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ABSTRACT

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The paper develops a theoretical framework, and a diagrammatic apparatus, for explaining the supply of child labour. It examines the effect of credit, insurance, and poverty (defined as more than just low income). It also explains bonded child labour, a modern form of slavery closely associated with the worst forms of child exploitation. The analysis is positive, but provides some of the elements for a normative judgement.

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1 Introduction

Despite economic growth, the incidence of child labour shows no sign of decline in developing countries. Indeed, illegal immigration is bringing child labour back to developed countries. Child labour takes a variety of different forms. At one end of the spectrum, we have relatively innocuous forms of work involvement, such as helping in the family farm or the family shop, or contributing to domestic chores. At the opposite end, we have the more odious forms of exploitation of children for physically damaging, or morally objectionable activities. In the middle, we have the great bulk of the activities, ranging from domestic service to factory work, that more readily spring to mind when child labour is mentioned.

Even the less objectionable forms of child work have an opportunity cost in terms of forgone education. On the other hand, child labour brings immediate benefits to the family, children included. In some cases, it is the only means of survival. In others it is not,¹ but the immediate benefit still outweighs the future loss. Where that is the case, utility and child labour move in the same direction. If the stance taken by international agencies – that child labour is always, and in all conceivable circumstances, a bad thing – is to be justified, this then requires either an externality argument, or a value judgement leading to the treatment of child labour as a *de*-merit good.

The present paper develops a theoretical framework, and a diagrammatic apparatus, for explaining the supply of child labour. We examine the effect of credit, insurance, and poverty (defined as more than just low income). We also examine the phenomenon of bonded child labour, a modern form of slavery closely associated with the worst forms of child exploitation. The analysis is essentially positive, and ignores the demand side of the child labour issue, but still throws light on some of the points on which a normative judgement ought to be based.

2 Parental decisions

Explaining the supply of child labour requires modelling parental decisions. Let us start from an idealized situation with no uncertainty, and no credit rationing. This will provide us with a benchmark against which to assess the consequences of credit rationing and uninsurable risk. We also assume, for the time being, that all children belonging to the same family are, and are treated, the same. We place ourselves at the stage where parents have a given number of school-age children, denoted by

¹Much of the existing literature restricts the analysis to households on the threshold of starvation. We will show that child labour can arise even where survival is not an issue.

n , and must decide what to do with them.

Let a denote current parental consumption, and c the amount currently consumed (inclusive of medical care, as well as food and clothing, but exclusive of educational expenditure, that figures as a separate item) by each child. The income that each of these children will receive in adult life is given by

$$y = h\omega + m, \quad (1)$$

where h is the stock of human capital with which this child will enter adult life, ω the return to this form of capital, and m the net transfers that the child will receive from his parents in adult life. His maximized lifetime utility is given by $U^*(c, y)$, where $U^*(., .)$ is increasing and concave. Denoting by a_s the subsistence level of adult consumption, and by c_s the subsistence level of child consumption, we may choose the origin of U so that $U^*(c_s, .) \equiv U^*(., a_s) \equiv 0$.

Assume that a self-enforcing "family constitution" requiring adults to support their parents and children at specified levels is in place.² Let x denote the amount of support that parents are entitled to receive from each of their children when the latter become adults. In old age, parents will then consume xn . Having decided to make a net transfer of m to each of their children, however, parents will bequeath each child the sum of $x + m$.³ If parents are free to borrow, m can have either sign. Assuming, however, that nobody can be legally obliged to accept a negative estate,

$$x + m \geq 0. \quad (2)$$

Parental preferences are represented by

$$U = u(a) + V(xn, U^*(c, h\omega + m)n). \quad (3)$$

The first term on the right-hand side of this equation represents the utility that parents derive from their own current consumption. The function $u(.)$ is assumed to be increasing and concave, with $u(a_s) = 0$ and $u'(a_s) = \infty$. The second right-hand term represents the utility that parents derive from their own old-age consumption, xn , and from their children's well-being, U^*n . The function $V(., .)$ is assumed to be increasing and concave, with $V(a_s, .) \equiv V(., 0) \equiv 0$ and $V_1(a_s, .) \equiv V_2(., 0) \equiv \infty$.

This representation of parental preferences is a synthesis of the popular Becker-Barro approach,⁴ based on the assumption that parents are

²See Cigno (1993, 2004).

³The reason why parents start to cash-in their x as soon as their children are adults, but wait to be dead before parting with $x + m$, will become clear in just a moment.

