The case against child labor bans*

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January 2016

Abstract

We argue that enforcing blanket child labor restrictions in developing economies, as advocated in the ILO Convention 138, is harmful even in the long run. The social return to child labor can be higher than its private return if laws against crime and laws in favor of compulsory education are not enforced, in which case child labor crowds out both child crime and crime against children.

Keywords: child labor, education, rule of law, international labor standards.

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1 Introduction

It is becoming increasingly recognized that blanket restrictions on child labor, as advocated in the International Labour Organization (ILO) Minimum Age Convention, 1973 (ILO Convention 138),[1] are harmful in the short run.[2] However, there remains the common belief that such restrictions must be beneficial in the long run. In this paper, to the contrary, we argue that blanket child labor restrictions in developing nations are harmful even in the long run.

To develop our argument, we analyze the allocation of children's time across school, work, and crime. As is standard in previous analyses of the economics of child labor, we assume that child labor is a source of current household income involving the sacrifice of the child's future human capital. Since human capital determines future income, child labor is a source of future poverty. In our view, it is this logic that underlies the common perception that, in spite of the short-run costs associated with child labor bans, the abolition of child labor will ultimately benefit children and promote their nation's economic development.

We begin by observing that *child crime* involves a similar sacrifice of a child's future human capital in exchange for current income. By crime we mean the illicit appropriation of the wealth of others. By child crime we mean crime committed by a child. Like child labor, crime is a source of current income and, also like child labor, it harms human capital accumulation because it interferes with schooling. A distinguishing feature of child crime, however, is that it harms other people by taxing the returns to their work and possibly harming their human capital accumulation.

The link between the problems of child labor and child crime is widely recognized. For instance, according to the United Nations Human Settlements Programme (UN-HABITAT, 2011, p.23) "in Africa, 27 percent of youth are neither in school nor at work, a situation that can lead to frustration, delinquency and social exclusion". This concern is specific neither to Africa nor to the twenty first century, as depicted by Charles Dickens' famous portrayal of nineteenth century London in *Oliver Twist*.

The interaction between child labor and child crime depends crucially on the institutional environment. In particular, in developing countries where the rule of law is weak the state is unable to effectively enforce either criminal law or laws on compulsory schooling. As long as the

[1] Article 1 of the ILO Convention 138 demands that member countries commit "*to pursue a national policy designed to ensure the effective abolition of child labour and to raise progressively the minimum age for admission to employment*", and Article 2(4) sets the initial minimum age for admission to employment at 14 years for member countries "*whose economy and educational facilities are insufficiently developed*".

[2] Basu (1999) and Edmonds (2008) are two excellent surveys of the literature on child labor.

latter remain unenforced the impact of compulsory restrictions on child labor depends on how children allocate the time that is freed up by such restrictions. At one extreme, if current and future time squeezed out of child labor were fully allocated to schooling, one would expect the policy to be desirable at least in the long run. At the other extreme, if all displaced child labor were instead driven to crime, one would expect the policy to be harmful even in the long run. The likely outcome in developing economies lies between these two extremes — though the existence and widespread neglect of compulsory schooling law indicates a "preference" for current over future income on the part of working children — and consequently, to evaluate the desirability of child labor restrictions it is necessary to study the allocation of schooling, child labor and child crime in society jointly.

We analyze this social allocation problem and show that the imperfect enforceability of laws against crime and laws in favor of compulsory schooling greatly shapes the relationship between the *social* return to child labor and its *private* return. If these laws were fully enforced, the social return to child labor would be lower than its private return. In the more relevant case, where these laws are poorly enforced, the social return to child labor can be higher than its private return. This feature has an intuitive explanation: child labor crowds out child crime, not just schooling.

We show that the enforcement of restrictions on child labor is socially harmful in the long run whenever the social return to child labor is larger than its private return. The reason is that restricting child labor interferes with its role in crowding out crime. The perverse long-run effects of otherwise well-intended policies against child labor are to be expected in countries with poor institutions, where the rule of law is weak and the returns to schooling are low. It is in this context that the blanket restrictions advocated by the ILO, national ministries, trade unions and ethical consumers from developed countries are harmful.

The case for the abolition of child labor is fallacious because it fails to recognize that the problem of child labor is a second-best problem. Of course, blanket child labor bans would be desirable if one could simultaneously solve all other problems. The simultaneous enforcement of laws against crime and the outright ban of all child labor would be desirable in the long run. Children would be forced to attend school, and the resulting increase in future human capital, together with the removal of the "crime tax", would be conducive to development. Similarly, one might expect the enforcement of compulsory full-time schooling to crowd out both child labor and child crime. However, this first-best allocation of child labor, crime and schooling is not attainable in practice, because neither laws against crime nor compulsory schooling laws are enforceable in the developing world.

Furthermore, the case for the abolition of child labor fails to recognize how, in a world with child crime, the short-term and the long-term effects of restrictions on child labor are linked through the intergenerational transmission of poverty. On the one hand, by lowering current and future child labor, these restrictions tend to increase human capital accumulation. On the other hand, this positive effect is counteracted by the negative effect of increased current and future crime on human capital accumulation. Moreover, current and future income fall, directly as the result of lower child labor income, and indirectly through the negative effect of lower incomes, and possibly higher crime, on saving and investment.

While our formal argument focuses on child crime, the scope of the argument is obviously broader. For instance, child labor is evidently heterogeneous. Many children work in activities that would not be considered exploitative. At the other extreme, the worst forms of child labor, including prostitution, pornography and all forms of child slavery, are intolerable. In contrast with Convention 138, which calls for blanket restrictions on *all* child labor, the ILO Convention 182 (1999) calls for the abolition of the worst forms of child labor *only*. Moreover, these intolerable forms of child labor are already illegal in virtually all countries. Yet, as long as the standards set in Convention 182 remain unenforced, policy makers should anticipate that enforcing the standards set in Convention 138 will push children into the worst forms of child labor. Whether blanket child labor bans exacerbate child crime or crime against children, or both, our argument implies that they are harmful even in the long run.

We are not the first to warn against unintended consequences of standard policies to combat child labor. A central message of research on the economics of child labor during the last decade is that there is a wide variety of circumstances in which policies against child labor are likely to backfire. They may increase the incidence of child labor (Jafarey and Lahiri, 2002, Edmonds and Pavcnik, 2005a, Basu, 2005, Basu and Zarghamee, 2009), cause households' welfare to fall (Basu and Van, 1998, Dessy and Pallage, 2005), and otherwise have perverse distributional consequences (Krueger and Donohue, 2005, Dinopoulos and Zhao, 2007, Baland and Duprez, 2009).

However, while previous research has brought attention to the negative short-run effect of blanket child labor restrictions, emphasizing the loss of current income suffered by poor households, it has left unchallenged the popular view that such blanket restrictions are necessarily beneficial in the long run.[3] We believe that this popular view explains why arguments against child labor bans

[3] Doepke and Zilibotti (2005, 2010) and Dessy and Knowles (2008) consider the link between political support for

have not found support in the policy arena. By contrast, challenging precisely this view is central to our argument against enforcing the standards set in the ILO Convention 138.

Section 2 presents some evidence on child labor and child crime as it pertains to our argument. Section 3 presents the basic model, and Section 4 characterizes the *laissez-faire* equilibrium. Section 5 analyzes the long-run consequences of restrictions on child labor. Section 6 considers two extensions. Section 7 concludes. Proofs are relegated to the Appendix.

2 Some evidence on child labor and child crime

Child labor remains pervasive around the world. Edmonds and Pavcnik (2005b) report participation rates in various activities for 124 million children between 5 and 14 years old from 36 countries in the year 2000. About 51 percent of those children combine school and work; 19 percent attend school and do not work; 18 percent work and do not attend school; the remaining 12 percent neither work nor attend school. While reliable data on actual criminal activity is lacking, it is evident that youth crime — potential as well as actual crime — is a serious concern in developing countries. According to the United Nations Office on Drugs and Crime (UNODC, 2011), about 4 million children worldwide were "brought into formal contact with the police" (i.e., arrested or cautioned) each year during the 2003-2008 period. Children working in the informal sector seem particularly vulnerable. According to e-oaxaca (June 13, 2011) more than 158,000 children working in the streets of the Mexican state of Oaxaca are believed to be vulnerable to recruitment by organized crime.

