priv* denotes the share of private credit (by deposit money banks and other financial institutions) to GDP (Beck and others 2000). A third indicator attempts to measure the development of insurance markets by estimating the extent to which variability in gross domestic product per capita ($\Delta \log y_{it}$) translates into variability in household consumption per capita ($\Delta \log c_{it}$) (1970–98, constant 1995 prices). Data on GDP and household consumption per capita are from World Bank (2001). For each country i , the variable *riskshare* is taken to be the estimated least squares regression coefficient β_i of the following regression equation:

$$(1) \quad \Delta \log c_{it} = \gamma_i + \beta_i \Delta \log y_{it} + \epsilon_{it}.$$

When β_i takes on a value of zero, household consumption is fully insured from per capita income shocks in country i . When $\beta_i = 1$, there is perfect pass-through of income variability to household consumption variability.

11. The variable *enforce* is constructed in this way because there are, for example, only four countries in our data set that have the lowest labor standard score based on OECD (2000). The logit estimations later in the article accordingly contain outcomes that could have been completely determined had the four-point classification simply been adopted as dummy variables.

12. There is also a burgeoning literature on the determinants of child labor (see, for example, Rogers and Swinnerton 2002).

TABLE 2. Incidence of Child Labor in Debt Bondage

<i>Bondchild</i> = 1		<i>Bondchild</i> = 0	
Countries list		Countries list	
1	Angola	44	Albania
2	Bangladesh	45	Algeria
3	Benin	46	Andorra
4	Bolivia	47	Antigua and Barbuda
5	Brazil	48	Argentina
6	Burkina Faso	49	Armenia
7	Burma	50	Australia
8	Cambodia	51	Austria
9	Cameroon	52	Azerbaijan
10	Chad	53	Bahamas
11	Colombia	54	Bahrain
12	Comoros	55	Barbados
13	Cote d'Ivoire	56	Belarus
14	Dominican Rep.	57	Belgium
15	Gabon	58	Belize
16	Ghana	59	Bhutan
17	Haiti	60	Botswana
18	India	61	Bulgaria
19	Indonesia	62	Burundi
20	Kenya	63	Canada
21	Laos	64	Cape Verde
22	Lebanon	65	Central African Rep.
23	Liberia	66	Chile
24	Malawi	67	China
25	Mali	68	Congo
26	Mauritania	69	Costa Rica
27	Morocco	70	Croatia
28	Mozambique	71	Cuba
29	Namibia	72	Cyprus
30	Nepal	73	Czech Rep.
31	Nicaragua	74	Denmark
32	Nigeria	75	Dominica
33	Pakistan	76	Ecuador
34	Peru	77	Egypt
35	Philippines	78	El Salvador
36	Sierra Leone	79	Eq. Guinea
37	South Africa	80	Eritrea
38	Sri Lanka	81	Estonia
39	Sudan	82	Fiji
40	Thailand	83	Finland
41	Togo	84	France
42	Uganda	85	Gambia
43	Vietnam	86	Georgia
		87	Germany
		88	Greece
		89	Guinea
		90	Guyana
		91	Hong Kong
		92	Iceland
		93	Ireland
		94	Israel
		95	Italy
		96	Jamaica
		97	Japan
		98	Kazakhstan
		99	Kiribati
		100	Korea, Dem.
		101	Korea, Rep.
		102	Kuwait
		103	Kyrgyzstan
		104	Latvia
		105	Lesotho
		106	Liechtenstein
		107	Lithuania
		108	Luxembourg
		109	Macau
		110	Madagascar
		111	Malaysia
		112	Maldives
		113	Malta
		114	Marshall Islands
		115	Micronesia
		116	Moldova
		117	Monaco
		118	Mongolia
		119	Netherlands
		120	New Zealand
		121	Norway
		122	Oman
		123	Palau
		124	Panama
		125	Papua New Guinea
		126	Paraguay
		127	Poland
		128	Portugal
		129	Qatar
		130	Romania
		131	Russian Federation
		132	Rwanda
		133	St Kitts and Nevis
		134	St Lucia
		135	St Vincent & Grenadines
		136	Samoa
		137	Sao Tome & Principe
		138	Saudi Arabia
		139	Senegal
		140	Seychelles
		141	Singapore
		142	Slovakia
		143	Slovenia
		144	Solomon Islands
		145	Spain
		146	Suriname
		147	Sweden
		148	Switzerland
		149	Syria
		150	Tajikistan
		151	Tonga
		152	Trinidad & Tobago
		153	Tunisia
		154	Turkmenistan
		155	Ukraine
		156	UAE
		157	United Kingdom
		158	USA
		159	Uzbekistan
		160	Vanuatu
		161	Venezuela
		162	Yemen
		163	Yugoslavia

Note: The countries in bold are classified *bondchild* = 0 based on the child labor data in World Bank (2001).

Source: U.S. Department of State 1999; Global March Against Child Labor 2000; World Bank 2001.

TABLE 3. Economic Characteristics and Regional Distribution of Incidence of Child Labor in Debt Bondage

Variable	Mean	Standard deviation	Minimum	Maximum	Number of Observations
<i>Bondchild = 1</i>					
GDP per capita (constant 1995 US\$)1994–98 (<i>rgdpch</i>)	8,466.810	11,356.240	148.391	47,988.230	112
Trade as share of GDP, 1998 (%)	86.718	48.658	19.830	249.830	44
Trade with OECD countries as share of GDP, 1998 (%)	45.448	29.315	6.620	130.090	67
East Asia and Pacific	0.175	0.382	0	1	120
Europe and Central Asia	0.200	0.402	0	1	120
Middle East and North Africa	0.125	0.332	0	1	120
South Asia	0.017	0.129	0	1	120
Western Europe	0.167	0.374	0	1	120
North America	0.017	0.129	0	1	120
Sub-Saharan Africa	0.125	0.332	0	1	120
Latin America and Caribbean	0.175	0.382	0	1	120
Low- and middle-income countries	0.692	0.464	0	1	120
<i>Bondchild = 0</i>					
GDP per capita (constant 1995 US\$) 1994–98 (<i>rgdpch</i>)	1,030.537	1,193.429	152.981	4,614.016	40
Trade as share of GDP, 1998 (%)	60.941	28.170	16.700	126.340	31
Trade with OECD countries as share of GDP, 1998 (%)	28.394	17.692	8.960	73.370	31
East Asia and Pacific	0.163	0.374	0	1	43
Europe and Central Asia	0.000	0.000	0	0	43
Middle East and North Africa	0.047	0.213	0	1	43
South Asia	0.116	0.324	0	1	43
Western Europe	0.000	0.000	0	0	43
North America	0.000	0.000	0	0	43
Sub-Saharan Africa	0.512	0.506	0	1	43
Latin America and Caribbean	0.163	0.374	0	1	43
Low- and middle-income countries	1.000	0.000	1	1	43

Source: Authors' calculations based on data from World Bank 2001.

Table 3 presents summary statistics on the basic macroeconomic characteristics and the regional distribution of countries with and without reported incidences of child labor in debt bondage. Child labor in debt bondage is reported in 43 of the 163 countries for which data are available. As expected, child labor in debt bondage is a developing economy phenomenon, although approximately 69 percent of countries free of observed incidence of child labor in debt bondage are in fact low- and middle-income countries (World Bank 2001). In addition, debt bondage is nonexistent in countries with mean GDP per capita (1994–98) greater than \$4,614. This is similar to the findings in Krueger (1997), which show a threshold income level dividing countries with and without reported incidences of child labor. Table 3 also shows that countries with debt bondage exhibit weaker trade links with the rest of the world and with OECD countries.

Table 4 presents information on the dependence on agriculture of the two groups of countries. Close to 40 percent of countries with reported incidence of child labor in debt bondage are exporters of nonfuel primary products, with agricultural exports contributing more than 50 percent to total export revenue. In contrast, a core group of countries without child labor in debt bondage are manufactures exporters. Despite these observed differences in trade patterns, the value added of agricultural workers is significantly higher in countries in which debt bondage does not exist.

With respect to the adoption of core labor standards in the two groups of countries, the average share of economically active children (aged 10–14) is substantially higher in countries where child labor in debt bondage is reported (table 5). This is despite the fact that almost all of the countries included in the data set have signed international conventions or adopted national minimum age legislation. Respect for the rights of workers to negotiate wages and form unions is observed much more in countries without observed child labor in debt bondage. Somewhat surprising, however, is that legislative exceptions for child labor in agriculture are common, regardless of whether debt bondage is reported or not.

On the degree of financial market development, it appears that countries with child labor in debt bondage have on average a larger interest rate gap and a lower share of private credit issued by deposit money banks and other financial institutions (table 6). In addition, countries without reports of child labor in debt bondage also tend to perform better on the ability of the average household to smooth consumption in the face of income shocks.

Tables 7 and 8 present logit estimates of the marginal impact of three factors that contribute to an increase in the likelihood of child labor in debt bondage.¹³

13. The number of observations used in these estimations is different as country coverage differs across data sources on labor standards, financial development, and other variables. A check of the frequency distribution of countries with child labor in debt bondage for each of the independent variables for which data are available found the percentages to be relatively stable, ranging from 2.2 percentage points above to 4.4 percentage points below the overall reported incidence of children in debt bondage (43 out of 163 countries).

TABLE 4. Export Orientation

Variable	Mean	Standard deviation	Minimum	Maximum	Number of Observations
<i>Bondchild</i> = 1					
Exporter of manufactures	0.244	0.431	0	1	119
Exporter of nonfuel primary products	0.168	0.376	0	1	119
Exporter of fuel	0.084	0.279	0	1	119
Exporter of services	0.227	0.421	0	1	119
Diversified exporters	0.193	0.397	0	1	119
Value added per worker in agriculture, 1998 (US\$)	10,160.1900	14,918.9800	144.1678	53,097.3000	88
Share of labor in agriculture	25.7956	23.5275	0.3600	94.1200	96
<i>Bondchild</i> = 0					
Exporter of manufactures	0.0233	0.1525	0	1	43
Exporter of nonfuel primary products	0.3721	0.4891	0	1	43
Exporter of fuel	0.0698	0.2578	0	1	43
Exporter of services	0.1395	0.3506	0	1	43
Diversified exporters	0.3953	0.4947	0	1	43
Value added per worker in agriculture, 1998 (US\$)	1,678.0010	4,582.7250	128.0602	29,226.4800	40
Share of labor in agriculture	59.1212	22.5585	2.0400	93.6500	42

Source: Authors' calculations based on data from World Bank (2001).

TABLE 5. Observance of Core Labor Standards

Variable	Mean	Standard deviation	Minimum	Maximum	Number of Observations
<i>Bondchild</i> = 1					
Child labor (% of children aged 10–14)	5.535	11.893	0.000	52.670	101
<i>legexag</i>	0.691	0.465	0	1	68
<i>enforce</i>	0.178	0.387	0	1	45
<i>Bondchild</i> = 0					
Child labor (% of children aged 10–14)	21.016	13.376	0.000	52.490	43
<i>legexag</i>	0.741	0.447	0	1	27
<i>enforce</i>	0.714	0.469	0	1	14

Source: Authors' calculations based on data from World Bank (2001); ILO (2001); OECD (2000).

These factors include a stage of economic development variable (average real GDP per capita, 1994–98), variables indicating observance of basic core labor rights (*enforce* and *legexag*), and a stage of financial development indicator. Although results vary in magnitude and significance, child labor in debt bondage is less likely in countries where per capita real income is relatively high, the rights of workers to freely negotiate wages and form unions are respected, and financial markets are better developed.¹⁴ Not surprisingly, because exceptions to child labor in agriculture are common in developing

TABLE 6. Financial Development and Credit Markets

Variable	Mean	Standard deviation	Minimum	Maximum	Number of Observations
<i>Bondchild</i> = 1					
<i>intspread</i> (%)	9.265	10.741	1.203	75.160	78
<i>risksharegdp</i>	0.772	0.645	-1.389	3.422	87
<i>priv</i> (%)	48.930	35.094	5.163	166.201	45
<i>Bondchild</i> = 0					
<i>intspread</i> (%)	12.034	9.766	-3.026	42.286	22
<i>risksharegdp</i>	1.024	0.705	-0.050	4.476	34
<i>priv</i> (%)	24.436	18.716	2.766	74.398	18

Source: Authors' calculations based on data from Beck and others (2000) and World Bank (2001).

14. As will be shown later, the institution of debt bondage has the effect of raising the total incidence of child labor. As such, the empirical results here are consistent with Dehejia and Gatta (2002), who find the cross-country empirical relationship between financial development and child labor incidence to be positive. In addition, Guarcello and others (2002) similarly show that credit rationing and income shocks are important determinants of child labor in Guatemala.