⁴See, for example, Becker and Barro (1988).

moved my purely altruistic motivations, and of the pension motive approach, underlying a considerable part of the development economics literature, which assumes that parents are selfishly interested in securing old-age support.⁵ We do not need to be more specific about the form of $V(\cdot, \cdot)$. Concavity already implies that selfish considerations will have more weight if parental old-age consumption is relatively low, less weight if it is relatively high.

Let $Q(h)$ be the cost of providing each child with h units of human capital. The function $Q(\cdot)$ is defined for $h \geq h_0$, where h_0 is a positive constant representing inalienable natural talent. Like all cost functions, $Q(\cdot)$ is increasing in output. Call h_1 the level of human capital production where the child's time becomes fully employed in education. Assuming that human capital is produced by means of the child's own time, and of other educational inputs (tuition, books, *etc.*), using a constant returns to scale technology, $Q(\cdot)$ will be linear for $h \leq h_1$, convex for $h > h_1$ (because the same amount of the child's time will have to be combined with increasing amounts of the other inputs in order to produce more h).

Denote by z be the minimum amount of above-subsistence consumption that parents must give each of their children under the terms of the family constitution, and by w_c the current child wage rate (or the marginal product of child labour in the family business). Let W be the sum of parental earnings and assets, *net* of the amount due to children and grandparents under the family constitution, $(c_s + z)n + x$, and of any other unavoidable payments such as rents and taxes. The household budget constraint is then

$$a + \left[c - z + Q(h) + \frac{m}{r} \right] n = W + w_c n, \quad (4)$$

where r is the interest factor. The right-hand side of this equation is the household's full disposable income (*i.e.*, disposable income if children work full time). The left-hand side represents the full variable cost of supporting a family with n children. Parents choose (a, c, h, m) to maximize (3), subject to (4) and

$$a \geq a_s, \quad c \geq c_s + z, \quad h \geq \max \left(\frac{1 + n a_s}{n \omega} - \frac{m}{\omega}, h_0 \right). \quad (5)$$

If (2) and (5) are not binding, the solution satisfies

$$u'(a) = V_2 U_c^*(c, h\omega + m) \quad (6)$$

⁵See, for example, Leibenstein (1977).

and

$$\frac{U_c^*(c, h\omega + m)}{U_y^*(c, h\omega + m)} = r \leq \frac{\omega}{Q'} \quad (7)$$

Condition (6) tells us that parents equate the marginal utility of their current consumption to that of their children's. The first condition in (7) says that parents dissave (save) to the point where their children's marginal rate of substitution of current for future consumption is equal to the interest factor. The second says that, if parents invest in their children's education, they do so the point where the marginal return, ω/Q' , is equal to the interest factor.

Let

$$q \equiv Q'(h) \text{ for } h_0 \leq h \leq h_1$$

denote the marginal cost of human capital (a function of input prices only) up to the point where the child's time is fully employed in education. The nature of the solution depends on whether r is higher or lower than ω/q . Figure 1 and Figure 2 illustrate the various possibilities. The straight line with slope r through point **P** is the graph of (4) in $(c, y/\omega)$ space. It may thus be interpreted as an intertemporal budget line. The kinked curve with slope ω/Q' through points **I** and **P** is the graph of (4) when m is set equal to zero (*i.e.*, without saving or dissaving). It may thus be interpreted as the domestic production frontier. The convex-to-the-origin curves through points **C** and **D** are indifference curves.

2.1 Low interest rate

Figure 1 refers to the case where the interest rate is relatively low,

$$r < \frac{\omega}{q}.$$

Point **P** is where (ω/Q') is equal to r . The ordinate of this point, h^P , is the stock of human capital that each child will have at the start of adulthood. Since **P** has to be on the left of the kink in the production frontier (because all points on the right have slope higher than r), *children study full time*. The abscissa, c^P , is the amount of current consumption that these children would have if their parents did not have access to credit and assets markets.

The optimal plan consumption is represented by point **C**, where (U_c^*/U_y^*) is equal to r . The abscissa of this point, c^C , is the amount of current consumption actually enjoyed by each child. The ordinate, $h^P + (m^C/\omega)$, is the human-capital equivalent of the income that each child will enjoy in adult life. Since c^C is higher than c^P , this means that

parents dissave. Since $h^P + (m^C/\omega)$ is lower than h^P , m^C must be negative, implying that parents borrow to pay for educational investments. But prices, wages, preferences and the number of children could just as well be such that **C** lies North-West of **P**. If that were the case, c^C would be lower than c^P , meaning that parents pay for their children's education out of their own resources, and $h^P + (m^C/\omega)$ higher than h^P , meaning that parents have still got assets to pass on to their children.