Our main insight is that the social return to child labor can be higher than its private return, because child labor crowds out child crime. This assumes that laws against crime are unenforceable, which is hardly questionable. It also assumes that compulsory schooling laws are unenforceable, and that the poor have access to only low-quality education in developing countries. All 193 members of the United Nations have signed the 1990 Convention on the Rights of the Child, whose Article 28 states that State Parties shall make primary education compulsory and available free for all.[4] Yet, according to the United Nations Educational, Scientific and Cultural Organization (UNESCO), more than 67 million children worldwide — about 10 percent of all children of primary school age — were out of school in 2009, and furthermore, "millions of children emerge from primary school each year without having acquired basic literacy and numeracy skills" (UNESCO, 2010, p. 104).

child labor regulation and fertility decisions.

[4] All members but the United States and Somalia have also ratified the convention.

Not surprisingly, in sub-Saharan Africa alone, for instance, about 10 million children drop out of primary school each year (UNESCO, 2011, p. 47).

Evidence of the consequences of child labor regulation draws mainly on the historical record of child labor in currently developed countries, particularly the U.S. and Britain. The overall contribution of child labor and education laws to the decline of child labor and the increase in educational attainment in these countries seems to have been small. Instead, these laws were enforced only after the rise of the factory system (see Moehling (1999) and Goldin and Katz (2011) on the U.S., and Kirbi (2003) on Britain).

In England, for instance, the 1815 Report of the Committee for Investigating the Causes of the Alarming Increase of Juvenile Delinquency in the Metropolis concluded that "the improper conduct of parents", "the want of education" and "the want of suitable employment" were the main causes of juvenile delinquency (Pinchbeck and Hewitt, 1973, p. 435). Indeed, it is well documented that child labor has been encouraged historically as an effective tool to combat child crime, for instance, in nineteenth century England and the U.S. (Watson, 1896, Myers, 1933, Davidson, 1939), and in Mexico during the 1920s (Sosenski, 2008). It is also worth noting that the first efforts to combat child labor emphasized access to education, rather than the prohibition of child labor (Hindman, 2002, p. 49).

Not only rigorous evidence in support of policies against child labor is lacking, but intervention-gone-awry cases of working children seem to be the rule, rather than the exception. For instance, the threat of the Child Labor Deterrence Act in 1993, advocated by Senator Harkin in the U.S., caused garment employers in Bangladesh to dismiss an estimated 50,000 children from their factories. The 1997 UNICEF State of the World's Children noted that "*follow-up visits by UNICEF, local non-governmental organizations (NGOs) and the International Labour Organization (ILO) discovered that children went looking for new sources of income, and found them in work such as stone-crushing, street hustling and prostitution*" (UNICEF, 1997, p. 60). Similar unintended outcomes were observed in the Morocco's garment industry in 1995 after a report of the British Granada TV's *World in Action*, which investigated the labeling of garment made in Méknès (see, e.g., Bourdillon et al., 2010).

In contrast, subsidies for school attendance have been successful in increasing school enrollment and reducing child labor incidence (Ravallion and Wodon, 2000, and Bourguignon, Ferreira and Leite, 2003). Programs such as Progresa in Mexico, Bolsa Escola in Brazil, and the Food-For-Education (FFE) program in Bangladesh are well known cases. Yet, the resulting increases in school enrollment tend to be significantly larger than the declines in child labor. With respect to this, our theory suggests that, where the potential for child crime is an important consideration, a relatively low response of child labor to targeted subsidies for school attendance is the counterpart of a relatively high response of child crime.[5]

3 The model

Consider an economy with overlapping generations. A continuum of identical agents, with mass 1, is born every period. Each agent lives for three periods, which we refer to as childhood, adulthood and old age. Only adults face non-trivial decisions. They have preferences over current consumption (equivalently, the consumption of the child-parent pair) c_a, consumption when old c_o', and their child's labor income next period, $w'h'$:

$$U = u(c_a) + u\left(c_o'\right) + \delta v\left(w'h'\right) \equiv \ln(c_a) + \ln\left(c_o'\right) + \delta \ln\left(w'h'\right), \tag{1}$$

with $\delta \in (0, 1]$, where w denotes an adult's wage per effective unit of human capital, h denotes an adult's effective human capital. Primed variables denote next-period values.

Only children and adults work, and each is endowed with one unit of time. Children make no decisions. Adults allocate their children's time among three alternative activities:

$$e + x + z \leq 1, \text{ with } e, x, z \geq 0, \tag{2}$$

where e is the time a child spends in school, x is the time she spends at work, and z is the time she spends in criminal activities (e.g., theft).

Both child labor and crime harm human capital accumulation. We assume that

$$h' = Q(Z)(1 - ax - bz)^{\beta} h^{1-\beta}, \tag{3}$$

with $0 < \beta < 1$, and $0 < a \leq b < 1$, where we refer to $1 - ax - bz$ as *effective schooling*, and h is the stock of human capital children inherit from their parents. The term $Q(Z)$ in equation (3) reflects the fact that aggregate child crime may harm children's human capital accumulation, for a

[5] The evidence for the U.S. strongly suggests that education is an effective tool to reduce juvenile crime. Lochner (2011) offers an excellent survey of the empirical evidence on education and crime.

given choice of effective schooling. We assume that $Q(0) > 0$, and

$$Q(Z) = \left(\frac{Z}{\underline{Z}}\right)^{-\gamma}, \tag{4}$$

for all $Z > 0$, with $0 \leq \gamma < \beta$, where the term $\underline{Z} > 0$ is a normalization. It is convenient to assume $\underline{Z} \leq (1-p)\,\epsilon$ throughout, with $p \in [1/2, 1)$ and $\epsilon \in (0, 1/2)$, which ensures that the equilibrium level of child crime always exceeds the lower bound $\underline{Z}$. Below, $1-p$ is defined as a "crime tax". It is worth anticipating that some of our results below refer to the case with $\gamma > 0$, but we show in Section 6 that they also go through if, instead, the negative externality associated with crime works through the crime tax, or if the log-utility assumption is relaxed.

Human capital accumulation in the above specification is not determined by the actual time children spend in school ($e \leq 1 - x - z$), but by effective schooling ($1 - ax - bz$), where a is the opportunity cost of time allocated to work in terms of school, and b is the opportunity cost of time allocated to crime in terms to school. Thus, if a child devotes all of her time to school, effective schooling coincides with the actual time she spends in school. That is, $1 - ax - bz = 1$ if $e = 1$. At the other extreme, effective schooling remains positive even if a child does not attend school. Thus, if a child works full time, effective schooling amounts to $1 - a$ units. Our assumption that $1 - a > 0$ reflects the fact that children will retain some of their human capital even if they work full time. Similarly, effective schooling would be equal to $1 - b$ units whenever a child engages in crime full time, and our assumption that $1 - b > 0$ implies that even a full time criminal retains some human capital. Assuming that $b \geq a$ implies that crime harms human capital accumulation at least as much as work does.

There is a single final good that is produced according to the production technology

$$F(K, H + \phi H_c) = A\, K^{\alpha}\, (H + \phi H_c)^{1-\alpha}, \tag{5}$$

with $A > 0$ and $\alpha \in (0, 1)$, where K is the aggregate stock of physical capital, $H = \int_0^1 h_i di$ is the aggregate stock of human capital provided by adults, $H_c = \int_0^1 x_i h_i di$ is the aggregate stock of human capital provided by children, and the productivity of children relative to that of adults is given by $\phi \leq 1$. We also maintain the assumption that $\phi > \frac{b-a}{1-b}$ throughout in order to rule out uninteresting scenarios. The aggregate production technology given by equation (5) reflects the fact that children and adults are perfect substitutes in production, the fact that children work x units of time rather than full time (i.e., one unit), and the fact that children are less productive than adults. For simplicity, we also assume physical capital depreciates fully every period.