TABLE 7. Logit Regression: Debt Bondage, Stage of Development, Core Labor Rights, and Financial Development

	I	II	III	IV	V
<i>lrgdppc</i>	-1.1560* (0.25)	-1.5829* (0.43)	-0.926** (0.19)	-1.2643* (0.28)	-1.1568* (0.25)
<i>intspread</i>	-0.0175 (0.03)				
<i>priv</i>		3.5480 (1.80)			
<i>risksbare</i>			0.3687 (0.37)		
<i>enforce</i>				0.9351 (0.90)	
<i>legexag</i>					-0.3157 (0.60)
Constant	7.3430* (1.88)	9.6952* (2.62)	5.4576* (1.32)	8.5447* (2.41)	7.5945* (1.83)
N	99	63	121	59	94
Wald χ^2	22.1500	20.2300	25.3700	23.9000	22.6600
Prob > χ^2	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R ²	0.2605	0.3890	0.2383	0.4279	0.3143
Log likelihood	-37.8318	-23.0276	-54.7395	-18.4945	-38.0124

*Significant at the 1% level.

Note: Dependent variable is the incidence of child labor in debt bondage (*bondchild*). Numbers in parentheses are robust standard errors.

Source: Authors' calculations based on data from U.S. Department of State (1999); Global March against Child Labor (2000); World Bank (2001); ILO (2001); OECD (2000); and Beck and others (2000).

and developed economies, the coefficients on *legexag* (table 8) are insignificant and of the wrong sign.¹⁵

These observations motivate three main features of the model. To begin with, poverty is viewed as one of the root causes of child labor, with the need to finance subsistence consumption a key rationale for putting children to work. Second, agrarian households are taken to have no access to formal credit markets, and consumption smoothing over periods of low income is available only through local landlords-moneylenders. Accordingly, the interlinked transactions examined take the form of a credit-labor service contract. Finally, agrarian workers have limited ability to organize and collectively negotiate the terms of the interlinked contracts with employers. This may be due to standard free-rider concerns or legal exceptions to child labor laws and union activities in agriculture. The next section shows how the emergence and persistence of the

15. As a robustness check, a logit estimation was also conducted using the restricted data set that leaves out the 10 observations with *bondchild* = 0 that are based on World Bank (2001). The signs and significance of estimated coefficients remain unchanged. These results are available on request.

TABLE 8. Logit Regression (Continued): Debt Bondage, Stage of Development, Core Labor Rights, and Financial Development

	I	II	III	IV	V	VI
<i>lrgdppc</i>	-1.1272* (0.65)	-2.3113*** (0.86)	-1.4130*** (0.32)	-1.3590*** (0.35)	-2.2187*** (0.62)	-1.0311** (0.24)
<i>intspread</i>	0.2802* (0.16)			-0.0098 (0.03)		
<i>priv</i>		4.6499 (2.89)			4.2044 (2.70)	
<i>riskshare</i>			2.6290* 1.51			-0.0978 0.61
<i>enforce</i>	3.7249** (1.59)	1.6429 (1.31)	0.5646 (1.00)			
<i>legexag</i>				-0.7129 (0.83)	-2.1337* (1.07)	0.0093 (0.67)
Constant	3.3707 (6.32)	14.4978*** (5.77)	8.0873*** (2.43)	9.3724*** (2.76)	15.4856*** (3.97)	6.6209*** (1.88)
N	45	43	54	66	51	81
Wald chi ²	17.5100	17.6800	24.6600	18.2700	21.1000	19.0600
Prob > chi ²	0.0006	0.0005	0.0000	0.0004	0.0001	0.0003
Pseudo R ²	0.5810	0.6019	0.4843	0.3638	0.5195	0.2709
Log likelihood	-8.8241	-8.7814	-15.9377	-23.2569	-14.4032	-34.5402

*Significant at the 10% level.

**Significant at the 5% level.

***Significant at the 1% level.

Note: Dependent variable is the incidence of child labor in debt bondage (*bondchild*). Numbers in parentheses are robust standard errors.

Source: Authors' calculations based on data from U.S. Department of State (1999); Global March against Child Labor (2000); World Bank (2001); ILO (2001); OECD (2000); and Beck and others (2000).

institution of child labor in debt bondage can be understood with these features in place.

II. THE BASIC MODEL

The basic model scrutinizes the interactions between landlords-moneylenders and agrarian households during the two seasons of an agricultural year—a lean season during which a spot labor market does not exist and a harvest season during which landlords compete in hiring wage laborers (Bardhan 1983; Basu 2002). Total harvest season output of a representative landlord is taken to be $X = \omega L$, where L denotes labor input, and ω the marginal product of labor.¹⁶ Adult and child laborers are imperfect substitutes in harvest work, and each unit of child labor is equivalent to $0 < a < 1$ of adult labor. The spot market returns

16. See Basu and Chau (2002) for a presentation of the intricacies that arise when production is more generally of the decreasing marginal product variety.

to a unit of adult labor and child labor are thus ω and $a\omega$, respectively, in units of agricultural output.

Each laborer household supplies (inelastically) one unit of adult labor. It may also supply up to one unit of child labor depending on labor market conditions and household consumption needs. Let \bar{C} denote the per season subsistence consumption of the household, and B_0 the inherited savings that the household can draw on to sustain consumption during the lean season. The utility of a household depends on net above subsistence-level household consumption each season ($c^l - \bar{C}$, $c^h - \bar{C}$), child labor (ℓ^k), and savings of harvest income to cover any above-subsistence-level consumption during the next lean season (B_1):¹⁷

$$(2) \quad u = \log(c^l - \bar{C}) + \rho[\alpha \log(c^h - \bar{C}) + (1 - \alpha) \log(1 - \ell^k)] + \rho^2 \log(B_1 - \bar{C}),$$

where $0 \leq \alpha \leq 1$ is the preference weight attached to consumption in the harvest season relative to the cost of putting the child to work,¹⁸ and ρ is the subjective discount factor per season.

Households in the Absence of Debt Bondage

Inherited savings B_0 is taken as given. Let $y^o(\omega) \equiv \omega(1 + a) - 2\bar{C}$ denote the disposable full income of the household during the harvest season, after accounting for expenditures on subsistence consumption during the harvest season and the upcoming lean season. Also let $b_0 = b(B_0, y^o)$ be the ratio of inherited disposable savings to full disposable income $(B_0 - \bar{C})/y^o(\omega)$. As will become clear, b_0 parameterizes the vulnerability of households to borrowing from landlords and engaging in debt bondage. In particular, it can be readily verified that if b_0 is sufficiently small, so that $\rho(1 + \rho)b_0 < 1$, households with no access to credit are better off consuming their entire available budget during the lean season.

The household then faces two budget constraints, one for the lean season and one for the harvest seasons:¹⁹

$$(3) \quad c^l = B_0, \quad c^h = \omega(1 + a\ell^k) - B_1.$$

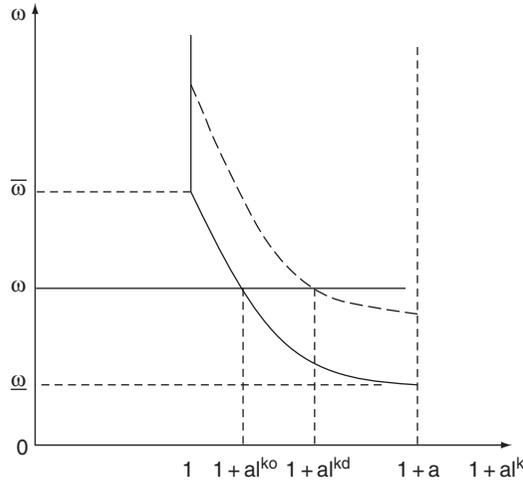
The utility maximizing level of child labor during the harvest season is given by:

17. Note that if households are assumed to ignore subsistence consumption needs in the future, then the implied savings can dip below the subsistence level, and debt bondage contracts trivially prevail, allowing landlords to extract the harvest income of the household completely without violating individual rationality.

18. While not explicitly modeled, $1 - \alpha$ can be interpreted more generally as the disutility of child labor, which may be due to time away from school or hazardous labor.

19. The section on Voluntary Participation in Debt Bondage also shows that unless $\rho(1 + \rho)b_0$ is less than unity, debt bondage will be a nonissue in equilibrium, even if landlords face minimal opportunity cost of loans ($i = 0$).

FIGURE 1. Child Labor Supply and Debt Bondage



$$(4) \quad \ell^{ko} = \min\{1, \max\{0, 1 - [(1 - \alpha)y^o(\omega)] / [(1 + \rho)\alpha\omega]\}\}.$$

There is thus a positive incidence of child labor if the disutility of child labor $(1 - \alpha)$ is not too large, child and adult laborers are close substitutes,²⁰ and adult wage income ω is small relative to subsistence consumption needs \bar{C} .

Equation 4 implies a downward-sloping labor supply schedule. In figure 1, $\bar{\omega}$ denotes a threshold level of adult labor income such that $\ell^{ko}(\omega) = 0$ for all $\omega \geq \bar{\omega}$. In addition, if $\omega \leq \underline{\omega}$, child labor supply is similarly independent of small changes in the spot wage, as the household deploys all available adult and child labor time to fulfill subsistence consumption needs.²¹ Because the primary focus here is child labor, ω is taken to be in the range $(\underline{\omega}, \bar{\omega})$. The child labor supply of a household free from debt bondage is thus given by $\ell^{ko} = 1 - [(1 - \alpha)y^o(\omega)] / [(1 + \rho)a\omega]$, and utility is then given by

$$(5) \quad V^o(B_0) = \log(B_0 - \bar{C}) + \rho(1 + \rho) \log y^o(\omega) + K,$$

in which K is a constant.

20. It can be shown that the lower limit on a is given by $a/(1 + a) > (1 - a)/(1 + \rho)$.

21. $\bar{\omega}$ is given by $[2(1 - \alpha)\bar{C}] / [(1 - \alpha)(1 + a) - (1 + \rho)a]$ and $\underline{\omega}$ by $2\bar{C}/(1 + a)$.

Households Engaged in Debt Bondage

The landlord has the option of providing lean season consumption loans to laborer households.²² In exchange for a loan of D amount to supplement lean season consumption, the household repays the landlord $\bar{\ell}$ amount of *effective* labor during the harvest season, where $\bar{\ell}$ can be made up of child labor, adult labor, or a combination. Unless $\bar{\ell}$ amount of effective labor services is repaid in full, the household may not search for harvest season employment elsewhere.

Debt bondage alters the household decision problem directly through the lean and harvest season budget constraints:

$$(6) \quad c^l = B_0 + D, \quad c^h = \omega(1 + a\ell^k - \bar{\ell}) - B_1.$$

For households engaged in debt bondage, let superscript d denote utility maximizing levels. Debt bondage will apply whenever B_0 is binding in the no-debt situation, that is, $\rho(1 + \rho)b_0 < 1$. Given the debt repayment obligation, child labor becomes greater and more likely when outstanding debts are positive. In that case child labor is given by

$$(7) \quad \ell^{kd} = 1 - [(1 - \alpha)(y^o(\omega) - \omega\bar{\ell})]/[(1 + \rho)a\omega] = \ell^{ko} + (1 - \alpha)\bar{\ell}/[(1 + \rho)a].$$

Thus, child labor supply rises with debt obligations. In figure 1, the labor supply schedule of households engaged in debt bondage thus lies uniformly above that of households free of debt bondage. Utility in this case is given by

$$(8) \quad V^d(B_0, D, \bar{\ell}) = \log(B_0 + D - \bar{C}) + \rho(1 + \rho) \log(y^o(\omega) - \omega\bar{\ell}) + K,$$

where K is the same constant as previously mentioned.

Voluntary Participation in Debt Bondage

With the option of participating in debt bondage open to individual households, voluntary participation in debt bondage requires that $V^d(B_0, D, \bar{\ell}) \geq V^o(B_0)$. Combining the preceding expressions of utility functions, voluntary participation requires that

$$(9) \quad D \geq (B_0 - \bar{C})\{[y^o(\omega - \omega\bar{\ell})/y^o(\omega)]^{-\rho(1+\rho)} - 1\} = D(\bar{\ell}, B_0),$$

where $D(\bar{\ell}, B_0)$ represents the minimum loan necessary to induce participation given $\bar{\ell}$. $\bar{\ell}$ represents the minimum loan necessary to induce participation

22. Following Hart (1986) and Binswanger and Rosenzweig (1984), the model takes into account established patron-client relationships between landlords and households, in which the prevalence of a caste system or past employment history, for example, dictate the size and the identity of the pool of households from which reliable labor services and debt repayments can be ensured.

given $\bar{\ell}$. As may be expected, it is increasing and strictly convex in $\bar{\ell}$, implying therefore that the cost that a landlord must incur in the form of a lean-season consumption loan increases with the amount of labor services demanded as payment. Intuitively, as the need for consumption smoothing declines with higher levels of B_0 , the loan cost required to induce participation likewise increases, so that $D(\bar{\ell}, B_0)$ is also increasing in B_0 .

The decision problem of the landlord in the lean season involves the selection of $\bar{\ell}$ and D for each borrowing household so as to maximize profits:

$$(10) \quad \Pi = \max_{\bar{\ell}} [\omega\bar{\ell} - (1 + i)D(\bar{\ell}, B_0)],$$

where i is the interest rate faced by the landlord. Because $D(\bullet)$ is increasing and strictly convex, the problem has a unique interior solution, $\bar{\ell}^d$. It follows easily that

$$(11) \quad \bar{\ell}^d = 0$$

if $\rho(1 + \rho)(1 + i)b_0 \geq 1$, and

$$(12) \quad [y^o(\omega) - \omega\bar{\ell}^d]/y^o(\omega) = [\rho(1 + \rho)(1 + i)b_0]^{1/[1+\rho(1+\rho)]}$$

in the opposite case.