If parents were denied access to credit or asset markets, their optimal plan would be a point on their domestic production frontier as in Chapter 3. Utility would then be lower than otherwise. The child labour implications would vary according to whether the marginal return to educational investment at point **C** is higher or lower than r . If **C** lies South-East of **P** as pictured, the optimal consumption plan without borrowing is represented by point **D**, where h is lower than h^P . In such a situation, permitting parents to borrow would *lower* the probability that a child works. But suppose that **C** is located North-West of **P**. The optimal consumption plan without dissaving is then a point on the frontier, North-West of **P**, where h is higher than h^P . In such circumstances, allowing parents to buy assets would have no effect on child labour (children would continue to study full time), but it would induce parents to invest less in their children's human capital, and more in conventional assets. Taking the two possibilities together, we can then conclude that giving parents access to credit and asset markets would raise aggregate utility, and reduce the incidence of child labour. Access to credit would be desirable on all possible grounds.

2.2 High interest rate

Figure 2 refers to the case where the interest rate is relatively high,

$$r > \frac{\omega}{q}.$$

As parents have now little incentive to invest in their children's education (they would happily sell off their children's natural talent if they could), point **P** lies as far to the right as possible along the production frontier. We thus have a corner solution,⁶ with ω/Q' lower than r . The ordinate of point **P** is now h_0 , implying that *children work only*. The optimal consumption plan, **C**, is again a point of tangency between an indifference curve and the intertemporal budget line.

In the figure, **C** lies South-East of **P**, where c is higher than c^P , and $h_0 + m^C (r/\omega)$ lower than h_0 . Parents thus do the next best thing to selling off their children's natural talent, they borrow against it. The

⁶Strictly speaking, at this point, Q_h has to be interpreted as a left-hand derivative.

other possibility is that \mathbf{C} lies North-West of \mathbf{P} , implying that parents save (c^C lower than c^P , $h_0 + m^C(r/\omega)$ higher than h_0). If that is the case, parents still leave their children ignorant, but equip themselves to provide them with some assets when they grow up.

If parents were denied access to credit and asset markets, their optimal plan would again be a point on the domestic production frontier, and their utility would consequently be lower than it would otherwise be. In Figure 2, the optimal plan without borrowing is represented by point \mathbf{P} itself. In that case, allowing parents to borrow would thus have no effect on child labour (children would continue to work full time). Consider, however, the possibility that \mathbf{C} is located North-West of \mathbf{P} , implying that parents would like to save. Their optimal plan, if they cannot buy assets, is then represented by a point on the production frontier North-West of \mathbf{P} , where h is higher than h_0 . Allowing parents to buy assets in such circumstances would increase the probability that a child works. Taking the two possibilities together, we can then conclude that giving parents access to credit and asset markets in the presence of a high interest rate would raise aggregate utility, but also the incidence of child labour. We remarked in section 1 that child labour has to be regarded as a demerit good for it to be always and in all circumstances "a bad thing". Here is an instance where the criterion of the maximization of aggregate utility would lead society to accept a certain amount of child labour.

It follows immediately from the foregoing analysis that a rise in the interest rate makes it more likely that parents will make no educational investments (as in Figure 4.2), and that the incidence of child labour will increase. The intuitive explanation is that a high interest rate makes it harder for parents to borrow in order to pay for educational investments, and more profitable to invest in other assets.

3 Poverty, uncertainty and insufficient commitment

Having examined the consequences of exclusion from credit or asset markets, we now look at some of the causes. One is *poverty*. We characterize this as a configuration of prices, wages, interest rates, initial asset holdings and number of children, such that parental choice is effectively constrained by the subsistence requirements in (5).⁷ Let us re-interpret the kinked curve through point \mathbf{P} in Figure 1 or 2 as the production frontier when current parental consumption is set equal to its subsistence level,

⁷Much of the literature starts from the *assumption* that child labour is the consequence of extreme poverty, and restricts the analysis to what happens in the vicinity of the subsistence point; see for example Basu and Van (1998). We have shown that child labour can arise even when survival is not an issue.

a_s , and look for the point $(c_s + z, \max(\frac{1+n}{n} \frac{a_s}{\omega} + \frac{x}{\omega}, h_0))$.⁸ If this point, call it **S**, lies on the intertemporal budget line, then $(c_s + z, \max(\frac{1+n}{n} \frac{a_s}{\omega} + \frac{x}{\omega}, h_0))$ is the only feasible plan. If **S** lies beyond the intertemporal budget line, the family cannot survive.