We assume that parents cannot borrow against their children's future income.[6] We model crime as the result of decentralized conflict over economic distribution,[7] and we assume, for simplicity, that crime taxes households' savings. We also assume that crime is fully unproductive, and only children engage in criminal activity. If there is some crime in the economy, a fixed proportion $1 - p \in (0, 1/2]$ of all the labor income that is not consumed is subject to appropriation. A household's labor income is the sum of the adult's labor income wh and the child's labor income $w_c hx$, which is the income that a child worker with human capital h, who works x units of time gets when her wage is w_c. To formalize the aggregate consequences of decentralized crime in a simple manner, we assume each household competes against the economy's average. In particular, if a child spends z units of time in criminal activity, she will secure a proportion z/Z of the economy-wide average crime rents $(1 - p)(Y_L - C_a)$, where Z is the average level of crime in the economy and Y_L denotes average labor income. Throughout the paper we use capital letters to denote economy-wide averages, which coincide with aggregates since there is a unit mass of households.

Aggregate consistency of the distribution of crime rents requires that the aggregate resources lost to child crime every period add to aggregate crime rents, that is,

$$\int_0^1 (1-p)\left((w + w_c x_i)\, h_i - c_{a,i}\right)\, di = (1-p) \int_0^1 (Y_L - C_a)\, z_i/Z\, di, \tag{6}$$

where the subscript i denotes an individual household. Although our focus below is on symmetric equilibria with positive levels of child crime, it remains to specify the crime rents that accrue to a criminal whenever $Z = 0$. We simply assume they are a fraction $(1 - p)$ of the average labor income net of consumption $Y_L - C_a$.

Old agents at time $t + 1$ simply consume their capital income,

$$c'_o = \left(1 + r'\right) s, \tag{7}$$

where r' is the market rate of return on savings. For simplicity, we assume there are no school fees, and so a household's savings out of labor income is given by

$$s = p\left((w + w_c x)\, h - c_a\right) + (1-p)\frac{z}{Z}\left(Y_L - C_a\right), \tag{8}$$

[6] Baland and Robinson's (2000) analysis of child labor radicates the main source of inefficiency in credit market imperfections. We take those as given, but emphasize the role of negative externalities associated with crime.

[7] See Gonzalez (2012) for a survey of research on insecure property rights, conflict and development.

whenever $Z > 0$, where $p \in [1/2, 1)$ reflects the security of effective property rights.

We restrict attention to *symmetric* equilibria with positive consumption, which are given by a sequence of allocations $\{x_{it}, z_{it}, s_{it}\}_{t=0}^{\infty}$ for all individuals $i \in [0,1]$, a sequence of average allocations $\{X_t, Z_t, K_{t+1}\}_{t=0}^{\infty}$, with $K_0 > 0$, and a sequence of prices $\{r_t, w_t, w_{ct}\}_{t=0}^{\infty}$ such that, given prices, individuals maximize utility, their time constraint (2) and budget constraints (7) and (8) are satisfied, firms maximize profits, human capital for each individual evolves according to (3), with $h_0 = H_0 > 0$, the distribution of crime rents satisfies (6), every market clears, and $\{x_{it}, z_{it}, s_{it}\} = \{X_t, Z_t, K_{t+1}\}$, for all $i \in [0,1]$ and for all $t \geq 0$.

4 Symmetric equilibrium

In this section we characterize the unique symmetric equilibrium with positive stocks of human and physical capital, and a positive level of child labor. We begin by considering the problem of an arbitrary household. First, note that optimal saving choices of the household are interior, and they satisfy the standard Euler equation

$$\frac{\partial u\left(c_a\right)/\partial c_a}{\partial u\left(c_o'\right)/\partial c_o'} = p\left(1 + r'\right),$$

which equates the marginal rate of substitution between current and future consumption of an adult and the corresponding marginal rate of transformation. The latter reflects the fact that the insecurity of property rights in the economy acts as a tax on savings.

Second, an optimal choice of child crime is always interior, equating the marginal benefits and the marginal costs of child crime:

$$\frac{\partial u\left(c_a\right)}{\partial c_a}\frac{\partial c_a}{\partial z} = -\delta\frac{\partial v\left(w'h'\right)}{\partial h'}\frac{\partial h'}{\partial z}.$$

The marginal benefits from child crime come from higher consumption, where

$$\frac{\partial c_a}{\partial z} = \left(\frac{1-p}{p}\right)\left(\frac{Y_L - C_a}{Z}\right)$$

is decreasing in the aggregate level of child crime, for given aggregate crime rents. The marginal costs of crime come from the reduction in future labor income associated with the negative impact of child crime on human capital accumulation, where

$$\frac{\partial h'}{\partial z} = \frac{-b\beta h'}{1 - ax - bz}.$$

Third, the household's optimal choice of child labor satisfies

$$\frac{\partial u(c_a)}{\partial c_a}\frac{\partial c_a}{\partial x} + \delta\frac{\partial v(w'h')}{\partial h'}\frac{\partial h'}{\partial x} \leq 0,$$

with equality whenever optimal child labor is interior. The marginal benefits from child labor come from increased current consumption associated with higher labor income, with

$$\frac{\partial c_a}{\partial x} = w_c h,$$

whereas the marginal costs come from the reduction in the child's future earnings associated with the negative impact of child labor on her human capital accumulation:

$$\frac{\partial h'}{\partial x} = \frac{-a\beta h'}{1 - ax - bz}.$$

Next, profit maximization implies that all units of human capital are paid according to their marginal product. Accordingly, the wage of an adult per unit of human capital is

$$w = (1-\alpha)\frac{F(K, H + \phi H_c)}{(1+\phi X)H}, \tag{9}$$

and the wage of a child is $w_c = \phi w$. Since markets are perfectly competitive, we also have:

$$1 + r = \alpha\frac{F(K, H + \phi H_c)}{K}. \tag{10}$$

Recalling that population is normalized to one, in a symmetric equilibrium we have that $x = X$, $z = Z$, $c_a = C_a$, $c_o = C_o$, $s = S$. Furthermore, the labor market for adult human capital clears every period ($h = H$) and so does the market for child labor ($xh = H_c$). Finally, market clearing in the final goods market implies that aggregate income is equal to aggregate output ($Y = F(K, H + \phi H_c)$), and market clearing in the capital market every period implies that aggregate savings and aggregate investment in physical capital are equal ($S = K'$). It is easy to verify that market clearing also implies that aggregate resources lost to child crime every period add to aggregate crime rents, so equation (6) is satisfied.

As usual, the market clearing conditions, together with symmetry of the equilibrium, can be used to characterize equilibrium dynamics as a function of aggregate variables alone, and equations (9)-(10) can be used to eliminate prices from the resulting equilibrium conditions. To that end, note that the above Euler equation for optimal savings, together with the fact that $C_o' = (1 + r')\, S$, imply that $S = pC_a$. Thus, the aggregate resources constraint implies that aggregate consumption by adults is a fraction $\frac{1}{1+p}$ of aggregate labor income $(1 - \alpha)\, Y$. Accordingly, aggregate investment is a fraction $\frac{p}{1+p}$ of aggregate labor income

$$K' = \left(\frac{p}{1+p} \right) (1 - \alpha)\, Y. \tag{11}$$

Note that savings come only from labor income, because old agents are the owners of capital, do not work, and consume all of their income. With log utility, households save a constant fraction of their labor income. Intuitively, aggregate investment increases with the security of property rights, as parameterized by p. In the limit as p approaches 1, households would save exactly half of their labor income, because they do not discount future consumption.

The log-utility assumption simplifies the analysis by eliminating dynamics in child labor and crime. Noting that the resources subject to appropriation is given by $(1 - \alpha)\, Y - C_a = pC_a$, it is easy to verify that the equality of marginal costs and benefits from child crime implies the following relationship between child labor and child crime every period:

$$Z = \frac{1 - aX}{b \left(1 + \frac{\delta\beta}{1-p} \right)} \equiv g\,(X)\,. \tag{12}$$

The equilibrium relationship $Z = g\,(X)$ has $\partial g / \partial X < 0$ because the marginal benefit from child crime is decreasing in Z, independent of X, while the marginal cost of child crime to a household is increasing in x and z, since there are diminishing returns to effective schooling.