Debt bondage is thus an equilibrium phenomenon only if $\rho(1 + \rho)(1 + i)b_0 \leq 1$. The disposable full income of a bonded household during the harvest season is then

$$(13) \quad y^o(\omega)[\rho(1 + \rho)(1 + i)b_0]^{1/[1+\rho(1+\rho)]}.$$

It can be checked that the implicit interest rate of the debt bondage contract, $i^d = (\omega\bar{\ell}^d/D) - 1$, is larger than the interest rate, i , faced by the landlord. As could be expected, the implicit interest rate is strictly increasing with respect to the interest rate facing the landlord and decreasing with respect to the initial household savings, b_0 . Furthermore, the incidence of child labor in debt bondage ℓ^{kd} decreases with both i and b_0 .

In summary, child labor in debt bondage is all the more likely when the implicit degree of credit market imperfection, $1/[\rho(1 + i)]$, is large enough and when the need for consumption smoothing ($1/b_0$) is sufficiently acute. In addition, easier credit terms facing landlords (a decrease in i) and rising demand for lean season consumption loans (a decrease in b_0) both contribute to increase the incidence of child labor in debt bondage.

These circumstances governing the equilibrium prevalence of debt bondage have long-run implications as well. It can be readily verified that debt obligations in indebted households adversely affect the size of savings for the upcoming lean season, B_1 . All else equal, this strengthens the demand for lean-season

consumption loans and thus the incentive to engage in debt bondage once again. Indeed, it can be shown that debt bondage is endemic and prevails in a stationary state where $B^d_0 = B^d_1$, whenever the degree of credit market imperfection is sufficiently acute, or $\rho^2(1 + i) < 1$.²³

III. POLICY IMPLICATIONS

This section examines the effectiveness of a number of policy options aimed at reducing child labor in debt bondage. It considers legislative solutions that target the demand side of the labor market, direct transfers to address the supply of child labor, alternative sources of consumption loans where there are credit market imperfections, and alternative sources of employment opportunities.

Legislative Solutions

The practical difficulties of enforcing a ban on child labor aside, it bears emphasis that a priori the enforcement of a ban can have two opposing effects on the incidence of child labor. To see this, let $0 \leq q < 1$ denote the probability that a landlord is caught hiring child labor. The expected output and therefore the spot harvest wage of a child laborer is thus just $(1 - q)a\omega \leq a\omega$. It follows that enforcing a ban on child labor in agriculture has a direct negative effect on the demand price for child labor. However, the adverse demand effect of the ban also translates into a reduction in the expected full household income in the harvest season. Full income is now $y^o_q(\omega) = y^o(\omega) - a\omega q$, and the effect of raising the likelihood of discovery q may thus be to reinforce the incentives for households to put children to work. In the absence of debt bondage, the effect of a (imperfect) ban on child labor is thus ambiguous, as shown by replacing $y^o(\omega)$ with $y^o(\omega) - a\omega q$ and a with $a(1 - q)$ in equation 7.

For households engaged in debt bondage, a third effect is also in play. Households find themselves *less vulnerable* to debt bondage as child labor laws are enforced because their ability to repay falls with increasingly stringent enforcement against the use of child labor. To see this recall that the solution of the landlord's profit maximization problem in equation 11 yields $\bar{\ell}^d = 0$, if $\rho(1 + \rho)(1 + i)b_q \geq 1$ and that

$$(14) \quad [y^o(\omega) - a\omega q - \omega\bar{\ell}^d]/[y^o(\omega) - a\omega q] = [\rho(1 + \rho)(1 + i)b_q]^{1/[1+\rho(1+\rho)]}$$

in the opposite case, with

23. Although a full-fledged analysis of the dynamics of debt bondage is beyond the scope of this article, interested reader may verify that $B^d_1 - \bar{C}$ is simply a fraction of the harvest income of the household net of debt obligations, $\rho[y^o(\omega) - \omega\bar{\ell}^d]/(1 + \rho)$. Because debt obligations in turn depend (negatively) on inherited savings (equation 13), it can be easily seen that $\rho^2(1 + i) < 1$ also ensures exactly one interior stationary state with $B^d_1 - \bar{C} = B_0 - \bar{C}$, in which the cycle of debt bondage repeats itself.

$$(15) \quad b_q = [b_0 y^o(\omega)] / [y^o(\omega) - a\omega q].$$

In the case in which there was debt bondage in the absence of the ban, $\rho(1 + \rho)(1 + i)b_0 < 1$, equation 15 shows that debt bondage ceases to be an equilibrium phenomenon for sufficiently large values of enforcement intensity, q . In addition, child labor may rise or fall with q for households engaged in debt bondage depending on the relative values of \bar{C} and the expected contribution of child labor $a\omega(1 - q)$.²⁴ Regardless of relative parameter values, however, it must be clear that the enforcement of child labor laws comes at the expense of household welfare, because raising q effectively decreases the full harvest season wage income of the household.

Direct Transfers to Indebted Households

Direct transfers to indebted households are meant to have the effect of removing or reducing the size of the outstanding debt and thereby the need to put children to work to supplement household consumption. However, the limits to such transfers in liberating households from debt bondage should be equally apparent.

Suppose a lump sum δ is transferred to indebted households in the harvest season and that this transfer is fully anticipated by both landlords and households in the lean season. Then the transfer will be fully appropriated by the landlord and will have absolutely no effect on child labor among households engaged in debt bondage or on their welfare. Indeed, the participation constraint in debt bondage (equation 9) is such that households receive the reservation utility level of households that do not engage in debt bondage. But this utility level is independent of δ .

As long as the availability of direct transfers is fully expected by landlords and households alike, the size of the transfer will be fully incorporated into the interlinked contract. Thus, any increase in δ , in the absence of compensating increases in the lean/harvest season income of the reservation household, will be offset by a corresponding increase in the labor service demanded by the landlord, $\bar{\ell}$, and the welfare of an indebted household is exactly equal to the welfare of the reservation household given B_0 . In effect, landlords' profits increase one for one with the amount of transfers to indebted household. All the while, the incidence of child labor remains strictly unaffected.²⁵

24. Specifically, child labor supply increases whenever $2\bar{C} > \omega + a\omega(1 - q) / [1 + \rho(1 + \rho)]$. Clearly, this occurs only if adult income in the harvest season is not sufficient to cover annual subsistence consumption needs.

25. This finding remains robust even when household utility is more generally defined as any increasing and concave function of lean- and harvest-season consumption, child labor, and savings, so that the landlord's decision problem has a unique solution. The important thing to observe is that the landlord's decision problem when households expect to receive δ in direct transfers and pay $\omega\bar{\ell}$ in debt obligations is equivalent to one in which the landlord simply demands $\omega\bar{\ell} = \omega(\bar{\ell} - \delta/\omega)$ of debt repayment without any transfers from the government. It is thus easy to see that landlords' profits increase one for one with the amount of transfers δ , because $\omega\bar{\ell}$ must be just $\omega\bar{\ell} + \delta$.

Credit Market Solutions

Because the lack of alternative sources of consumption loans is one of the root causes of debt bondage, the provision of alternative sources of credit would seem to be a natural course of policy action. For one thing, the mere option of borrowing from a source other than the landlord may tip the balance of the principal-agent relationship between landlords and agrarian households in the households' favor.

Thus, let i_A be the interest rate that a credit agency offers to any household. Interest rate i_A may be greater than the opportunity cost of loans facing landlords, i , if, for example, the relative risk of default or the cost of monitoring loan payments is biased against the credit agency (see, for instance, Bottomley 1975; Basu 1984). Interest rate i_A can also be less than i if the credit program is government-subsidized. In either case, if all households have access to credit at interest rate i_A , the lean and harvest season budget constraints are

$$(16) \quad c^l + L_A = B_0, \quad c^h = \omega(1 + a\ell^k) - L_A(1 + i_A) - B_1,$$

where L_A denotes the size of the loan. Full disposable income during the harvest season $y_A^o \equiv \omega(1 + a) - L_A(1 + i_A) - 2\bar{C}$ is necessarily lower than full disposable income without credit access, $y^o(\omega)$, because of the loan repayment. It follows from equation 4 that child labor is more likely, and larger when strictly positive, than in the absence of credit. Moreover, child labor supply increases with small decreases in i_A whenever $L_A > 0$. As may be expected, easier credit terms encourage borrowing, and as such the need to put children to work during the harvest season to repay outstanding debt to the credit agency also rises. Of course, these observations do not imply that easier credit terms make households worse off. Indeed, it is easy to show that household welfare is an decreasing function of i_A with the noncredit case corresponding to a prohibitively high value of i_A .

Turning now to the landlords' decision problem, equation 16 implies a revised participation constraint, where $V^d(B_0, D, \bar{\ell}) \geq V_A^o(B_0, \omega, i_A)$. Thus it may be shown that households will rely on market credit whenever $\rho(1 + \rho)(1 + i_A) b_0 < 1$ and debt bondage ceases to prevail as an equilibrium outcome if $i_A \leq i$. Debt bondage may persist if $i_A > i$, but child labor supply in households engaged in debt bondage is less than in the absence of credit. Moreover, the provision of easier credit terms by the agency (a decrease in i_A) decreases child labor in a situation of debt bondage.

The provision of alternative credit sources may thus eradicate debt bondage if the interest rate charged by credit agencies is sufficiently low. But even here, the incidence of child labor may nevertheless rise as each household simply switches from landlord to credit agency as a source of credit, where relatively cheaper credit increases the desire to borrow, particularly for households that have the strongest need for consumption loans. Until debt bondage is completely eradicated, however, the provision of easier credit terms can indeed decrease the incidence of child labor in debt bondage and raise the welfare of all households.

Labor Market Solutions

In the search for a policy remedy, the findings so far highlight the importance of accounting for the institutional context in which debt bondage takes place. In particular, attempts to supply an alternative credit source may fall short of ending child labor so long as lean-season consumption needs continue to be sufficiently acute. Meanwhile, subsidies that target indebted households fail to improve the plight of bonded households, as the terms of the interlinked contract are based on the availability of desirable outside options for households that elect *not* to participate in bondage.

These considerations suggest that a viable policy option should aim to reduce seasonal demand for credit and raise the welfare of the reservation households. To this end consider a rural public works program that provides employment opportunities during the lean season through activities such as irrigation, road construction, and other rural public goods that improve agricultural productivity.²⁶ Such a program reduces the need for borrowing in the lean season and the need for child labor—because labor productivity is higher—in the harvest season.

More precisely, if the per worker payment that the rural public works program offers during the lean season is large enough, incentives for both households and employers to engage in debt bondage are eliminated. The equilibrium incidence of child labor in the harvest season decreases, and welfare rises for all households. Note, however, that to achieve all these favorable effects, rural public works programs might have to be substantially subsidized. The important point is that they are clearly superior to transfers that are conditional on debt.

Long-Run Considerations and Policy Implications

Finally, what are the longer-term implications of each of the four policies? To begin with, because the incidence of child labor in debt bondage is the joint outcome of consumption needs in the lean season and the lack of access to alternative credit (other than the landlord), the effect of any given policy may diminish over time. This occurs when the policy-induced change in the incidence of child labor is accomplished at the expense of reducing the household's ability to put aside harvest income for the next lean season. The enforcement of child labor laws fits squarely into this category as the harvest earnings of the household decline with the intensity of enforcement efforts. Thus a sustained increase in the intensity of enforcement of child labor laws can become increasingly ineffective, because households' need for lean-season consumption loans to subsidize the shortfall in savings becomes increasingly acute over time.

26. Such programs have taken on particular significance in South Asia in recent years. For an analysis, see Basu (2002).

Consequently, even though enforcement may initially eradicate child labor, debt bondage will subsequently reemerge.²⁷

It is also possible that the initial effect of policy actions on child labor in debt bondage may be weaker than the long-run response. This applies when policy actions lead to an increase in household savings, thus alleviating the need for child labor in debt bondage in subsequent years. The provision of easy credit and rural public works programs both fit this pattern. As long as debt bondage continues, easier credit directly lowers the debt obligations of households, whether they opt to borrow from landlords or from credit agencies. The incidence of child labor thus declines even further in subsequent years at constant i_A , as the credit policy enable households to put checks on the demand for loans in the future. Similarly, as long as debt bondage continues to prevail, the effectiveness of rural public works program in reducing the incidence of child labor is also stronger in subsequent periods. This is because lean-season employment and higher earnings in the harvest season enable households to save more for upcoming lean seasons.

These considerations are equally relevant to efforts to eradicate child labor in debt bondage. In particular, because there is no conflict between the initial impact and the dynamic consequences of easy credit and rural public works on the incidence of child labor induced by debt bondage, debt bondage does not reemerge in periods subsequent to the implementation of these two policy reforms. Tables 9 and 10 summarize these observations and highlight the initial impact and long-term effects of each of the four policies discussed so far.

IV. CONCLUSION

This article began with an examination of the evidence on child labor in debt bondage, and this evidence was used to construct an index of bonded child labor. Broadly put, child labor in debt bondage is a developing economy phenomenon, although low income is not a sufficient condition for debt bondage. Also important are a dependence on agriculture as a mainstay economic activity, nonobservance of core labor rights, and underdeveloped insurance and financial markets.