If **S** lies inside the intertemporal budget line, but outside the domestic production frontier, parents survive by either saving or dissaving, but are excluded from certain forms of trade. Consider, for example, the low-interest rate situation depicted in Figure 1. If point **S** is located between the domestic production frontier and the intertemporal budget line above point **P**, that will rule out a solution like that represented by point **C**, where parents borrow to pay for their children's education. For another example, look at the high-interest situation portrayed in Figure 2. If point **S** is located South-East of **P**, a solution like that represented by point **C**, where parents borrow to pay for current consumption, is out of the question.

Poverty is not the only possible cause of exclusion from credit. Another, and more pervasive, cause of exclusion from credit is *insufficient commitment* on the part of children. Consider again the borrowing plan represented by point **C** of either Figure 1 or Figure 2. Can parents convince an external lender that the debt will be honoured? Financial institutions have generally no difficulty in lending money for the purchase of a mortgageable asset, such as a building or a piece of land, because the asset itself will serve as security.⁹ But an entitlement arising, like x , from an informal intra-family arrangement cannot be legally transferred to a third party, and cannot thus be offered as collateral. Even if (5) is not binding, parents may thus be debarred from borrowing for consumption or educational purposes. A solution such as point **C** of either Figure 1 or Figure 2 is then impossible. This brings us to the question of why financial institutions require collateral.

The realization of $V(xn, U^*(c, h\omega + mr)n)$ is subject to two orders of *uncertainty*. One comes from the fact that labour market conditions tend to fluctuate. The other relates to the number of years for which their children will live, and to the number of times in each year that they will be too ill to work. If the family could buy insurance, the consequences of uncertainty would be reduced, if not eliminated. There are good reasons, however, why private financial institutions are unwilling to provide insurance for these kinds of risk.

⁸Notice that we have set the amount borrowed per child at the highest level consistent with (2), namely x .

⁹The problem may be rather that the interest rate at which the financial institution is willing to lend is higher than the uncertainty-corrected internal rate of return to the assets that are available for sale.

One is *moral hazard*. The wage distribution has to do with the state of the economy, and is thus exogenous where the individual worker is concerned. But the intensity of individual job search, and the amount of individual effort actually supplied if a job is found, are endogenous and difficult for the insurer to monitor. Another is *adverse selection*. The "produced" component of a person's stock of human capital is reflected (albeit imperfectly) in his educational credentials, but native talent, h_0 , may be difficult for an outsider to observe. As these difficulties exist also in developed economies, where the insurance industry disposes of rich data bases and highly sophisticated methods of detection, all the more they will in developing countries.¹⁰

Let us now look at all these questions from the viewpoint of the future worker's parents, under the assumption that they cannot buy insurance. Since there is nothing parents can do about their children's chances of obtaining a high return to their human capital, we may treat ω as a random variable with given density $f^\omega(\omega)$, and mean ω^m , independent of parental action. There is, by contrast, something that parents can do to improve their children's chances of a long and unfragmented working life. Let γ be the maximum number of days that a person will be able to work over his adult life. In the analysis so far, we have implicitly taken γ to be a given constant, and normalized it to unity. In an uncertainty context, γ will be a random variable taking values between 0 and 1, with given density $f^\gamma(\gamma, c)$ conditional on the amount of food and medical care (included in c) that the future adult will have received from his parents during school age. We assume that a rise in c skews the density of γ to the right.

Since the earning capacity of each future adult is now a random variable, $\gamma h \omega$, the amount that he must pay to his elderly parents under the family constitution cannot be a given constant as in the certainty case examined in the last section. Let us then assume that it is given by $\gamma x \omega$. If they are free to save or dissave, parents now choose (a, c, h, m) to maximize the expected value of (??),

$$E(U) \equiv u(a) + \int_{\omega} \int_{\gamma} V(\gamma x \omega n, U^*(c, \gamma h \omega + m) n) f^\omega(\omega) f^\gamma(\gamma, c) d\omega d\gamma, \quad (8)$$

subject to (4), (5) and (2). The assumption that $V(., .)$ is concave now implies *risk aversion*.