If the optimal choice of child labor is interior, the optimality of child labor and child crime, together, give a second equilibrium relationship between these two activities:

$$Z = \left(\frac{a\,(1 - p)}{b\phi\,(1 + p)} \right) (1 + \phi X) \equiv f\,(X)\,, \tag{13}$$

which has $\partial f / \partial X > 0$ because the marginal benefit from child labor is decreasing in X, independent of Z, the marginal benefit from child crime is decreasing in Z, independent of X, while the ratio of marginal costs of child labor and child crime is constant.

An equilibrium with positive levels of child labor is such that $X^* > 0$ solves $g\,(X) = f\,(X)$, with $Z^* = g(X^*)$ every period. It is then easy to verify the following (see Appendix).

Proposition 1 *There is a symmetric equilibrium with positive child labor and schooling if and only if* $\phi/a \in (m^L, m^H)$ *and* $b \in (b^L, b^H)$*, where* $m^L \in (0,1)$, $m^H > m^L$, $b^L \in (0,1)$*, and* $b^H > b^L$ *are given in the Appendix. This equilibrium is unique, with*

$$\begin{aligned} X^* &= \frac{1+p-(1-p+\delta\beta)\left(\frac{a}{\phi}\right)}{a(2+\delta\beta)}, \\ Z^* &= \left(1+\frac{a}{\phi}\right)\left(\frac{1-p}{b(2+\delta\beta)}\right), \\ K' &= \left(\frac{p}{1+p}\right)(1-\alpha)AK^\alpha H^{1-\alpha}(1+\phi X^*)^{1-\alpha}, \\ H' &= \left(\frac{Z}{\underline{Z}}\right)^{-\gamma}(1-aX^*-bZ^*)^\beta H^{1-\beta}, \end{aligned}$$

and it converges to a steady state for all initial conditions $K_0 > 0$ *and* $H_0 > 0$.

Intuitively, the existence of a symmetric equilibrium with positive child labor requires the productivity of child labor, ϕ, to be sufficiently high relative to the opportunity cost of child labor in terms of schooling, a ($\phi/a > m^L$), so there is an incentive for children to allocate some time to work. It also requires that the productivity of child labor be sufficiently low relative to the opportunity cost of child labor in terms of schooling ($\phi/a < m^H$), so there remains an incentive for children to allocate some time to school. In turn, the opportunity cost of child crime in terms of schooling, given by b, needs to be sufficiently low ($b < b^H$) for schooling not to be crowed out entirely ($m^H > 0$), and also sufficiently high ($b > b^L$) for child labor and schooling to coexist ($m^L < m^H$).

5 Long-run consequences of child labor restrictions

In this section we use the above model to argue that the presence of child crime can greatly shape the long-run implications of child labor restrictions. Formally, we consider an enforceable upper bound to the time a child can devote to work, which we denote by $\overline{x}$, with $0 \leq \overline{x} < X^*$. Larger values of $\overline{x}$ correspond to weaker child labor restrictions, which are binding as long as they constrain child labor to be below the equilibrium level X^*. The case where $\overline{x} = 0$ corresponds to an outright child labor ban.

That restrictions on child labor have a negative short run effect is not surprising. Even though the resulting fall in child labor comes with a rise in child crime, household income, saving, and investment all fall in the short run. Consequently, current households can be made worse off, even if their children's future human capital rises. More importantly, the following proposition shows that restrictions on child labor can make future generations worse off as well.

Proposition 2 ***(i)*** *A permanent cap $\overline{x}$ on child labor, with $0 \leq \overline{x} < X^*$, reduces long-run utility if and only if $\overline{x} < x_U$;* ***(ii)*** *$x_U > 0$ if and only if $\phi/a > n_U$;* ***(iii)*** *x_U rises with γ, and $x_U \geq X^*$ if and only if $\gamma \geq \beta \left(1 - \frac{1-p+\delta\beta}{(1+\frac{\delta}{2})(1+p)}\right)$, where x_U and n_U are given in the Appendix.*

Part *(i)* of the proposition says that child labor restrictions harm long-run utility whenever they lower child labor sufficiently. Part *(ii)* provides the conditions for a full ban to be harmful. More generally, it says that there is a non-empty interval of child labor restrictions $[0, x_U]$ that harms long-run utility if and only if the productivity of child labor, relative to the opportunity cost of child labor in terms of schooling, is sufficiently high. Part *(iii)* implies that a given child labor restriction is more likely to be harmful when the effect of the human capital externality associated with child crime is stronger. It also says that even a marginal restriction on child labor may harm long-run utility.

The short-run and the long-run consequences of restrictions on child labor are linked through the intergenerational transmission of poverty. Following the enforcement of a permanent cap on child labor, increased current and future crime counteracts the positive effect on human capital accumulation of decreased current and future child labor. Moreover, current and future income fall, directly as the result of lower child labor, and indirectly through the negative effect of lower incomes on saving and investment.

It is somewhat remarkable that Proposition 2 holds even in the log-utility case, and even though the crime tax $1 - p$ is independent of aggregate crime. These two assumptions will be relaxed in Section 6. However, under these assumptions, not only child labor and crime are unaffected by the dynamics of capital accumulation, but the aggregate investment *rate* is independent of the levels of child labor and crime. Accordingly, the negative effect of lower income on investment is particularly weak, since the aggregate *investment rate* is unaffected by the enforcement of a cap on child labor.

The above two assumptions weaken the negative effect of crime on human capital accumulations as well. Thus, it is easy to verify that human capital increases, both in the short run and in the long run, following the enforcement of a permanent cap on child labor. However, the increase in human capital cannot compensate for the fall in capital accumulation if the human capital externality associated with crime is sufficiently strong.

The intuition behind the results given in Proposition 2 is better understood by contrasting the equilibrium of the model with two alternative benchmark planning problems. The first one is the problem of a planner that allocates all resources in the economy in order to maximize the representative household's long-run utility over all feasible allocations. Formally, let the utility of the representative household in period t be

$$V_t = \ln(\theta_t C_t) + \ln((1-\theta_{t+1})C_{t+1}) + \delta \ln\left(\frac{(1-\alpha)F(K_{t+1},(1+\phi X_{t+1})H_{t+1})}{(1+\phi X_{t+1})}\right),$$

where $\theta_t \equiv C_{at}/C_t$, and where the above objective function assumes that adult labor is rewarded according to its social marginal product every period. The relevant planning problem consists of choosing an allocation $\{X_t, Z_t, K_{t+1}, \theta_t\}_{t\geq 0}$ in order to solve:

$$\begin{aligned} \max \lim_{t\to\infty} V_t \text{ subject to } \quad C_t &= F(K_t,(1+\phi X_t)H_t) - K_{t+1}, \\ H_{t+1} &= \left(\frac{Z_t}{\underline{Z}}\right)^{-\gamma}(1-aX_t-bZ_t)^{\beta} H_t^{1-\beta}, \\ X_t &\geq 0,\ Z_t \geq \underline{Z},\ X_t+Z_t\leq 1,\ \theta_t\in[0,1],\ \text{for all } t\geq 0. \end{aligned} \tag{14}$$

It is easy to verify that any solution exhibits constant values of X and Z. As indefinitely maintainable values of C, K, and H satisfy $C = F(K,(1+\phi X)H) - K$ and $H = \left(\frac{Z}{\underline{Z}}\right)^{-\gamma/\beta}(1-aX-bZ)$, Problem (14) reduces to the following two-step problem. First, suppose that the planner allocates aggregate consumption period by period between the old and the adults, with $C_a = \theta C$, and $C_o = (1-\theta)C$. It is easy to see that $\theta = 1/2$ solves:

$$\max_{\theta} \ln(\theta C) + \ln((1-\theta)C) \text{ for any } C > 0. \tag{15}$$

Now, Problem (14) reduces to:

$$\begin{aligned} &\max_{X,Z,K} 2\ln\left(AK^{\alpha}H^{1-\alpha}(1+\phi X)^{1-\alpha} - K\right) + \delta\ln\left(\frac{(1-\alpha)AK^{\alpha}H^{1-\alpha}(1+\phi X)^{1-\alpha}}{(1+\phi X)}\right) \\ &\text{subject to } H = (Z/\underline{Z})^{-\gamma/\beta}(1-aX-bZ),\ X\geq 0,\ Z\geq\underline{Z},\ X+Z\leq 1. \end{aligned} \tag{16}$$