Based on these observations, the theoretical model set out here seeks to answer several questions: Does debt bondage constitute an additional reason why children are put to work? Despite the fact that households “voluntarily” enter into interlinked contracts of debt and labor services, does bondage perpetuate poverty among agrarian households? Can debt bondage persist as a stable equilibrium outcome? The findings indicate that as long as the degree of

27. This reiterates the discussion earlier on how debt bondage will prevail in a stationary state whenever the degree of credit market imperfection is sufficiently acute ($\rho^2(1+i) < 1$), regardless of the degree of enforcement of the minimum age law.

TABLE 9. Summary of Policy Implications for Households Engaged in Debt Bondage

Policy	Initial impact on		Welfare (V^d)	Savings (B_1)	Long-term effects on child labor, welfare, and savings ^a
	Child labor				
<i>Law enforcement (an increase in enforcement intensity)</i>					
	Positive	If subsistence consumption is high relative to harvest earnings	Negative	Negative	More ineffective once savings adjust to reflect lower harvest household income
<i>Anticipated direct transfers (an increase in transfers to indebted households)</i>					
	Ineffective	—	Ineffective	Ineffective	—
<i>Access to credit (lower interest i_A when debt bondage prevails)</i>					
	Negative	—	Positive	Positive	More effective once savings adjust to reflect higher harvest household income
<i>Rural public works programs (an increase in lean-season wage and harvest season productivity)</i>					
	Negative	If worker payment in lean season is sufficiently higher than the increase in labor productivity	Positive	Positive	More effective once savings adjust to reflect higher harvest household income

^aWhen the corresponding conditions governing initial effects apply.

TABLE 10. Summary of Policy Aimed at the Eradication of Debt Bondage

Policy	Initial impact on				Long-term effects on ^a	
	Debt bondage		Child labor (on eradication of debt bondage) ^b		Debt bondage	Child labor (on eradication of debt bondage) ^b
<i>Law enforcement</i>						
	Effective	If enforcement intensity is sufficiently large	Positive	If subsistence consumption is high relative to harvest earnings	Ineffective	—
<i>Anticipated direct transfers</i>						
	Ineffective	—	—	—	Ineffective	—
<i>Access to credit</i>						
	Effective	If i_A is less than i	Positive	—	Effective	Positive
<i>Rural public works programs</i>						
	Effective	If worker payment in lean season is sufficiently higher than the increase in labor productivity	Negative	If worker payment in lean season is sufficiently higher than the increase in labor productivity	Effective	Negative

^aWhen the corresponding conditions governing initial effects apply.

^bThese indicate child labor supply response from households free of debt bondage.

asymmetry in credit access is large enough, the answer to all three questions is yes. Debt bondage turns out to be an important feature in the cycle of poverty and child labor in agrarian economies.

These findings form the basis of the analysis of four types of policies aimed at combating child labor in debt bondage in poor agrarian in economies. In each case the merits and drawbacks of policy measures cannot be appropriately ascertained without accounting for the principal–agent relationship between households and landlords and the interplay between the need for consumption smoothing and the supply of child labor. Specifically, although standard demand-side disincentives, such as enforcement of minimum age laws, are expected to put checks on debt bondage, as households become less able to repay outstanding loans, the net outcome can in fact be an increase in child labor supply if, for example, subsistence consumption needs are sufficiently acute. Meanwhile, an examination of supply-side policies such as direct transfers to indebted households spells out the importance of understanding the institution of debt bondage as an implicit contract. Specifically, the welfare of households engaged in debt bondage depends critically on the availability of outside options. As such, discriminatory transfers that target solely indebted households have no impact on the equilibrium incidence of child labor.

An important theme that emerges is that the eradication of child labor in debt bondage need not imply the eradication of child labor. In particular, so long as lean-season consumption needs and low adult wages in the harvest season are not addressed, child labor supply may in fact increase as households switch from landlords as a credit source to other alternatives, particularly if the alternatives offer easier credit terms. Thus, although the basic empirical and theoretical conclusions in this article reiterate popular conceptions about the workings and welfare consequences of child labor arising out of bondage, the findings also caution against wholesale implementation of policy measures without due consideration of the institutional features specific to debt bondage.

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Children's Working Hours and School Enrollment: Evidence from Pakistan and Nicaragua

Furio Camillo Rosati and Mariacristina Rossi

Although much of the literature on child labor looks at the decision on whether to send a child to school or to work (or both), little attention has focused on the number of hours worked. This article analyzes the determinants of school attendance and hours worked by children in Pakistan and Nicaragua. A theoretical model of children's labor supply is used to simultaneously estimate the school attendance decision and the hours worked, using a full model maximum likelihood estimator. The model analyzes the marginal effects of explanatory variables, conditioning on latent states, that is, the propensity of the household to send the child to work or not. These marginal effects are in some cases rather different across latent states, with important policy implications.

Child labor is thought to be harmful to children's welfare in many ways. It interferes with human capital accumulation and may affect the present and future health of the child. The recent literature has explored the determinants of child labor supply (see Basu 1999; Rosati and Tzannatos 2003; Cigno and others 2001; Cigno and Rosati 2002), focusing largely on the determinants of the categorical decision of the household on whether to send a child to school or to work or both.¹ Almost no attention has been paid to the amount of time that children devote to work (whether this is their sole activity or whether it is combined with school attendance). An exception is Ray (2000), which treats labor supply separately from the household decision to send a child to school.

The number of hours spent working not only is important in itself as a measure of child welfare (as a measure of forgone leisure, for example) but is also essential for evaluating the cost of work in terms of health and human capital accumulation. This article adds to the literature by focusing on the

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1. The cited literature also looks at the quantitatively nonnegligible cases in which children appear to neither work nor go to school.

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simultaneous decision on school attendance and amount of work supplied. A simple theoretical model is constructed to simultaneously estimate two equations. In addition to giving full consideration to the joint decisions about work and schooling, the model also calculates marginal effects, conditioning on the “latent” propensity of the child to attend school or to work. These marginal effects are in some cases rather different across latent states; this has interesting analytical and policy implications.

I. THE THEORETICAL OUTLINE AND THE MODEL

Consider an altruistic arrangement in which parents care about the present and future consumption and current leisure of their children.² The number of children is taken as given and for simplicity of exposition is normalized to one.³ Human capital accumulation is the only way to transfer resources for children’s future consumption.⁴ Human capital is accumulated by sending children to school.⁵ The time a child has to spend at school is fixed at h_S . Normally, school hours are not flexible, and school attendance requires a minimum fixed amount of time devoted to school. Some of the children who both work and attend school might miss some classes, thus making their school hours more flexible. However, the flexibility that can be achieved in this way is limited, because skipping school often leads to dropping out and is normally not tolerated by school authorities.⁶ Hence, school hours are treated as fixed.

School attendance does not rule out child labor, but working hours are assumed to have a negative influence on human capital accumulation. Hours spent at work reduce time available for study, tire the child, and reduce learning productivity. Because most children perform mainly unskilled labor and mostly on a family farm or business, the hours spent at work, h_L , can be considered flexible and so can be treated as a continuous choice variable.

2. As discussed in Rosati and Tzannatos (2003), similar results are obtained if a nonaltruistic model is used.

3. Endogenous fertility does make a difference to child labor analysis (Rosati and Tzannatos 2003), but for the current analysis, nothing of substance is changed by treating fertility as exogenous.

4. If capital markets were present, the efficient level of human capital investment would equalize returns to human capital investment and the market interest rate. Allowing for the presence of capital markets complicates the exposition without bringing additional insights. For a discussion of the role of capital markets in determining child labor supply, see Rosati and Tzannatos (2003).

5. Child labor could also contribute to human capital accumulation through, for example, on the job training. This case is not included in the discussion for two reasons. First, there is no evidence to substantiate the claim that child labor is a means to accumulate human capital. Second, formal education plays an empowerment role that goes beyond that of increasing the productivity of working time. This effect is captured in the model by introducing human capital as such as an argument of the utility function.

6. There are programs that try to make school hours more flexible to accommodate child labor activities, but their coverage is marginal, and in any case, such programs are not present in Pakistan.

The human capital production function takes the form

$$(1) \quad H = h(h_L; h_S); h(,0) = 0,$$

where $\partial H/\partial h_L < 0$. Parents maximize a utility function defined over the current consumption of household members and the current leisure and future consumption of the children.

If parents send their children to school, current household consumption, C_{1S} , is given by

$$(2) \quad C_{1S} = y + w h_L - q$$

where y is the (exogenous) income of the parents, w is the wage rate (marginal product) of child labor, and q is the direct cost of education. Children's future consumption, C_{2S} , is given by $K + H$, where K is the exogenous endowment of human capital and H is defined in equation 1. Parents also attach value to the current leisure enjoyed by children, $L = 1 - h_S - h_L$ (having normalized total available time to one).

If parents do not send their children to school, present household consumption is given by $C_1 = y + w h_L$, future consumption by $C_{2L} = K$, and current leisure by $L = 1 - h_L$.

In both cases the choice variable is h_L (the time spent at work), but the money and time budget constraints differ according to whether the child is sent to school or not.

As the amount of time required by school attendance is fixed, the parents' choice of h_L is given by

$$(3) \quad \text{Max}[U_S^*(h_L), U_L^*(h_L)],$$

where

$$(4) \quad U_S^* = \max_{h_L} U(y + w h_L - q, K + H(h_L; h_S), 1 - h_S - h_L; M)$$

and

$$(5) \quad U_L^* = \max_{h_L} U(y + w h_L, K, 1 - h_L; M)$$

and M represents a vector of household characteristics, such as education of the parents and location of household. In other words, parents compare the maximized utility under the two regimes and select the one that yields the highest welfare.

The optimal decision regarding school enrollment, s , is given by

$$(6) \quad s > 0, \text{ if } U_S^* > U_L^*$$

and vice versa.

The system of equations 3–6 generates two behavioral equations in s and h_L , which can be expressed in reduced form as functions of the set of exogenous variables already discussed.

The comparative statics properties of the model show that as parents' income rises, the probability that a child attends school increases and the number of hours worked falls. An increase in the cost of schooling reduces human capital accumulation. These results depend on the simplifying assumptions of exogenous fertility and absence of capital markets. Relaxing such assumptions does not change the results of interest here, but it will make a difference to the discussion of child labor policies. (A detailed analysis of these issues can be found in Rosati and Tzannatos 2003). Note that other things being equal, child labor supply is expected to be lower when children are attending school because of the negative effect on human capital accumulation and the higher marginal value of leisure. Also observe that corner solutions are possible in both regimes for h_L .

As illustrated, the decisions on schooling and working are simultaneous. In particular, a child is enrolled in school if $U_S^* - U_L^* > 0 \Rightarrow s^* > 0$, and the hours of work supplied by the child also depends on enrollment status.

Hours worked and enrollment status are modeled using the following reduced form.⁷

$$(7) \quad s^* = Z'g + u$$

$$(8) \quad h^* = X'b + \varepsilon,$$

where h^* is hours worked, s^* is enrollment status, and ε and u are the disturbance terms following a bivariate normal distribution with zero means and variance covariance matrix, Σ , as follows:

$$\Sigma = \begin{bmatrix} 1 & \sigma_{\varepsilon u} \\ \sigma_{\varepsilon u} & \sigma_{\varepsilon}^2 \end{bmatrix}.$$

The two equations are allowed to be correlated through their error terms. One possible source of correlation is the unobservable (by a researcher) ability of the child. If children with higher abilities are more likely to go to school and work fewer hours, a negative correlation between the two error components would be expected.

Both the enrollment rate and the hours worked are latent variables. Enrollment is observed as a dichotomous variable, according to the following structure:

$$s = 1 \text{ if } s^* > 0$$

$$s = 0 \text{ if } s^* \leq 0$$

7. The subscript L is dropped because no confusion can arise.

Because it is not possible to buy time, the hours worked are censored at zero. Observed hours worked are assumed to be described by the following Tobit model:

$$b = b^* \text{ if } b^* > 0$$

$$b = 0 \text{ if } b^* \leq 0$$

The joint decision of working and studying is described by a simultaneous equation model that combines a tobit and a probit model with correlated disturbances. More specifically, each observation belongs to one of the four possible regimes:

1. Working hours > 0 , enrolled;
2. Working hours $= 0$, enrolled;
3. Working hours > 0 , not enrolled;
4. Working hours $= 0$, not enrolled.⁸

The model is estimated by maximum likelihood. The log likelihood function, L , for estimation of the parameters b , ρ , and σ is given by

$$L = \sum_{i \in 1} \ln p(s = 1, b^* > 0) + \sum_{i \in 2} \ln p(s = 1, b^* \leq 0) + \sum_{i \in 3} \ln p(s = 0, b^* > 0) + \sum_{i \in 4} \ln p(s = 0, b^* \leq 0)$$

II. THE DATA SETS

Two data sets were used in the estimates, drawn from surveys in Pakistan and Nicaragua. This permitted testing the determinants of hours of work and school enrollment with data from largely different economies with different social structures and different patterns of children's employment. A relatively larger number of children work for wages in Pakistan than in Nicaragua. This allows for greater confidence in the generality of the results obtained.