Under standard assumptions about the properties of the density functions, $E(U)$ is increasing and concave in (a, c, h, m) . If (5) and (2) are

¹⁰In developed countries, furthermore, public transfers offer some level of protection against the more extreme forms of bad luck. In developing countries, this safety net is either absent, or available only for certain privileged minorities.

not binding, the solution satisfies

$$u'(a) = \int_{\omega} \int_{\gamma} [x\omega V_1 f_c^{\gamma} + (U_c^* f^{\gamma} + U^* f_c^{\gamma}) V_2] f^{\omega} d\omega d\gamma \quad (9)$$

and

$$\frac{\omega^m}{Q'(h)} \leq r = \frac{\int_{\omega} \int_{\gamma} [x\omega V_1 f_c^{\gamma} + (U_c^* f^{\gamma} + U^* f_c^{\gamma}) V_2] f^{\omega} d\omega d\gamma}{\int_{\omega} \int_{\gamma} \gamma U_y^* V_2 f^{\omega} f^{\gamma} d\omega d\gamma}. \quad (10)$$

These conditions differ from (6) – (??) only in that the return to human capital, and the marginal utilities of the children’s current consumption and future income, are now expectations. Since uncertainty concerns only the children’s future earnings, parental choice is now distorted in favour of current parental consumption, and of assets other than the children’s human capital. That will raise the incidence of child labour. Assuming that risk aversion decreases as income increases, child labour will rise more in low than in high-income families.

But the assumption that parents are free to borrow sits uncomfortably with the one that they cannot buy insurance. We have already pointed out that financial institutions may be reluctant to lend without collateral because the borrower’s children might be *unwilling* to honour the debt incurred on their behalf. In the presence of uncertainty, financial institutions have an additional the reason for being reluctant, namely that the borrower’s children may be *unable* to honour the debt. It is thus doubly unlikely that parents will get credit from legitimate lenders for consumption or educational purposes. If parents cannot borrow, we are back to the situation where the consumption plan has to be a point on the domestic frontier. The family may then face starvation even if its expected future income is more than sufficient to support its members at the subsistence level.

4 Bonded labour

A long-term labour contract is an employment-*cum*-insurance deal, whereby an employer commits himself to paying a fixed wage in exchange for labour services over an extended period of time (typically until the employee reaches the statutory retirement age). The difference between the expected short-term (say daily) wage, and the long-term wage agreed by contract, is the implicit premium that the worker pays for the assurance of a fixed wage. If the employee is sufficiently more risk averse than the employer, such an arrangement will be of mutual benefit to both parties. In developed countries, labour legislation tips the scales in favour of the employee, the weaker party, by making the contract binding only on the

employer. There is then little a worker has to lose by accepting a long-term contract, because he can walk out of it at any time.¹¹ In developing countries, there may be circumstances where a worker has no option but to enter into an irrevocable long-term employment relationship. We then talk of tied or *bonded labour*.

We call it bonded labour, if the worker is paid a lump sum at front, in exchange for a commitment to supply labour at a below-market wage rate for a specified number of years. The at-front payment is, in effects, a form of credit, and the difference between the market wage, and the wage envisaged by the contract, a form of credit repayment. The contract may be nominally revocable on the part of the worker by the repayment of the outstanding debt, but the contractual wage is generally so low, and the contractual interest rate so high, that the worker has in practice no way of receding from the contract before its natural end. The existence of bonded labour is a reflection of lack of access to ordinary credit.

The reason why a person may not get credit without offering himself or a member of his family as bond is typically that he cannot buy insurance. Consider a catastrophic event – such as crop failure, serious illness, or even the birth of too many (or too few) children – bringing an uninsured worker and his family below the subsistence threshold. If this person cannot borrow any other way, he may then have no option but to offer himself or another member of his family as bond. Alternatively, suppose that this person did manage to borrow, but things did not get better sufficiently (or sufficiently fast) to allow him to repay the original debt. If either of these circumstances occurs, a household with nothing else to offer as collateral may then have no choice but to offer its own members as bonds.¹²

In a sense, there is bonded labour because it is possible to bond labour. Genicot (2002) argues that the availability of bonded labour arrangements makes it less likely that assetless households will get credit from legitimate lenders. If a borrower defaults on his repayments to a bank, he will in fact be denied credit (by that, and by every other bank) the next time round. If bonded labour were effectively outlawed, a borrower would then know that the penalty for defaulting is death by starvation when bad luck strikes again. If bonded labour is only

¹¹But the employer also may find the contract advantageous, if it serves to attract workers with particularly desirable skills or personal characteristics, or because the long-term relationship it creates provides scope for the accumulation of firm-specific human capital.