The second planning problem is just like Problem (14), except that the planner cannot control child crime, and so she faces the additional constraint $Z_t = g(X_t)$ every period, where $g(\cdot)$ is given by equation (12). The only difference between the two planning problems is that the second one must take into account that child crime decisions are made optimally by the households. The above argument now implies that the new planning problem also solves Problem (15). However, instead of solving Problem (16), it solves:

$$\max_{X,Z,K} 2\ln\left(AK^{\alpha}H^{1-\alpha}\left(1+\phi X\right)^{1-\alpha}-K\right)+\delta\ln\left(\frac{\left(1-\alpha\right)AK^{\alpha}H^{1-\alpha}\left(1+\phi X\right)^{1-\alpha}}{\left(1+\phi X\right)}\right)$$

$$\text{subject to } Z=g\left(X\right),\ H=\left(Z/\underline{Z}\right)^{-\gamma/\beta}\left(1-aX-bZ\right),\ X\geq 0,\ Z\geq\underline{Z},\ X+Z\leq 1. \tag{17}$$

Let $\{X_1, Z_1, K_1\}$ and $\{X_2, Z_2, K_2\}$ solve Problem (16) and Problem (17), respectively. Comparing these allocations and the steady-state equilibrium allocation $\{X^*, Z^*, K^*\}$ implied by Proposition 1, one can show the following result (see Appendix).

Proposition 3 ***(i)*** *$X_1 < X^*$ if and only if $X^* > 0$, and $Z_1 = \underline{Z} < Z^*$.* ***(ii)*** *$X_2 > 0$ is a necessary condition for a permanent cap $\overline{x}$ on child labor, with $0 \leq \overline{x} < X^*$, to reduce long-run utility.* ***(iii)*** *The following three statements are equivalent: (a) $X_2 \geq X^*$, (b) $Z_2 \leq Z^*$, and (c) $x_U \geq X^*$, where x_U is given in Proposition 2.*

Part *(i)* says that equilibrium child labor and crime are both inefficiently large relative to the long-run optimal allocation $\{X_1, Z_1, K_1\}$. Thus, it is socially desirable to eliminate both child labor and crime. Part *(ii)* implies that child labor restrictions necessarily increase long-run utility if the constrained long-run optimal allocation $\{X_2, Z_2, K_2\}$ requires the elimination of all child labor. Part *(iii)* states that the condition that equilibrium child labor be inefficiently low relative to the *constrained* long-run optimal allocation $\{X_2, Z_2, K_2\}$ is equivalent to the condition given in Proposition 2 to have that even a marginal restriction on child labor will harm long-run utility. It also implies that equilibrium child labor is too low if and only if equilibrium child crime is too high, relative to $\{X_2, Z_2, K_2\}$.

To appreciate the full implications of Proposition 3, it is useful to consider the solutions to Problem (16) and Problem (17) in some detail. In both cases, optimal investments require equating the marginal product of capital to its cost:

$$\frac{2}{C}\left(\frac{\partial F}{\partial K}-1\right)=-\delta\frac{1}{Y}\frac{\partial F}{\partial K}.$$

Using the fact that $\frac{\partial F}{\partial K}=\alpha\frac{Y}{K}$ and $\frac{C}{K}=\frac{Y}{K}-1$, the long-run optimal investment rate is:

$$\frac{K_1}{Y_1}=\frac{K_2}{Y_2}=\alpha\left(\frac{2+\delta}{2+\alpha\delta}\right), \tag{18}$$

which is greater than the capital share in the production of output, α, because $\delta > 0$, and individuals do not care about their children's consumption, but rather about their labor income. It is easy to verify that the steady-state equilibrium investment rate is lower than the long-run optimal investment rate, that is, $K^*/Y^* < K_1/Y_1$, if and only if $\frac{p}{1+p} < \frac{\alpha}{1-\alpha}\left(\frac{2+\delta}{2+\alpha\delta}\right)$. For instance, $\alpha \geq 1/3$ ensures that this is the case for all $p < 1$.

Now, consider Problem (16). Since crime harms human capital accumulation, the long-run optimal choice of crime is simply $Z_1 = \underline{Z}$. Furthermore, if the long-run optimal level of child labor is interior, the *social* return to child labor in the long run must be zero:

$$2\phi \frac{\partial F}{\partial (1+\phi X)} - (2+\delta)\frac{\partial F}{\partial H}\left[-\frac{\partial H}{\partial X}\right] = 0. \tag{19}$$

The first term in the left side of the equation is the *social* marginal benefit of child labor. The second term is its *social* marginal cost. For a comparison, in equilibrium, child crime satisfies $Z^* = g(X^*)$, and it is the *private* return to child labor that is zero:

$$(1+p)\,\phi \frac{\partial F}{\partial (1+\phi X)} - \delta \frac{\partial F}{\partial H}\left[-\frac{\partial H}{\partial X}\right] = 0. \tag{20}$$

The first term in the left-hand-side is the *private* marginal benefit of child labor evaluated in utility terms. It accounts for the fact that individuals consume only a fraction $\frac{1}{1+p}$ of additional income from child labor. The second term is the *private* marginal cost of child labor, which reflects the marginal cost from the forgone future income, discounted by the factor δ, due to the fact that child labor harms the child's human capital.

Evaluated at the equilibrium allocation, the *social* marginal benefit of child labor is greater than the *private* marginal benefit. This comes from the fact that child labor increases output, which increases the consumption of both the adult and the old. Evaluated at the equilibrium allocation, the social marginal cost of child labor is also greater than its private marginal cost. This comes from the fact that child labor harms a child's human capital, which depresses consumption of both the adult and the old. It also depresses future labor income, and this cost is discounted by the factor δ. It is easy to see that the social return (that is, the social benefit net of cost) of child labor is always negative, when evaluated at the equilibrium allocation, since $\frac{2}{2+\delta} < \frac{1+p}{\delta}$. Accordingly, $X_1 < X^*$.

Now, consider Problem (17). Child crime satisfies $Z_2 = g(X_2)$ and X_2 satisfies

$$2\phi \frac{\partial F}{\partial (1+\phi X)} - (2+\delta) \frac{\partial F}{\partial H} \left[-\frac{\partial H}{\partial X} - \frac{\partial H}{\partial Z} \frac{\partial Z}{\partial X} \right] = 0. \tag{21}$$

As in Problem (16), it is the social return to child labor that is being maximized. The only difference is that Problem (17) takes into account the fact that child labor crowds out child crime, which in turn affects the calculation of the marginal cost of child labor in terms of human capital. Since $\frac{\partial g(X)}{\partial X} < 0$, this additional effect reduces the social marginal cost of child labor, relative to the unconstrained optimum, whenever the human capital externality associated with crime is present, which implies that $X_2 > X_1$ whenever $\gamma > 0$. Moreover, Proposition 2 and Proposition 3 together imply that the social (marginal) returns to child labor are positive (when evaluated at the equilibrium allocation) if and only if $X_2 > X^*$, which is the case if and only if the human capital externality associated with crime is sufficiently strong that even a marginal child labor restriction will harm long-run utility. Note that the harmful effects of child labor restrictions come from the *potential*, as opposed to the actual, participation of children in criminal activities.

It is easy to show that

$$X_1 = \begin{cases} \frac{(1-b\underline{Z})\frac{1}{a} - \left(1+\frac{\delta}{2}\right)\frac{1}{\phi}}{2+\frac{\delta}{2}} & \text{if} \quad \phi/a \geq \frac{1+\frac{\delta}{2}}{1-b\underline{Z}} \\ 0 & \text{if} \quad \phi/a \leq \frac{1+\frac{\delta}{2}}{1-b\underline{Z}}. \end{cases} \tag{22}$$

Recall that we have assumed that $\underline{Z} \leq (1-p)\epsilon$, with $p \in [1/2, 1)$ and $\epsilon \in (0, 1/3)$, in order to ensure that the equilibrium level of child crime exceeds the lower bound $\underline{Z}$. In addition, note that Z_1 converges to 0 as ϵ approaches 0, and so

$$\lim_{\epsilon \to 0} X_1 = \begin{cases} \frac{\frac{1}{a} - \left(1+\frac{\delta}{2}\right)\frac{1}{\phi}}{2+\frac{\delta}{2}} & \text{if} \quad \phi/a \geq 1+\frac{\delta}{2} \\ 0 & \text{if} \quad \phi/a \leq 1+\frac{\delta}{2}. \end{cases}$$

Similarly, it is easy to verify that

$$X_2 = \begin{cases} \frac{\frac{1}{a} - \left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right)\frac{1}{\phi}}{1+\left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right)} & \text{if} \quad \phi/a \geq \left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right) \\ 0 & \text{if} \quad \phi/a \leq \left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right), \end{cases} \tag{23}$$

where it is evident that $X_2 \geq X_1$ whenever $\gamma \geq 0$, with $X_2 = X_1$ if and only if $\gamma = 0$.