8. The probability associated with each of the regimes can be written as follows:

$$\Pr(1) = P(h^* > 0) * P(s = 1 | h^* > 0) = \phi(b^* - X'b, \sigma) \Theta \left(\frac{(Z'g + \rho\sigma^{-1}(b^* - X'b))}{\sqrt{1 - \rho^2}} \right)$$

$$\Pr(2) = P(s = 1, h^* = 0) = \Theta 2(-X'b/\sigma, Z'g, -\rho)$$

$$\Pr(3) = P(h^* > 0) * P(s = 0 | h^* > 0) = \phi(b^* - X'b, \sigma) \left(1 - \Theta \left(\frac{(Z'g + \rho\sigma^{-1}(b^* - X'b))}{\sqrt{1 - \rho^2}} \right) \right)$$

$$\Pr(4) = P(s = 0, h^* = 0) = \Theta 2(-X'b/\sigma, -Z'g, \rho)$$

where $\phi, \Theta, \Theta 2$ are respectively the univariate density function, univariate cumulative function, and the bivariate cumulative function

Pakistan

The survey in Pakistan, carried out in 1996, contains information on working children (age, gender, location, occupation, and industry); working conditions (hours worked, wages received, terms of employment, and safety and health aspects of the workplace); and socioeconomic characteristics of the children and their families. The Pakistan survey is part of the Statistical Information and Monitoring Programme on Child Labor led by the International Labour Organization (ILO) as part of its International Program for the Elimination of Child Labor (IPEC). The survey covers 10,453 households with an average of eight members, for a total of 77,684 household members. The goal of the survey is to investigate the conditions of working children, so only households that reported child labor within the age group 5–14 years were interviewed. The sample, therefore, is representative of the subset of the population of households that have at least one child working.

On the basis of the survey data on households with at least one working child, ILO-IPEC estimated that during the reference week 3.3 million children of the total of 40 million children ages 5–14, or 8.3 percent, were economically active and that during most of the previous 12 months almost 8.1 percent had as their principal activity either working or being available for economic activity.⁹

In the model estimates, however, references are to the sample of households with at least one working child and not to the whole Pakistani population. After eliminating observations with missing values, there are 27,512 children aged 5–14 in the sample. Table 1 shows the proportion of children who work and are enrolled in school programs and the proportion of full-time students and part-time workers among total children in the sample. The overall enrollment rate is about 40 percent, and there are very large gender differentials in enrollment rate at all age groups. A large proportion of the children cannot be classified in any of the three activities: “working only,” “studying only,” and “working and studying.” They are classified as children with “no activities.” Girls are more

TABLE 1. Children’s Activities by Gender in Pakistan, 1996 (percentage of all children in sample aged 5–14)

Activity	Male	Female	Total
Work only	36.35	27.49	32.83
Study only	29.85	20.36	26.08
Work and study	19.56	2.32	12.71
No activities	14.24	49.82	28.38
Total	100	100	100

Source: ILO-IPEC 1996 Statistical Information and Monitoring Programme on Child Labor survey.

9. For details, refer to the technical documentation on the ILO Web site (www.ilo.org).

TABLE 2. Children's Activities by Gender in Nicaragua, 1998
(percentage of all children in sample aged 6–14)

Activity	Male	Female	Total
Work only	8.61	1.07	4.88
Study only	66.69	76.29	71.44
Work and study	6.81	2.77	4.81
No activities	17.90	19.87	18.87
Total	100	100	100

Source: Living Standards Measurement Study survey 1998.

likely than boys to belong to this group, probably because the questionnaire does not classify household chores as working activities.

Nicaragua

The Nicaragua survey, conducted in 1998, was part of the Living Standards Measurement Study survey.¹⁰ There are 6,084 children aged 6–14 in the sample, representing 28.8 percent of the sample.

About 71 percent of children attend school (table 2). Attendance is higher for girls than for boys at all ages. Most of the children study only (76 percent of girls and 67 percent of boys). Girls are less likely than boys to work. About 20 percent of the children are apparently involved in no activities. Most of these are girls, again perhaps reflecting their greater participation in household chores than boys.

III. ESTIMATES OF CHILDREN'S LABOR SUPPLY AND SCHOOL ATTENDANCE

Table 3 present descriptive statistics, and tables 4 and 5 present the results of the maximum likelihood estimates for Pakistan and Nicaragua. The coefficient of correlation, ρ , is negative in both estimates, indicating that it would be inappropriate to estimate the two equations separately. This is confirmed by the estimated coefficients for independent probit and tobit regressions, which differ from those obtained in the maximum likelihood estimation by more than 10 percent in some cases. It is beyond the scope of this article to try to establish the direction of the bias and the characteristics of the correlation structure among the variables that are likely to influence the size and the direction of the bias itself.¹¹

10. The Living Standards Measurement Study was developed by the World Bank in 1980 to explore ways of improving the type and quality of household data collected by government statistical offices in developing economies.

11. For reasons of space, the results are not shown here. Interested readers are referred to a longer version of the article available online at www.ucw-project.org.

TABLE 3. Descriptive Statistics

Variable	Pakistan		Nicaragua	
	Mean (1)	SD (2)	Mean (1)	SD (2)
Weekly hours worked	15.72	20.74		
Daily hours worked			0.68	2.11
Weekly hours worked if working	35.29	16.59		
Daily hours worked if working			5.94	2.77
Age (years)	10.14	2.780	9.82	2.58
Household size (number of members)	8.46	3.54	7.74	2.99
Number of babies	1.38	1.30	3.13	1.45
Number of children	3.55	1.48	1.04	1.07
Household (net) income (rupees)	2,968.34	2,588.09		
Household income (cordobas)			4,779.45	5,894.62
Proportion of female	0.389	0.487	0.49	0.50
Proportion of rural	0.435	0.496	0.55	0.50
Father's education: proportion with primary	0.267	0.442	0.42	0.49
Father's education: proportion with secondary or more			0.19	0.40
Mother's education: proportion with primary	0.053	0.225	0.44	0.50
Mother's education: proportion with secondary or more			0.16	0.37
Number of observations	27,512		4,278	

Note: The samples consist of children aged 5–14 in Pakistan and 6–14 in Nicaragua.

Source: Authors' computations based on ILO-IPEC 1996 Statistical Information and Monitoring Programme on Child Labor survey (Pakistan) and the Living Standards Measurement Study survey of 1998 (Nicaragua).

The regressors used in the enrollment equation include the following variables for the Pakistani data: age, age squared, household income net of child earnings,¹² household size, number of children aged 5–14, number of children aged 0–5, number of children aged 0–5 interacted with the female dummy variable, a dummy variable for girls, a dummy variable for rural areas, and dummy variables for fathers or mothers who have at least a primary education. A similar set of regressors was used for Nicaragua, with a change in the dummy variables for parents' education to reflect the different characteristics of the sample: one dummy variable for parents' completion of primary school and

12. To obtain total adult income, children's wages were first estimated using a two-step Heckman procedure to predict the earnings of children who do not work for a wage or for whom wage data are not available and then netting out the predicted child earnings from the household income.

a second for completion of secondary school. Moreover, because the data for Nicaragua did not allow separating adults' and children's income, total expenditures were used as a proxy for total available household resources.

The structure of the model enables estimation of the marginal effects, conditioning on the latent status of children: enrolled or not, working or not. This provides information on the effects of exogenous variables differentiated by latent status of children. The differences that emerge among the various groups are not negligible, indicating that the policy effects of the interventions might be differentiated according to the target selected.

Columns (a) and (b) of tables 4 and 5 report the marginal effects conditioned on desired working hours being positive or not. Some of the explanatory variables have quite different effects on the two (high and low propensity to work) groups.¹³ School enrollment is a nonlinear function of age. Income has a positive effect on enrollment. However, the effect is much smaller for children with a high propensity to work compared with the other group. The household composition effects are well determined. With income controlled for, these effects should reflect mainly the marginal productivity of children's time in the various activities. Again, the marginal effects are differentiated across latent groups. Household size has a negative and small effect on the probability of attending school for the potentially working children, and it has a strong and significant positive effect on the other group. Substitutability between adult and child work appears to be stronger in households that are not likely to send their children to work than in those that are.

An additional child in the household negatively affects the enrollment rate for the nonworking children in both countries. The presence of preschool-age children reduces the enrollment probability for children who are not likely to work and has the opposite effect for children who are likely to work. This effect is more pronounced for girls, even though in Nicaragua it is significant only at the 10 percent level. Children living in rural areas are also less likely to be enrolled in school. The presence of a significant gender differential in enrollment is confirmed by the estimates in both countries, albeit in opposite directions. In Pakistan girls are less likely than boys to be at school, and the probability decreases further if there are preschool-age children in the household, as shown by the negative coefficient of the product of the number of young children in the household and the dummy for being a girl. In contrast, girls have a higher probability than boys of being enrolled in school in Nicaragua, although the chances of attending school are reduced if there are preschool-age children in the household.

Columns (c) and (d) of tables 4 and 5 show the marginal effects on working hours conditional on the latent enrollment or nonenrollment status of the

13. The standard errors of the marginal effects are reported in the extended version of the article (www.ucw-project.org).

TABLE 4. Maximum Likelihood Estimates of Child Enrollment and Hours Worked in Pakistan

Regressor	Enrollment				Hours			
	Estimated coefficient	P^a	Marginal effect		Estimated coefficient	P^a	Marginal effect	
			working (a)	not working (b)			enrolled (c)	not enrolled (d)
Age	0.592	0.000	0.192	0.459	18.762	0.000	4.712	3.899
Age ² / 100	-3.339	0.000	-0.205	-2.178	-49.515	0.000	-1.308	2.817
Household size	0.038	0.000	-0.006	0.021	0.033	0.782	-0.221	-0.264
Number of children	0.023	0.011	-0.061	-0.014	-3.686	0.000	-1.798	-1.794
Number of babies	-0.051	0.000	0.035	-0.015	1.685	0.000	1.073	1.116
Number of babies * female child	-0.127	0.000	0.067	-0.047	2.924	0.000	2.104	2.221
Household income/1000	0.032	0.000	0.008	0.016	-0.173	0.036	-0.278	-0.313
Female child	-0.375	0.000	-0.133	-0.173	-28.744	0.000	-8.389	-11.25
Rural	-0.048	0.004	-0.018	-0.021	-1.307	0.001	-0.603	-0.768
Father with primary education or more	0.620	0.000	0.245	0.237	-5.115	0.000	-0.401	-0.927
Mother with primary education or more	0.460	0.000	0.179	0.181	-3.760	0.000	-0.266	-0.714
Constant	-2.966	0.000			-115.923	0.000		
Coefficient of correlation	-0.643							

^aProbability that true coefficient is zero.

Source: Authors' computations based on ILO-IPEC 1996 Statistical Information and Monitoring Programme on Child Labor survey (Pakistan) and the Living Standards Measurement Study survey of 1998 (Nicaragua).

TABLE 5. Maximum Likelihood Estimates of Child Enrollment and Hours Worked in Nicaragua

Regressor	Enrollment				Hours			
	Estimated coefficient	P^a	Marginal effect,		Estimated coefficient	P^a	Marginal effect,	
			working (a)	not working (b)			enrolled (c)	not enrolled (d)
Age	0.777	0.000	0.464	0.174	3.092	0.001	5.161	-2.792
Age ² / 100	-0.041	0.000	-0.011	-0.009	-0.059	0.165	-0.113	0.177
Household size	0.0386	0.005	-0.070	0.009	-0.564	0.000	-0.834	-0.357
Number of children	-0.035	0.149	0.076	-0.008	0.603	0.009	0.896	0.350
Number of babies	-0.132	0.000	0.161	-0.029	1.316	0.000	1.922	1.034
Number of babies * female child	-0.067	0.108	-0.041	-0.015	-2.78	0.515	-0.463	0.238
Household income/1000	0.0968	0.000	0.010	0.022	0.016	0.749	0.082	-0.460
Female child	0.2295	0.001	0.007	0.046	-6.083	0.000	-0.804	-1.109
Rural	-0.362	0.000	-0.108	-0.105	3.196	0.000	0.470	0.673
Father with primary education or more	0.2562	0.000	0.104	0.072	-0.900	0.072	-0.073	-0.095
Mother with primary education or more	0.4575	0.000	0.180	0.229	-0.914	0.281	-0.020	0.001
Father with secondary education or more	0.3073	0.000	0.124	0.084	-1.524	0.002	-0.161	-0.214
Mother with secondary education or more	0.4901	0.000	0.192	0.123	-3.791	0.000	-0.453	0.612
Constant	-3.298	0.000			-32.186	0.000		
Coefficient of correlation	-0.344							

^aProbability that true coefficient is zero.

Source: Authors' computations based on ILO-IPEC 1996 Statistical Information and Monitoring Programme on Child Labor survey (Pakistan) and the Living Standards Measurement Study survey of 1998 (Nicaragua).

working child.¹⁴ Once the covariance in the errors is taken into account, the marginal effects are quite different from the estimated coefficients. An increase in income reduces the number of hours children work, with a stronger effect for children who are likely not to be in school. Household size has a negative effect on hours worked: children in larger households work fewer hours, if they work. The presence of an additional preschool-age child increases the number of hours worked. This effect is more pronounced for girls (though not significant for girls enrolled in school in Nicaragua), as shown by the positive coefficient of the interaction between number of children and being a girl. In Nicaragua the presence of an additional school-age child in the household increases the daily hours worked by more than an hour.

Girls work fewer hours than boys, probably because household chores are not recorded as working activities in the survey. Children working in rural areas are less likely to attend school, but they work fewer hours than do children working in urban areas.

The results are similar for Nicaragua and Pakistan. The main differences are in the effects of the number of school-age children and area of residence. Children in households with larger numbers of school-age children tend to work more hours in Nicaragua but fewer hours in Pakistan. Living in a rural area increases the number of hours worked in Nicaragua but lowers the hours in Pakistan.

IV. CONCLUSIONS

The literature on child labor has somewhat neglected the determinants of the number of hours worked by children in favor of the determinants of the household decision to send children to school or work. Knowing the duration of work is important for assessing its impact on children's health and human capital accumulation. A simultaneous equation system was derived from a simple theoretical framework and used to estimate household decisions relative to children's school enrollment and hours worked. The results show the importance of taking into account the simultaneity of the decision about schooling and hours worked in assessing the importance of different explanatory

14. The marginal effects in column (c) were obtained by differentiating with respect to each regressor the expected value of the hours worked conditional on the enrollment and working status of the child (Maddala 1993):

$$E(h|h^* > 0, s^* > 0) = \beta'X + \frac{\sigma}{\Phi_2(X'\beta, Z'g, \rho)} \left(\phi(-X'\beta/\sigma) \Phi\left((1 - \rho^2)^{-1/2}(Z'g - \rho X'\beta/\sigma)\right) + \rho(-Z'g) \Phi\left((1 - \rho^2)^{-1/2}(X'\beta/\sigma - \rho Z'g)\right) \right).$$

Total marginal effects of the enrollment probability conditional on the working status of the child in column a are derived by partially differentiating the enrollment probability with respect to each regressor: $E(s^* > 0 | h^* > 0) = \Phi_2(X^*\beta^*, Z'g, \rho) / \Phi(X^*\beta^*)$.

variables. In this simultaneous system the effect of the variables on the hours worked also depends on the changes they induce in the probability that a child is sent to school, through the correlated error terms of the two equations.

Moreover, the structure of the model allows the marginal effects to be computed conditional on the latent variable indicating the propensity of the household to send the child to work or not. These marginal effects may be very different among the two groups and show that policy action can have a different impact depending on whether the child is likely to be sent to work or not.

Consider, for example, the case of income. The results indicate that policies aiming to reduce child labor by introducing incentive schemes (like income transfers) that only marginally modify the opportunity set of the household are likely to produce more significant effects on households that are at the margin between sending their children to work or to school—households that have a low propensity for child labor. Such schemes are likely, if not properly targeted, to be ineffective in households—most likely the poorest and most uneducated—that have a high propensity to send their children to work.

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Child Labor: A Normative Perspective

Debra Satz

Examining child labor through the lenses of weak agency, distributive inequality, and harm suggests that not all work performed by children is equally morally objectionable. Some work, especially work that does not interfere with or undermine their health or education, may allow children to develop skills they need to become well-functioning adults and broaden their future opportunities. Other work, including child prostitution and bonded labor, is unambiguously detrimental to children. Eliminating these forms of child labor should be the highest priority. Blanket bans on all child labor may drive families to choose even worse options for their children, however. Moreover, child labor is often a symptom of other problems—poverty, inadequate education systems, discrimination within families, ethnic conflicts, inadequately protected human rights, weak democratic institutions—that will not be eliminated by banning child labor.

The International Labour Organization (ILO 2002) estimates that more than 246 million children are engaged in labor. Although the incidence of child labor has been falling globally, it is doing so unevenly, and in some areas it appears to be on the rise (Fallon and Tzannatos 1998).

The widespread existence of child labor has provoked both popular outrage and legislative initiatives aimed at banning the sale of all products made by children. But developing economies—and many development economists—have cautioned against universally proscribing child labor. They argue that such bans will be inefficient and will hurt poor families and their children. Some economists have voiced concern about paternalistic interference with family strategies that may have evolved rationally in the context of poverty and inadequate education systems. Others point out that because child labor is itself heterogeneous, ranging from light work delivering newspapers after school to child prostitution, uniform policies may undermine the ability to target its worst forms.

There is considerable debate, then, as to whether establishing and enforcing a uniform worldwide set of standards for dealing with child labor is desirable.

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Against the background of this debate, this article explores the normative issues posed by child labor. It identifies several considerations that make child labor morally problematic, considerations that turn on issues of weak agency, distributive inequality, and harm.¹ It concludes that the worst forms of child labor, including child prostitution and the use of children in wars or as bonded laborers, should be unconditionally prohibited.

Other types of child labor may need to be tolerated under certain circumstances, at least in the near future, even as efforts are made to eradicate them. Legal toleration, however, does not imply indifference, and states and non-governmental organizations (NGOs) can protect and promote the interests of children in many ways. In particular, they can take broad social measures to improve outcomes for children, especially by ensuring that all working children are educated.

Whatever policies are adopted will involve tradeoffs between different values. Policymakers need to make explicit the values they want to promote and the tradeoffs they are willing to accept. Normative judgments cannot be escaped: they are implicated in the selection of research questions, in the data sought, and in policy design.

I. WHAT IS A CHILD?

Many countries define childhood in terms of chronological age; others take into account social factors. In some African countries, for example, 10-year-old apprentices or brides are no longer assumed to possess all the characteristics that industrial countries bundle together into the status of "child." They may be eligible for marriage but not entitled to make decisions independently of their parents. Different countries invoke different age thresholds of adulthood; even within countries such thresholds can diverge—one age for voting, another for employment, another for military service.

What is the normative basis of modern society's view of childhood?² The concept of a child, implicit in moral and legal practices, is that a child is a person who is in some fundamental way not developed but rather developing (Schapiro 1999). Because of this undeveloped condition, adult parents or surrogates are needed to act on children's behalf. Parents or surrogates are thus given special obligations, including the obligations to protect, nurture, and educate children. These obligations are paternalistic, because adults feel bound to fulfill them, whether the children in question consent to be protected, nurtured, or educated.

1. For a discussion of the dimensions of "noxious markets," see Kanbur (forthcoming) and Satz (forthcoming). I have been very influenced here by Kanbur's approach.

2. Despite the different age thresholds and bundlings they employ, almost all societies share a common view of childhood. If this seems overreaching, it is certainly true that a common notion is shared by the United Nations, liberal democracies, and most international aid agencies.

Adults feel justified in treating children paternalistically because children have not yet developed the cognitive, moral, and affective capacities to deliberate and act competently in their own interests.³ At the same time, children have legitimate claims to have their interests considered: they are not simply tools. Children are not yet full persons, but they are persons.

II. NORMATIVE DIMENSIONS OF CHILD LABOR

Consider the normative dimensions of child labor. Child labor raises moral concerns because of the weak agency of children (and sometimes their parents), its connections to underlying inequalities, and especially its potential for harm.

Weak Agency

Children cannot be assumed to have full agency. They lack the cognitive, moral, and affective capacities of adults, and they seldom have the power in the family to make decisions about how to allocate their time.⁴ As Humphries (1999) has pointed out, there is no *infans economicus* responding to market signals; most children are put to work by their parents. Parents are the primary decision-makers for children, especially very young children, exercising authority and control over most aspects of their children's lives.

Consider the contrast with ideal labor markets, in which workers and employers are fully rational agents who transact on their own behalves with perfect information. In child labor, as noted, parents make the market decisions concerning their children's time. This gap between chooser and chosen for in the market for child labor opens up the possibility that children's interests will be discounted. Surrogate decisionmaking is a morally fraught arena, especially in the case of young children, who often cannot even articulate their own interests. Moreover, such surrogate agency often breaks down, as in the case of parents who lose custody of children they have abused, exploited, or neglected.

Child labor also differs from ideal labor markets in that the decisionmaker may lack relevant information regarding the consequences of his or her choice. The costs of child labor can extend far into the future, having, for example, long-term adverse effects on health. It is not clear that these costs are taken into account, even by well-meaning parents. Lack of information may be especially

3. Children should not be seen as merely passive "patients" whose opinions never need be consulted. Clearly, the extent of children's agency increases over time, so that 3-year-olds differ dramatically from 16-year-olds in terms of their level of effective rational agency. The fact that children's agency is lower than that of adults does not denigrate the contributions children make to their own well-being or the well-being of others.

4. Children orphaned by AIDS or civil wars and older children who have fled abusive homes do make decisions on their own behalf. But even in these cases, to the extent that their powers of decision remain undeveloped, they cannot generally be seen as full agents.

important if the parents are themselves from very poor or despised castes. As Drèze and Gazdar (1996:86) point out, “the ability of parents to assess the personal and social value of education depends, among other things, on the information they have at their disposal. If their entire reference group is largely untouched by the experience of being educated, that information might be quite limited.” It is noteworthy that children in bonded labor tend to have parents who were also bonded laborers (Burra 1995).

Agency problems (surrogate decisionmaking, ignorance, uncertainty about the future) may be associated with child labor. But even if child labor were fully informed and voluntary, it would not necessarily be morally justified. If all the options poor children and their parents face are unjust, the option chosen does not by some mysterious process become just. A key input for the moral assessment of an action depends on one’s views about the moral legitimacy of the socially available choices an agent faces. Whether a voluntary choice confers legitimacy depends on other conditions besides its being voluntary.

Distributive Inequality

Child labor may appear particularly objectionable because of the inequalities that underlie it. These inequalities can occur between societies (poor children working in rich multinational firms) or between families within a society (domestic elites whose children receive excellent education versus poor families whose children work as bonded laborers). Child labor appears as a symptom of an objectionable level of inequality. In many countries, undemocratic institutions and caste and ethnic divisions compound these inequalities.

Child labor can also manifest and perpetuate inequality within families. Some families may sacrifice a working child for the sake of other children or family members. They may, for example, keep girls out of school to care for younger children while the mother works outside the home.⁵ The bias in favor of some children within a family over others is troublesome (see Jejeebhoy 1992).⁶

Harmful Outcomes

The nature of the damage generated by child labor depends on the form of child labor. Many international protocols (including the ILO’s Worst Forms of Child Labor Convention 182 and the Sanders Amendment considered by the U.S. Senate in 1997) view forced labor as one of the worst forms of child labor. But

5. Indeed, girls may be systematically undervalued by their families. Such discounting helps explain why, as Amartya Sen has dramatically phrased it, “more than 100 million women are missing,” mainly in South Asia and China (see Sen, 1999).

6. Child labor may also reflect power inequalities between mothers and fathers. A growing body of evidence suggests that mothers have a stronger preference than fathers for investing in their children’s welfare, including education (Haddad, Hoddinott, and Alderman 1977). See Agarwal (1995) for evidence that land allocation to women rather than men results not only in higher productivity in agriculture but also in better outcomes for children.

forced labor is not a useful category for distinguishing the most harmful forms of child labor from others. Parents make paternalistic decisions on behalf of their children that can include forcing children to go to school. It follows that almost all child labor (and child education) is forced. It is not possible to identify what is harmful about child labor without a fuller theory of children's interests.

Children have two kinds of interests, what Sen (1985) calls welfare interests and agency interests. Welfare interests concern a person's overall good; agency interests concern the ability to participate in deciding matters that bear on that good. Both children and adults have these interests but in different ways and to different degrees.

Consider welfare interests first. A child's present welfare interests include shelter, food, health, education, bodily integrity, and a stable, loving relationship with his or her parents (or other caregivers). Children need parents to protect and provide for these interests because they cannot yet provide for them themselves.⁷ The state needs to play a crucial role in protecting children against parental abuse and neglect.

An adult's welfare interests are different. First, adults are not dependent on others in the same way children are. Given appropriate background conditions, adults are assumed to have the capacity to provide for their own welfare: to obtain nourishment, health, and shelter; avoid escapable mortality and premature morbidity; and exercise a range of capabilities. Second, adults' welfare is shaped by their own values and concerns—values and concerns that they have the capacity to endorse or change.

Very young children have few immediate agency interests. But unlike other dependent and vulnerable people (for example, people with severe cognitive disabilities), given appropriate background conditions children will develop the capabilities to set goals for themselves and act in accordance with their own values. As they develop, children's interest in exercising their agency grows, although given their lack of competency and experience, societies still reasonably set legal bounds on it.

Adults, by contrast, have a significant interest in exercising their agency, in being educated participants in decisions that affect their lives. They find it offensive to be treated as children. They willingly allow others, such as political leaders, to make decisions on their behalf only with their consent. Ignorance and undemocratic institutions, which prevail in many of the world's poorest states, are serious obstacles to the achievement and exercise of adult agency.

Although the interests of children and adults thus differ, children are also developing into adults. Any theory of children's interests must look at those interests dynamically, as contributing to the development of their interests as

7. Of course, parents cannot provide all of the things children need, such as a clean environment. In this sense both children and parents depend on larger social institutions.

adults. No society can be indifferent to how children are raised and educated, because these factors affect the nature of its future citizens. Uneducated, illiterate, and passive adults will not be able to contribute much to social development or play a role in responding to social problems (Sen 1999).