It should be noted that $X_2 > 0$ if and only if a/ϕ is sufficiently small, and also that this situation is compatible with $X_1 = 0$, which requires that a/ϕ be sufficiently large. In this sense, our main results apply to an economy where child labor is unambiguously harmful to children, but not too harmful. As a mater of interpretation, our argument against child labor restrictions therefore excludes the worst cases of *hazardous work* as well as all *unconditionally worst forms of child labor*.[8] Importantly, however, we think that our analysis does apply to many forms of child labor that harm children's human capital accumulation. An implication is that the fact that child labor is harmful to children does not justify the imposition of child labor restrictions. This is the case only if child labor is sufficiently harmful.

Consider the case in which property rights are perfectly secure. That is, suppose that $p = 1$, and $\gamma = 0$. In this extreme case, it is easy to verify that child labor restrictions unambiguously increase long-run utility. However, it should be noted that they also make current generations worse off. In particular, the current old suffers from decreased capital rents, and the current households forgo child labor income, which is not compensated by the increase in adult labor income. This scenario formalizes the common perception that child labor restrictions are desirable in the long run because they allow children to accumulate human capital, even though current generations may be worse off.

6 Extensions

The above formulation of the negative externalities associated with child crime, working through human capital accumulation, allowed for a simple analysis of the long-run effects of restrictions on child labor. In this section, we briefly discuss two extensions of our basic model that would lead to the same qualitative results, even in the absence of human capital externalities associated with child crime. The first one allows aggregate child crime to affect the magnitude of the "crime tax". The second one relaxes the assumption of log-utility.

There are various ways to think about how child criminality works. For example, it may teach children to be opportunistic. One implication is that it reduces the effectiveness of schooling, as in our basic model. The relevance of this channel is documented in studies of school violence.[9]

[8] Worldwide, about 115 million children (under 18 years old) are estimated to do *hazardous work* (ILO, 2011) — "work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children" (ILO Convention 182 (1999), Article 3(d)). At least another 8.4 million children are involved in *unconditional worst forms of child labor*, including all forms of slavery, prostitution and pornography, and drug production and trafficking (ILO Convention 182 (1999), Article 3(a,b,c)).

[9] For instance, a study of school violence in ten developing countries concludes that *"violence at school is costly not only in financial terms, but also in terms of the long-term damage it inflicts on the individual's healthy personality growth and development, the loss of his and her quality of life, its interference with the individual's learning of pro-social behaviours, and, above all, its impact on the vital task of developing human resources for national development."*

Another is that it may lower institutional quality.[10] A way to formalize the latter is to allow aggregate child crime to affect the crime tax $1-p$ in our basic model. We have the following analog of Proposition 2.

Proposition 4 *Suppose that $1-p = P(Z)$, with $P(0) = 0$, $\partial P/\partial Z > 0$, and $\partial^2 P/\partial Z^2 < 0$, and consider an equilibrium with positive crime.* ***(i)*** *A binding permanent cap $\overline{x}$ on child labor reduces long-run utility if and only if $\overline{x} < \widetilde{x}_U$;* ***(ii)*** *$\widetilde{x}_U > x_U$, where $\widetilde{x}_U$ is characterized in the Appendix, and x_U is given in Proposition 2.*

This proposition considers the case where the "crime tax" $(1-p)$ increases, at a decreasing rate, with the aggregate level of child crime, focusing on equilibria with positive crime. Part *(i)* of the proposition says that child labor restrictions harm long-run utility whenever they lower child labor sufficiently. Part *(ii)* says that the effect of crime on the crime tax makes any given child labor restriction relatively less desirable in the long run. The problem is that any restriction on child labor increases the aggregate level of child crime in the economy, which increases the crime tax, which in turn promotes crime. The resulting equilibrium level of crime is higher, while long-run investment, income, and utility all fall relative to the case where the crime tax is exogenous.

It is easy to construct numerical examples to ensure that any restriction on child labor will reduce long-run utility even in the absence of human capital externalities (i.e., even if $\gamma = 0$). One such example is the following: let $P(Z) = 1 - \exp\{-\eta Z\}$, with $\delta = 1$, $\alpha = 0.7$, $\beta = 0.8$, $\phi = 0.85$, $a = b = 0.95$, and let $\gamma = 0$ and $\eta = 1.28$, which gives $X^* = 0.38$, $Z^* = 0.03$, and $p = 1 - P(Z^*) = 0.96$, in the unique equilibrium with positive crime. In this case, a cap on child labor still leads to higher human capital in the long-run as well as in the short run. Relative to the case where the crime tax is exogenous, the counteracting effect of increased crime on human capital is larger; moreover, increased crime raises the crime tax, which in turn depresses the economy's investment rate; consequently, the negative impact that a cap on child labor has on investment, and thus on future income, is exacerbated.

Finally, it should be noted that the assumption of log utility in our basic model facilitates the analysis by eliminating dynamics in the allocation of children's time. Alternatively, suppose that

(UNESCO, 1997, p. 7).

[10] One instance of this is documented in Al Jazeera's (02/09/2012) broadcast on the river traders of Brazil, in particular, on the participation of children in both trade and piracy along the Tajaparu River (http://www.aljazeera.com/programmes/2011/05/201153142852595854.html).

an adult's utility is given by

$$U = \frac{c_a^{1-\sigma} - 1}{1-\sigma} + \frac{(c_o')^{1-\sigma} - 1}{1-\sigma} + \delta \left(\frac{(w'h')^{1-\sigma} - 1}{1-\sigma} \right),$$

where $\sigma \geq 0$, and where $\sigma = 1$ corresponds to log utility. One can verify that there is a continuum of equilibrium paths whenever $\sigma \neq 1$, which are parameterized by arbitrary initial conditions (X_0, Z_0). However, one can also show that this feature does not translate into a continuum of steady-state equilibrium allocations. It is not difficult to ensure that there exists a unique steady-state equilibrium, although it has no analytical solution.

Simulations of the model indicate that larger values of σ tend to exacerbate the negative consequences of restrictions on child labor, so much so that any restriction will lead to lower utility in the long run if the elasticity of intertemporal substitution $(1/\sigma)$ is sufficiently low, even in the absence of human capital externalities (i.e., even if $\gamma = 0$), and even if the crime tax $(1-p)$ is exogenous. For example, simulations of the model, with $\delta = \phi = 1$, $\alpha = 0.7$, $\beta = 0.8$, $a = 0.45$, $b = 0.5$, $p = 0.95$, and $\gamma = 0$, indicate that even a marginal restriction on child labor causes utility to fall in the long run whenever $\sigma \geq 4$, with $X^* = 0.31$ and $Z^* = 0.004$, for $\sigma = 4$, and where X^* and Z^* decrease with σ.

Intuitively, the greater the value of σ, the less willing individuals are to sacrifice current consumption, either in exchange for future consumption, or for the sake of their children's future human capital. Accordingly, for greater values of σ, the loss of current income arising from child labor restrictions induces households to sacrifice relatively more of their child's future human capital, by increasing child crime. Indeed, it is possible to find numerical examples where the outright ban of all child labor would lower not only utility but also human capital in the long run. For example, simulations of the model, with $\delta = \phi = 1$, $\alpha = 0.5$, $\beta = 0.8$, $a = 0.3$, $b = 0.5$, $p = 0.93$, and $\gamma = 0$, indicate that banning all child labor would cause human capital to fall in the long-run if $\sigma \geq 15$ (with $X^* = 0.25$ and $Z^* = 0.007$ if $\sigma = 15$). This effect would reinforce, rather than offsetting, the negative welfare effect of reduced investment, and so it is sufficient to ensure that long-run utility would fall as well.