Harms can be defined in terms of negative effects on a child's present or future (adult) agency and well-being. In particular, one can define a level of basic agency and well-being interests, the failure to satisfy which would be abusive to children, stunt the development of crucial adult capabilities, or be subversive to the state's interests in producing an informed citizenry. Child labor that violates children's basic interests would constitute extreme harm.

It is important to distinguish this standard from the "best interests of the child" standard that some children's advocates have proposed for judging child labor. That standard suffers from two major problems. First, because there is no widely shared view of what constitutes a child's best interests, parents can interpret the standard in radically different ways. Broad consensus is much more likely to be reached on a basic interests standard.⁸ Second, the best interests standard assumes that parents (which in practice usually means mothers) are mere instruments for optimizing their children's interests and do not count independently. From a moral point of view, this is just wrong. There is no inherent injustice in family structures that assume that children must make some contribution to the well-being of their families as a whole or to other family members. Tradeoffs among interests within the family are acceptable and to some extent inevitable. Work performed by children might thus be acceptable under certain conditions and given certain restrictions.⁹

III. POLICY IMPLICATIONS

What should the response be to child labor that scores poorly along these normative dimensions, manifesting weak agency on the part of children or their parents, inequality within and between families, or very bad outcomes for children? One approach, taken by some activists and NGOs, is to perceive all child labor as a violation of the rights of the child and to call for its immediate abolition. Within this framework, drawing distinctions between kinds of child labor—hazardous versus nonhazardous, bonded versus nonbonded, part-time versus full-time—is considered pointless, because anything short of full-time

8. What if a state rejects the existence of these core interests? The welfare and agency interests identified here are those whose satisfaction describes what might be called a minimally decent human life. There are a variety of ways of supporting the claim that such interests are in fact universal features of an adequate human life. One could, for example, appeal to certain physiological and psychological needs that people have regardless of their cultural circumstances or draw on the choices people make for themselves when they are in a position to make meaningful choices (see Barry 2001).

9. Given that in the family parents' interests are likely to prevail over children's interests, there are practical reasons to adopt an approach to child labor that focuses on what happens to the children in a family.

formal education for children is seen as a threat to children's basic interests. (Kabeer 2001:4) Although this approach offers little guidance on how it could be implemented—a serious concern in the context of weak states—it nevertheless has an important policy function. Rights, especially legal rights, create, legitimate, and reinforce social understandings about what people deserve (Kahneman, Knetch, and Thaler 1987). Articulating rights for children may thus have positive effects on children's welfare by reinforcing the idea that children have a claim on the state, society, and the international community for their protection.

Assessing the practicality of abolishing child labor by strictly enforcing legal sanctions is difficult, because we do not really know whether child labor is an unavoidable reality for poor countries. Debate continues over the extent to which child labor is caused by poverty and underdevelopment or by policy failures, including failures arising from social and political inequality. Weiner (1991), for example, argues that Indian elites fail to enforce compulsory universal education because they believe that educating the poor will lead to the overthrow of their rule.

Indeed, children's education, rather than child labor, has been linked to economic development. China, the Republic of Korea, and Taiwan (China) all made rapid economic progress while promoting basic education. Banning child labor and thus restricting the labor market may raise the wages of adult workers enough to make children's work unnecessary (Basu 1999). We do not yet know the limits of the possible within poor countries themselves or what the industrial countries might do to eradicate child labor if they really had the will.

Given resource constraints and the likely need for tradeoffs between values, blanket prohibitions on child labor face two important challenges. First, in some contexts, bans on all child labor may drive families to choose even worse options for their children. Children are better off attending school part-time than not at all; they are presumably better off working in factories than as prostitutes or soldiers. Policymakers must thus take care to combine legislation or efforts to ban all child labor markets with policies designed to protect children from worse outcomes on the black market.

The second objection to immediate bans on all child labor stems from recognition that child labor is often a symptom of other problems—poverty, inadequate education systems, discrimination within families, ethnic conflicts, inadequately protected human rights, weak democratic institutions—that will not be eliminated by banning child labor. Blanket legislation against child labor may do nothing to address the underlying problems. Many children who do not work do not attend school. Many of these “nowhere” children are likely to be girls (Bhatty 1998). A focus on enforcing legislative solutions may not solve the problems and may direct scarce resources away from other methods of improving children's lives.

The framework adopted here provides the basis for a somewhat different approach. Child labor can be examined through the lenses of weak agency (especially in the form of parental ignorance and adaptive preferences), distributive inequality, and harm. Within this framework not all work performed by children

is equally morally objectionable. Some work, especially work that does not interfere with or undermine their health or education, may allow children to develop skills they need to become well-functioning adults and broaden their future opportunities. Indeed, in some countries, given the deficiencies of the public education system, some children work to earn the tuition for private education (Brown, Deardorff, and Stern 2003).

Child labor is most objectionable where it clearly violates children's basic interests. The miserable conditions of abuse that children suffer in some kinds of work cannot be seen as in a child's basic interests, present or future. According to the most recent study by the ILO (2002), 171 million working children—two-thirds of all working children—are routinely exposed to health risks, abuse, and probable injury.¹⁰ An estimated 8.4 million children are caught in what the ILO refers to as “unconditional worst” forms of labor, including slavery, trafficking, debt bondage, participation in armed conflict, prostitution, and pornography. Eliminating these forms of child labor should be the highest priority. Even if under some circumstances children have to work, at least in the short term, there is no reason that they should suffer the kind of maltreatment that underlies such practices. No state, NGO, family, lending agency, or consumer can justify participating in activities in which the basic rights of children are completely disregarded, in which children are treated with contempt, their lives disposed of as carelessly as the contents of a trashcan.

Two other considerations should also be used to determine how harmful a child labor practice is. First, children who work and do not go to school will likely lack the capacities that they need—literacy, numeracy, broad knowledge of personal and social alternatives, communication skills—to effectively exercise their agency as adults. One central benefit of education is the ability of an educated person to choose in a more informed way. Education thus deeply influences the quality of a person's life. For example, the ability to read documents and newspapers can help oppressed people demand their rights; it can be especially important to women. Empirical investigations by Murthi, Guio, and Drèze (1995) indicate that female literacy is a crucial variable in empowering women in the family and lowering birth rates. Thus even child labor that is not immediately harmful can be very harmful in terms of a child's future well-being and agency interests as an adult.

Second, significant third-party harms can result from child labor, even in those cases in which it is not directly abusive to the child. Child labor can lead to an illiterate and minimally productive workforce, reduce adult wages, undermine health, and lead to a passive and ignorant citizenry.

These two types of harm—to the child's future interests as an adult and to society as a whole—are costs that parents may not take into account in making

10. Millions of children are beaten, raped, harassed, and abused, suggesting that more than economic motivations are driving employers (often the children's parents). Indeed, children's lives might be much better if only the bloodless impersonal economic motives of an ideal market were at issue.

their decisions about how to allocate their children's time. The discrepancy between parents and children's short-term interests and children's and society's long-term interests suggests two main routes for intervention. First, where child labor reflects the weak agency of children or their parents, action could be taken to try to increase both parties' agency. This could be accomplished by providing more information to parents about the costs of child labor and the benefits of education, strengthening the intrafamily decisionmaking process to bolster the mother-child axis, or requiring that parents sign enforceable agreements with their children's employers about the terms of work.

Second, interventions could aim at changing the external context of family decisionmaking. A widely cited example of a promising intervention is Mexico's Programa de Educación, Salud y Alimentación, which provides cash transfers to mothers whose children attend school. Other strategies include strengthening the education system, restricting children's work days to a limited number of hours so that they can attend school at least part-time, encouraging measures (training, organizing) to raise adult wages, and providing credit to poor families (see Grootaert and Kanbur 1995 for additional suggestions).

It is worth reflecting on the environment in which much child labor thrives: poverty, weak states, poor education systems, ethnic conflicts, massive inequalities, lack of democratic institutions. How much of South Asia, which has the highest absolute numbers of working children, has functioning labor markets? How much of the economy is characterized by bonded labor, serfdom, debt peonage, and slavery? Even if one grants that in some circumstances children must work, there is no doubt that children are vastly worse off than they would be if laws created and enforced genuinely free markets, including the right to exit from employment and restrictions on monopoly and monopsony, with perhaps the state stepping in as a source of credit to poor families. Developing and strengthening democratic political and economic institutions is likely to be an essential component in the process of ending child labor.

In the absence of broad changes in policy and commitment, different interventions will lead to different tradeoffs between values. For example, imposing a uniform and egalitarian educational system in a country may discriminate against children who are at greatest social and economic disadvantage. Some families may simply not be able to afford to send their children to school full-time. But allowing some children to attend school part-time undermines a commitment to educational equity and perhaps perpetuates caste and geographic inequalities. Tolerating child labor in some countries will give rise to worries about unfair competition in the international context. In considering various policy tools, it is thus extremely important to be explicit about which values are being favored.

IV. CONCLUSIONS

This article endorses a position between the absolutist universalists, who want to immediately abolish all child labor, and the contextualists, who seek to temporarily

accommodate it.¹¹ Tradeoffs among different values are inevitable, but there is a need to draw some bottom lines. Child labor that is abusive to children—prostitution, bondage, slavery, and the use of children as soldiers—threatens the core of their lives and should not be tolerated under any circumstances. But tradeoffs between different values above this line need to be weighed in working to eliminate other forms of child labor that score high along one or more of the normative dimensions. Although different people, organizations, families, and states will draw those tradeoffs in different ways, it is important to keep the focus on what different policies do to individual children, not to aggregates. Limits should be placed on the costs that policies impose on children in the name of future familial or societal benefits. Contextualism should be guided and regulated by the universalist standards we are trying to realize.

In this sense, the normative perspective proposed here is broadly humanitarian, which gives priority to the securing of a decent minimum level for all children. Insofar as liberal democratic institutions are instrumental to that humanitarian goal, however, promoting them must be part of overall strategies for addressing child labor. Indeed, gradualist approaches to ending child labor are much more likely to succeed in the context of accountable political entities. The poor are undoubtedly better off where governments do not devote themselves to theft or ethnically based spoils systems but to providing health clinics, primary schools, roads, and communications. Diminishing certain kinds of social inequality may itself lead to better outcomes for the least advantaged.

Although the state of the world may justify the use of gradualist measures, we need to be attentive to the trajectory of societies using child labor. It makes a great deal of difference whether child labor is a transitional strategy that can deliver future benefits to the child or a strategy of exploitation, propping up the profits of multinational corporations, selfish parents, corrupt governments or satisfying the whims of sadistic employers. It is thus crucial to establish benchmarks for progress in educating children. These benchmarks can foster accountability and allow tracking of what is actually happening over time to children's interests. If children's interests are to be realized, it is essential that obligations fall where power is exercised. NGOs and lending institutions need to hold the parties they work with—parents, local villages, corporations, national governments—accountable for what happens to children.¹²

More data and empirical research are needed to identify which gradualist policies should be favored in which contexts. For example, although the claim is sometimes made that children benefit from child labor under some

11. Contextualists should be distinguished from relativists, who deny universal standards as such. Contextualists recognize the pull of such standards but also recognize that it may not be possible to implement them given current conditions.

12. The international lending institutions should not repeat the policies of the past, in which corrupt dictators like Mobutu Sese Seko were repeatedly given new loans for development that did nothing to improve the lives of Zaire's people (see Easterly 2001).

circumstances, insufficient attention has been paid in the empirical literature to the question of whether the child who is working is the child who benefits.

More data are needed on intrahousehold tradeoffs between children and between adults and children. It makes a great deal of difference whether all the children in a family work a little but all go to school or whether daughters are pulled out of school so that sons need not work. It is therefore important to continue to gather data on lower levels of analysis to assess the relevance of gender and other factors. Collecting these data could help policymakers formulate effective interventions. They could reveal, for example, that the focus should be on informing parents and teachers about the importance of educating girls or that lending agencies should make some of their loans conditional on achieving gender equity in education.

Too much of the data are underinclusive. Very few studies provide data on girls working at home who do not attend school. Indeed, the ILO does not include such girls in its statistics on child labor. This limitation on who counts as a working child may be behind the category of nowhere children, children who are neither at work nor at school. Although it may be extremely difficult to obtain survey data on girls working at home, those data are important for assessing the effectiveness and the normative adequacy of different policies.

Attention also needs to be paid to children who combine work and school. Subsidy programs may draw children into school without reducing the family's need for the child's labor. Kabeer (2001) has noted the implications of this "double burden" for children's achievements and well-being. Studying this group of children is especially important insofar as gradualist strategies for combating child labor are adopted.

Good empirical projects are needed to investigate how and why some states and governments have made substantial progress in educating their children. Poor countries do differ in what they provide to their children. Within India, for example, states with similar levels of poverty have dramatically different levels of educational performance. In Uttar Pradesh only 32 percent of rural 12- to 14-year-old girls have ever attended school—about a third as many as in Kerala, where 98 percent of girls this age have attended school (Kabeer 2001). What factors explain this difference in outcomes?¹³

Child labor was once prevalent in what is now the industrial world. Eliminating it in poor societies may not be feasible on the basis of the resources and institutions of those societies. But a key difference between historical and

13. Economic analyses of child labor tend to treat the marginal productivity of a child as a property of the child, given a fixed technology of household production. There are two problems with this assumption. First, household technology is not fixed: Parents affect children's marginal productivity. Parents could, for example, assign household duties in different ways—by challenging gender norms and giving more productive jobs to girls, for example. Second, children affect their own price: They make norm-supported choices concerning their economic commitments to aging parents. Children are not analogous to other economic products; their benefits and costs are not only exogenously determined. Zelizer (1995) argues that a variety of cultural forces rather than changes in the structure of the labor market changed the view of children in the United States during the 19th century.

contemporary cases of child labor is that today the industrial world exists. Increasing development aid, ending protectionist policies that close off markets to poor countries, encouraging multinationals to pay higher wages to adult workers, facilitating partnerships in the research and development of products needed by the poor (vaccines, drugs), empowering democratic institutions around the world, and transferring technology may all make a difference. The need for a well-funded global initiative on basic schooling, recently stressed by the United Nations, is also clear.

Child labor may be understandable in parts of the world as a response to poverty. But different distributions of wealth and power would undercut the need for child labor. Much depends on whether these alternative distributions can be realized.

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Understanding Children's Work: An Interagency Data and Research Cooperation Project

Alec Fyfe, Frans Roselaers, Zafiris Tzannatos, and Furio Rosati

During the 1990s broad interest resurfaced among the public and policymakers on the subject of child labor, this time concentrating on the plight of children in the developing world. The Children's Summit in New York (1990), the World Summit on Social Development in Copenhagen (1995), and the International Labour Organization's (ILO) adoption of Convention 182 on Elimination of the Worst Forms of Child Labour (1999) are clear evidence of the increasing international concern. In several conferences leading up to the 1999 ILO convention (Geneva 1996, Amsterdam 1997, Cartagena 1997, and Oslo 1997), the same commitment to combat child labor was expressed, along with the need for closer cooperation between international organizations, a point emphasized especially in Oslo.

With the adoption of the Millennium Development Goals in 2000, the realization quickly grew that international and national efforts to address key developmental objectives will be hampered unless there are adequate data for measuring, monitoring, and managing results; sufficient capacity to use the data at the local level, supplemented by technical assistance; donor harmonization of policies for setting global (rather than donor) priorities and exploring synergies among all stakeholders; and—conditional on the previous three areas—timely and relevant policy interventions.

This note describes a major initiative for international cooperation on child labor, including the creation of a database that can be accessed electronically by researchers. The initiative aims to develop a common language and methodologies and to stimulate more intense joint action on the ground to create local capacity to address the problem of child labor.

I. ORIGINS OF THE UCW PROJECT

In December 2000 the three leading international agencies on children, labor, and development—the United Nations Children's Fund (UNICEF),

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the International Labor Organization (ILO), and the World Bank—launched the joint interagency research project, Understanding Children’s Work (UCW). Its goals are to:

- Enhance child labor research, data collection, and data analysis;
- Enhance the capacity for child labor data collection and research, especially at local and national levels;
- Improve the assessments of interventions against child labor.

The project is guided in part by the Agenda for Action, unanimously adopted at the 1997 International Conference on Child Labor in Oslo. The agenda specifically identified the need for better information on child labor—its extent and nature, its causes and consequences, and the effectiveness of policies and programs for addressing it. Data gaps and conceptual differences hamper an optimal understanding of child labor. They make it difficult to identify priorities, design policies, effectively target resources, and assess program impact and so are an obstacle to achieving maximum synergy among programs to combat child labor.

The UCW project also responds to the need for stronger and better articulated cooperation and coordination on child labor among partner agencies. There is general recognition that under different mandates and instruments (such as ILO Convention 138 on Minimum Age of Work and Convention 182 on the Worst Forms of Child Labor, the 1989 U.N. Convention on the Rights of the Child, the 1997 Oslo Agenda for Action, the Millennium Development Goals, and the World Bank’s project, programmatic, and advisory activities), action on child labor is often insufficiently harmonized and coordinated at national and local levels.

The value of the UCW project to the three agencies (and potentially to others that may join or follow similar efforts) is in facilitating research and analysis and interagency cooperation on child labor issues. The project’s independence from the strict mandates and operational requirements of the individual agencies leaves it uniquely positioned to fulfill these roles. The project is pushing the child labor research agenda forward in areas of direct relevance to the program work of the agencies concerned. It also addresses the research process itself, providing technical support to the development of the research tools and methodologies needed at the country level for exploring new areas of knowledge. By helping create a common knowledge base on child labor as a necessary starting point for improved cooperation and cross-fertilization of experience and ideas, UCW contributes to greater coherence in approaches to child labor. These dimensions go beyond cooperation on child labor research to positively influence operational projects, advocacy, and the policy advice given to governments and other partners at the country level.

II. DATA AVAILABILITY AND ACCESS BY THE INTERNATIONAL COMMUNITY

By bringing together information on child labor from a wide variety of sources, the UCW project Web site improves access to this information for researchers and

policymakers alike (www.ucw-project.org). The Web site presents a broad spectrum of surveys and survey-based data sets relating to child labor, child labor statistics for over 50 countries, a comprehensive child labor bibliography, a database on child labor–related agency projects, and various country studies, reports, and research papers. It also provides links for downloading micro data and studies from UNICEF’s Multiple Indicator Cluster Surveys (MICS), the World Bank’s Living Standards Measurements Surveys (LSMS), and ILO’s Statistical Information and Monitoring Programme on Child Labor (SIMPOC).¹

Beyond improving access to existing data, the UCW project is developing a joint core survey questionnaire on child labor designed to standardize and extend child labor data collected by the three agencies. The project also supports the development of tools for researching areas that are beyond the scope of the large-scale institutional surveys of the three agencies, such as quantifying child involvement in the worst forms of labor, measuring the health effects of child labor, and identifying factors influencing the demand side of the child labor equation.

III. CURRENT AND POTENTIAL AREAS OF RESEARCH

Using available data, researchers can undertake analyses designed to improve the understanding of child labor and a host of household factors affecting child labor. The information in the various data sets can be used to study a wide range of issues, such as health effects of child labor, links with education, social risk management, youth employment, and the worst forms of child labor. Country-level research and capacity-building activities are also planned, along with mainstreaming and dissemination efforts to increase awareness and uptake of research outputs by countries themselves and by other agencies.

The UCW project is also currently mapping information on impact assessments. A methodological review was conducted on the limited number of completed impact assessments of child labor–related activities, agency projects relating to child labor were mapped, and a review was undertaken of progress in identifying best practices. With this mapping exercise now largely complete, the focus is shifting to the impact of specific programmatic child labor interventions at the country level.²

1. UNICEF’s MICS, based on household surveys, includes a list of global indicators developed jointly with other agencies (including the World Health Organization, the United Nations Educational, Scientific, and Cultural Organization, and the ILO) to assess progress for children. For more information see <http://childinfo.org/MICS2>. The World Bank’s LSMS are household surveys designed to better measure and understand poverty in developing economies. The surveys often have specific information on children’s activities. For more information see www.worldbank.org/lms. The ILO’s SIMPOC carries out a wide range of surveys around the world on child labor. Key to SIMPOC are national household-based surveys collecting detailed information on the extent, nature, causes, and consequences of child labor. For more information see www.ilo.org/ipecc/simpo.

2. For more information on project activities, see www.ucw-project.org.

Through shared information and data and joint research, the UCW project has strengthened interagency cooperation among UNICEF, the ILO, and the World Bank and advanced a number of activities undertaken by the agencies individually. For the ILO, for instance, references, data, and methodologies obtained through the project were used to establish new global estimates on child labor in 2002. The parameters of ILO's SIMPOC surveys were discussed with its partners in the UCW project and adapted. For UNICEF the project has been particularly valuable at the country level, for example, in El Salvador, Guatemala, Nepal, Morocco, and Yemen, where it helped strengthen interagency collaboration and provided a common platform to promote child labor concerns and assist governments in identifying priorities for future action. For the World Bank the project has broadened awareness of partners' activities and of the multisectoral nature of child labor, education, and health, which calls for greater coordination among units within the World Bank and for enhanced dialogue with countries and other agencies.

The UCW project is about to enter its second phase, and more activities are planned for joint research and data collection to advance understanding of the causes and consequences of child labor.

Erratum

In Stephan Klasen's article "Low Schooling for Girls, Slower Growth for All? Cross-Country Evidence on the Effect of Gender Inequality in Education on Economic Development," Volume 16, 2002, Number 3 of the journal, an extra line was inserted through a typesetter error into Table 4. The correct table appears below. The publisher regrets the error.

TABLE 4. Gender Inequality in Education and Economic Growth: Further Specifications

Dependent variable	(8) Growth	(9) Growth	(10) Growth	(11) Growth	(12) Growth	(13) Growth	(14) Growth
Constant	7.92*** (3.5)	7.68*** (3.5)	4.34 (1.1)	4.42** (2.2)	5.90*** (3.6)	1.29 (0.3)	3.91* (1.6)
<i>LNINC60</i>	-1.15*** (-3.5)	-1.12*** (-3.5)	-1.30* (-1.6)	-0.96*** (-3.85)	-1.04*** (-4.2)	-0.80** (-1.9)	-1.03** (2.5)
<i>Popgro</i>	-1.02*** (-3.1)	—	—	-0.45 (-1.1)	-1.19 (-1.2)	—	—
<i>LFG</i>	0.61*** (2.4)	—	—	0.70* (1.5)	—	1.66* (1.3)	—
<i>OPEN</i>	0.007** (2.1)	0.012*** (3.7)	0.001 (0.1)	0.008** (2.2)	0.010*** (2.6)	0.015** (2.0)	0.012** (1.8)
<i>Inv</i>	0.111*** (4.7)	—	—	0.035 (0.4)	—	0.019 (-0.4)	—
<i>ED60</i>	0.08 (1.0)	0.19** (1.9)	0.29 (0.8)	0.31*** (3.0)	0.33*** (3.2)	0.06 (0.2)	0.19 (0.7)
<i>GED</i>	—	—	33.96 (1.2)	14.1*** (3.9)	15.39*** (3.2)	11.18** (2.2)	11.78** (2.4)
<i>RED60</i>	1.33** (1.65)	2.12*** (2.6)	1.24 (0.8)	1.14* (1.5)	1.71** (2.2)	2.59** (2.1)	3.29*** (3.0)
<i>RGED</i>	—	—	2.64** (1.7)	0.53** (2.2)	0.52** (2.0)	0.62* (1.5)	0.36 (1.1)
Eastern Europe and Central Asia	-1.83** (-2.3)	-0.70 (-0.9)	0.26 (0.3)	-0.58 (-0.6)	-0.98* (-1.3)	—	—
Latin America and Caribbean	-1.87*** (-3.0)	-2.29*** (-3.5)	-0.50 (-0.4)	-1.39** (-1.8)	-1.62** (2.2)	—	—
Middle East and North Africa	0.22 (0.3)	0.08 (0.1)	0.14 (0.2)	-0.12 (-0.2)	-0.16 (-0.2)	—	—
South Asia	-1.01* (-1.4)	-1.78** (-2.3)	0.40 (0.4)	-0.24 (-0.35)	-0.48 (-0.7)	—	—
Sub-Saharan Africa	1.74*** (-2.9)	-2.76*** (-4.5)	-0.35 (-0.3)	-1.26** (-1.7)	-1.64*** (2.6)	—	—
OECD	-1.01* (-1.6)	-0.34 (-0.5)	1.73** (1.9)	—	—	—	—

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(continued)

TABLE 4. (continued)

Dependent variable	(8) Growth	(9) Growth	(10) Growth	(11) Growth	(12) Growth	(13) Growth	(14) Growth
1960s	2.60*** (7.9)	2.58*** (7.9)	—	—	—	—	—
1970s	1.74*** (5.9)	2.10*** (6.9)	—	—	—	—	—
Adjusted R^2	0.47	0.40	0.19	0.60	0.58	0.55	0.56
Omitted variables test	Passed	Passed	Not applicable	Passed	Passed	Passed	Passed
N	295	295	96	86	86	27	27

— Not available.

*Significance at the 90 percent level.

**Significance at the 95 percent level.

***Significance at the 99 percent level (one-tailed test).

Note: Numbers in parentheses are heteroscedasticity-adjusted t -ratios. *LNINC60* refers to the log of income per capita in 1960 adjusted for purchasing power parity. Other variables are explained in table 1. This table shows only the direct effect and reduced form regressions. The intervening regressions of investment, population growth, and labor force growth are available on request. Regressions 8 and 9 are based on a panel regression with three observations per country (1960s, 1970s, and 1980s). In these regressions *ED60* and *RED60* refer to the level and female–male ratio of years of schooling of people age 25 and older at the start of each decade. Regression 10 is the second stage of a two-stage least squares regression. The instruments used for *GED* and *RGED* are government spending on education (as a share of GDP), the fertility rate in 1960, and the change in the fertility rate between 1960 and 1990. Regressions 11 and 12 restrict the sample to developing economies, and regressions 13 and 14 to countries in Sub-Saharan Africa. The Ramsey Reset test is used to test for omitted variables. East Asia and the Pacific is omitted.

Source: Author's calculations.

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