7 Conclusion

The dominant view within developed countries is that international labor standards aimed at the eradication of child labor must be immediately enforced. This view underlies significant international activism aimed at compelling developing countries to enforce the standards set in the ILO Convention 138. Thus, on August 29, 2012, the Union cabinet of India approved an amendment to existing child labor laws that, if adopted by parliament, would impose significant penalties to parents and employers of children younger than 14 in any work at all. Not surprisingly, it has been noted that "*[i]mage is very important now since India is promoting itself as the fastest-emerging economic power in the world, ...[t]hey can't afford legislation which goes against that image*" (Wall Street Journal, November 23, 2012).

Those welcoming India's proposed law rejoice that *"[t]hey've really recognised that the long-term benefits of education are far more consequential than the short-term gains of child labor"* (Financial Times, August 29, 2012). Dissenting voices regret that "*strategies have been designed for all children based on generalised examples of children in hazardous and intolerable forms of labour ... that account for a very small percentage of the child work force*", warning that "*[t]his new amendment will be even more difficult to enforce and will further push children into more invisible, unmonitored and therefore hazardous situations*" (Deccan Herald, September 4, 2012).

Evidently, arguments against blanket child labor restrictions have not found much support in the policy arena, despite increasing recognition that they are likely to be harmful in the short run. We think this is because of the persistent belief that such restrictions are likely to be beneficial in the long run.

In this paper, to the contrary, we have argued that enforcing the standards set in the ILO Convention 138, as India is proposing to do, is harmful even in the long run. That some forms of child labor are abhorrent is not in dispute. Neither is the spirit of Convention 138. However, our analysis does call on policy makers to avoid blanket restrictions on child labor, lest they violate the well-known Hippocratic injunction to *do no harm*.

The case for the abolition of child labor is fallacious, not only because it presumes that high-quality education is the relevant alternative to child labor, but also because it fails to recognize that the problem of child labor is a second-best problem and it also fails to recognize how the short-term and the long-term effects of restrictions on child labor are linked through the intergenerational transmission of poverty.

While our analysis has focused on the link between child labor and child crime, the scope of our argument is obviously broader. For instance, as long as the standards set in the ILO Convention 182 — which calls for the abolition of the worst forms of child labor (see footnote 8) — remain unenforced, policy makers should anticipate that enforcing the standards set in the ILO Convention

138 — which calls for blanket child labor bans (see footnote 1) — will not be in the best interest of children because it will push them into the worst forms of child labor. Whether blanket child labor bans exacerbate child crime or crime against children, or both, our argument implies that they are harmful even in the long run.

Consequently, greater emphasis should be given to complementary interventions aiming at improving the quality of education, the children's work environment, and the enforcement of laws against crime. The problem of child labor is related not only to poverty, but also to poor institutions and poor school quality. While these issues remain unresolved in developing economies, it is the eradication of child abuse and neglect, rather than the eradication of child labor, that is imperative.

Appendix

Proof of Proposition 1

The analysis leading to Proposition 1 shows that an equilibrium with $X^* > 0$ and $Z^* > 0$ is such that (X^*, Z^*) solves equations (12) and (13), every period. Since both equations are linear, and they have different slopes, there is at most one solution. It is straightforward to verify that the solution (X^*, Z^*) is the one given in the proposition.

Next, one must ensure that $X^* > 0$, $Z^* > \underline{Z}$, and $X^* + Z^* < 1$. These three conditions are necessary and sufficient to ensure $X^* \in (0, 1)$, $Z^* \in (\underline{Z}, 1)$, and $1 - X^* - Z^* \in (0, 1)$. It is straightforward to verify that $X^* > 0$ if and only if $\phi/a > m^L$, with $m^L \equiv \frac{1-p+\delta\beta}{1+p}$, and also that $X^* + Z^* < 1$ if and only if $\phi < m^H a$, with

$$m^H \equiv \frac{\left(1 + \frac{\delta\beta}{1-p}\right) \frac{b}{a} - 1}{\left(\frac{1+p}{1-p}\right) \frac{b}{a} + 1 - b \left(1 + \frac{\delta\beta}{1-p} + \frac{1+p}{1-p}\right)}.$$

Note that $m^L \in (0, 1)$, for all $p \in [1/2, 1]$. It remains to show that $m^H > m^L$, with $m^H > 0$. One can easily verify that $m^H > 0$ if and only if

$$b\left(1 + \frac{\delta\beta}{1-p}\right) < 1 + \left(\frac{1}{a} - 1\right)\left(\frac{1+p}{1-p}\right) b,$$

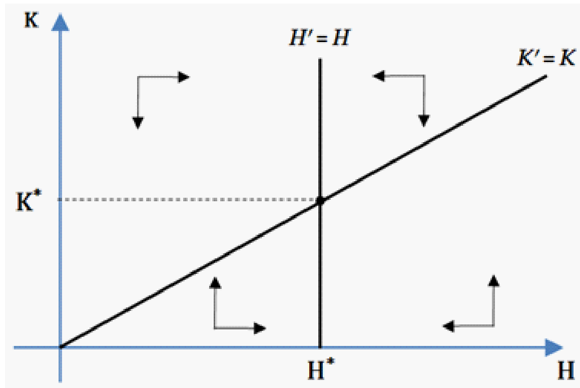
and also that $m^H > m^L$ if and only if $b\left(1 + \frac{\delta\beta}{1-p}\right) > 1$. The above conditions define the interval $\left(b^L, b^H\right)$ given in the proposition in the obvious way.

Next, recalling that $\underline{Z} \leq (1-p)\,\epsilon$, it is easy to verify that $Z^* > \underline{Z}$ if $\epsilon < \frac{1+\frac{a}{\phi}}{b(2+\delta\beta)}$, which is the case for all $\epsilon \in (0, 1/2]$ since $\phi < m^H a$. It is easy to verify that the above existence conditions are consistent with the assumption that $\phi > \frac{b-a}{1-b}$.

The difference equation for K follows from (5) and (11), and the difference equation for human capital accumulation follows from evaluating (3) in equilibrium. Equilibrium dynamics are characterized by these two difference equations, together with (K_0, H_0). Moreover, interior schooling allocations ensure that the equilibrium exhibits positive human and physical capital for all positive initial capital stocks. The equilibrium is obviously unique.

Furthermore, it converges to a unique steady state for all $K_0 > 0$ and $H_0 > 0$, as seen in the phase diagram depicted in Figure 1. The locus of points with $H' = H$ is given by $H = (Z^*/\underline{Z})^{-\gamma/\beta}\,(1 - aX^* - bZ^*)$, and the locus of points where $K' = K$ is given by $K = BH\,(1 + \phi X^*)$, where $B = \left(\left(\frac{p}{1+p}\right)(1-\alpha)\,A\right)^{\frac{1}{1-\alpha}}$. The sign of K'/K and that of H'/H in the different regions of the phase diagram can be easily inferred from the dynamic equations for K and H that are given in the proposition. This concludes the proof. QED

Figure 1: phase diagram



Proof of Proposition 2

One can verify that steady-state equilibrium utility, for any given $\overline{x}$ with $X = \overline{x} \leq X^*$, is equal to $\ln[B_1 \Psi(\overline{x})]$, where $B_1 > 0$ is some constant, with $\Psi(\overline{x}) = (1 - a\overline{x})^{\left(1-\frac{\gamma}{\beta}\right)(2+\delta)} (1 + \phi\overline{x})^2$. The function Ψ is strictly concave, with its maximum at $\overline{x} = X_2$, where X_2 is given by (23), and where $X_2 > 0$ if and only if $\phi/a \geq (1 - \gamma/\beta)(1 + \delta/2)$. It is easy to see that there exists a number $x_U \in [0, X^*]$ such that $\Psi(\overline{x}) < \Psi(X^*)$ if and only if $\overline{x} < x_U$. Let $x_U = X^*$ if and only if $X_2 \geq X^*$. Else, if $X_2 < X^*$, let x_U be the unique solution to $\Psi(x_U) = \Psi(X^*)$ with $x_U \in (0, X^*)$. Note that $x_U > 0$ if and only if $X_2 > 0$ and $\Psi(0) < \Psi(X^*)$, where $\Psi(0) = 1$. Accordingly, let $x_U = 0$ if and only if $\Psi(0) \geq \Psi(X^*)$. This proves Part (i).

Consider Part (ii). It is easy to verify that the necessary and sufficient condition for $\Psi(X^*) > 1$ can be written as

$$\left(1 + \frac{a}{\phi}\right)^{\left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right)} \left(1 + \frac{\phi}{a}\right) > \left(1 + \frac{1+p}{1-p+\delta\beta}\right)^{\left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right)} \left(1 + \frac{1-p+\delta\beta}{1+p}\right).$$

The left side of the inequality falls with a/ϕ if and only if $\frac{\phi}{a} > \left(1 - \frac{\gamma}{\beta}\right)\left(1 + \frac{\delta}{2}\right)$, for $0 \leq \gamma < \beta$. Above, we have noted that this is the necessary and sufficient condition for $X_2 > 0$. Let n_U be the unique value of $\phi/a \geq (1 - \gamma/\beta)(1 + \delta/2)$ that equates both sides of the above inequality. A value of $n_U \geq (1 - \gamma/\beta)(1 + \delta/2)$ can always be found since the right side of the inequality is minimized at $\frac{1+p}{1-p+\delta\beta} = [(1 - \gamma/\beta)(1 + \delta/2)]^{-1}$. This proves Part (ii).

Now consider Part (iii). It is easy to verify that x_U, as defined above, is increasing in γ, for all $x_U \in (0, X^*)$. Recall that $x_U < X^*$ if and only if $X_2 < X^*$, and note that X_2 is an increasing function of γ, whereas X^* is independent of γ. Finally, one can verify that $x_U < X^*$ if and only if $\gamma < \beta\left(1 - \frac{1-p+\delta\beta}{(1+p)(1+\delta/2)}\right)$. This concludes the proof. QED

Proof of Proposition 3

Consider Part (i). First, as noted in the proof of Proposition 1, $\epsilon \in (0, 1/2]$ is a sufficient condition for $Z^* > \underline{Z}$. Next, to compare X^* and X_1, recall that $X^* > 0$ if and only if $\phi/a > m^L$, where

$m^L \in (0,1)$ is given in the proof of Proposition 1. From equation (22), note that $X_1 > 0$ if and only if $\phi/a \geq (1+\delta/2)/(1-b\underline{Z})$, where $(1+\delta/2)/(1-b\underline{Z}) \geq 1$, for all $\underline{Z} \geq 0$. Next, note that $X_1 > 0$ solves the equilibrium condition (19) whenever $\phi/a \geq (1+\delta/2)/(1-b\underline{Z})$. Substituting equation (18) into (19) one can show that an interior solution $X_1 > 0$ must solve

$$\frac{\phi}{1+\phi X} = \left(1+\frac{\delta}{2}\right)\frac{a}{1-aX-b\underline{Z}}. \tag{24}$$

Moreover, taking into account that $Z^* = g(X^*)$, equation (20) can be written as

$$\frac{\phi}{1+\phi X} = \left(\frac{1-p+\delta\beta}{1+p}\right)\frac{a}{1-aX}. \tag{25}$$

Comparing equations (24) and (25), one can see that $X^* > X_1$ if and only if

$$\left(1+\frac{\delta}{2}\right)\frac{1-aX_1}{1-aX_1-b\underline{Z}} > \frac{1-p+\delta\beta}{1+p}, \tag{26}$$

which is always the case, since the left side is greater than 1 and the right side is lower than 1, for all $p \in [1/2, 1)$. It is easy to verify that existence of the allocation (X^*, Z^*, K^*) with $X^* > 0$ implies existence of (X_1, Z_1, K_1). This concludes the proof of Part *(i)*.

Part *(ii)* was shown in the proof of Proposition 2.

Consider Part *(iii)*. Noting that $Z^* = g(X^*)$, $Z_2 = g(X_2)$, and $\partial g/\partial X_2 < 0$, it follows that $Z^* \geq Z_2$ if and only if $X^* \leq X_2$. Next, note that $X_2 > 0$ if and only if $\phi/a \geq (1-\gamma/\beta)(1+\delta/2)$, and also that $X_2 > 0$ solves the equilibrium condition (19). In turn, this condition implies that an interior solution $X_2 > 0$ must solve

$$\frac{\phi}{1+\phi X} = \left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right)\frac{a}{1-aX}. \tag{27}$$

Noting that $X^* > 0$ if and only if $\phi/a > \frac{1-p+\delta\beta}{1+p}$, and $X_2 > 0$ if and only if $\phi/a > (1-\gamma/\beta)(1+\delta/2)$, and comparing equations (27) and (25), one can see that, whenever $X^* > 0$, one has that $X^* \leq X_2$ if and only if $\left(1-\frac{\gamma}{\beta}\right)\left(1+\frac{\delta}{2}\right) \leq \frac{1-p+\delta\beta}{1+p}$. It is easy to verify that this condition holds if and only $x_U \geq X^*$, as shown in the proof of Proposition 1. It is now easy to verify that existence of the equilibrium allocation (X^*, Z^*, K^*) with $X^* > 0$ implies existence of the constrained optimal allocation $\{X_2, Z_2, K_2\}$, whenever $X^* \geq X_2$. Instead, if $X^* < X_2$, note that the existence of the allocation $\{X_2, Z_2, K_2\}$ requires that $X_2 + Z_2 < 1$, where $Z_2 = g(X_2)$. It is easy to see that $X + g(X)$ is an increasing function of X. Moreover, since X_2 is increasing in γ whenever $X_2 > 0$, it is easy to verify that there exists a number $\gamma_{\max} \in (\gamma_U, \beta)$, where $\gamma_U \equiv \beta\left(1-\frac{1-p+\delta\beta}{(1+p)(1+\delta/2)}\right)$, such that the allocation $\{X_2, Z_2, K_2\}$ exists if and only if $\gamma \in [0, \gamma_{\max})$. Finally, to prove that $Z_2 > \underline{Z}$, note the minimum level of Z_2, denoted by $Z_2^{\min}$, is given by $X_2 + Z_2 = 1$ since $X + g(X)$ is increasing on X and $g'(X) < 0$. Note that $Z_2^{\min} = \frac{(1-p)(1-a)}{b(1-p+\delta\beta)-a(1-p)} > \underline{Z}$ for all $\epsilon \in (0, 1/2]$ since $\phi/a > \frac{1-p+\delta\beta}{1+p}$ and $b < \frac{a+\phi}{1+\phi}$. This concludes the proof. QED

Proof of Proposition 4

One can verify that the optimality of crime choices implies that $z = G(x, P(Z))$, where $G(x, 1-p) = g(x)$, and g is given by equation (12). Suppose there is an equilibrium with positive crime. Paralleling the arguments in the proof of Proposition 2, equilibrium long-run utility can be written as $\ln[B_2(1 - P(Z))\Psi(X)]$, where $B_2(p) = B_1$, and where B_1 and Ψ are the same as in the proof of Proposition 2. Moreover, note that the facts that $P(0) \geq 0$, $\partial P/\partial Z > 0$, and $\partial^2 P/\partial Z^2 < 0$, imply that $(\partial P(Z)/\partial Z) Z \leq P(Z)$, for $Z \in [0, 1)$, which in turn implies that $dZ/dX < 0$, with $dZ/dX = \frac{\partial G(X,P(Z))/\partial X}{1-\partial G(X,P(Z))/\partial Z}$. The rest of the proof parallels the proof of Proposition 2, noting that, if $dZ/dX < 0$, then $\ln[B_2(1 - P(Z))\Psi(X)]$ is a strictly concave function of X with its maximum at $X = \widetilde{X}_2$, where $\widetilde{X}_2 > X_2$, since $\frac{dB_2(1-P(Z))}{dZ}\frac{dZ}{dX} > 0$. QED

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