¹²Some special institutions make small unsecured loans to particular categories of persons with a reputation for creditworthiness. In Pakistan, for example, the Grameen Bank makes small loans to women. But that is a drop in the ocean compared with the total demand for unsecured credit.

nominally outlawed, however, it is possible for a defaulter to survive. The existence of this safety net makes the borrower's commitment to pay back a debt a little less credible, and consequently restricts the range of loan applications that financial institutions are willing to accept.

A worker may thus find himself bonded either because he cannot get credit any other way, or because he cannot repay a pre-existing debt. The latter is all the more likely if the worker was charged a usurious interest rate on his original debt. The question is why the worker should have borrowed from an usurer in the first place. An obvious answer is that legitimate credit institutions cannot circumvent interest rate regulations as easily as unofficial money lenders,¹³ and may thus find it unprofitable to take on bad risks at an interest rate that does not exceed the permitted maximum. Another is that the usurer is typically a local person, who knows the applicant personally, and is thus more willing than an impersonal organization to give credit without collateral. But the real reason is that the person practicing usury has generally extra-legal means of enforcing repayment.

Labour bonding is no longer legal anywhere in the world, but it was once.¹⁴ In country areas with a not-so-distant history of legal bonding, ignorance of the law and a misplaced concept of honour on the part of the debtor still make it possible for the creditor to exact labour as debt repayment without recourse to actually illegal means. Beyond that, labour bonding takes more sinister connotations. Throughout the developing world, debt workers carry out extenuating and often dangerous assignments under armed guard in quarries, factories and plantations.¹⁵ In developed countries, the inmates of clandestine sweatshops, and many of the prostitutes and peddlers plying their trade in the streets, are illegal immigrants trying to redeem their debt to the criminal organization that brought them in. Here, we are especially concerned with the possibility that children might be given as bonds. From the point of view of the taker, children are preferable to adults because they are more docile, and easier to restrain by physical force if need be. Let us consider this possibility from the point of view of the parents.

In exchange for giving a child as bond, parents receive a sum of money, A , reflecting the present value of the stream of revenues (net of the child's wage, or consumption) that the child will generate for the

¹³Episodes of connivance between bank officials and local userers, whereby the former refuse a person credit, and point him towards a local latter, are not unknown (and not only in developing countries).

¹⁴A young London-trained barrister, the future Mahatma Gandhi, made his first appearance on the political scene campaigning for the rights of bonded labourers in South Africa.

¹⁵Bales (1999) gives detailed accounts of the plight of these "new slaves".

bond taker. It seems reasonable to assume that parents will resort to offering a child as bond only if they cannot get credit any other way. Therefore, m is nonnegative. It could be positive, meaning that parents use A to buy assets, but we assume that this arbitrage operation would not be advantageous, because the return on any assets the parents could buy would be lower than the implicit interest factor charged by the bond taker. Therefore, m is zero. On the other hand, the marginal return to educational investment, ω/Q' , may be higher than the implicit interest factor. If that is the case, parents may want to bond some of the children, and use the credit to buy education for those that are left. To allow for that, we shall drop the assumption that all children belonging to the same family are treated the same.

Let B denote the number of bonds issued by the parents. Although the number of children that can be bonded is an integer, we shall treat B as a continuous variable to allow for the possibility that a child is bonded for less than his working life. Assuming, for the time being, that only children (not adults) are acceptable as bonds, parents then choose (a, c, h, B) to maximize

$$E(U) \equiv u(a) + \int_{\omega} \int_{\gamma} V(\gamma x \omega (n - B), U^*(c, \gamma h \omega) (n - B)) f^{\omega}(\omega) f^{\gamma}(\gamma, c) d\omega d\gamma, \quad (11)$$

where

$$a = W + AB - [c + Q(h) - w_c - z](n - B), \quad (12)$$

subject to

$$a \geq a_s, \quad c \geq c_s + z, \quad h \geq \max\left(\frac{1 + n a_s}{n \omega}, h_0\right) \quad (13)$$

and

$$0 \leq B \leq n. \quad (14)$$

In the absence of alternative forms of credit, the opportunity-cost of keeping a child at home (*i.e.*, of not using him as bond) is

$$C \equiv A + Q(h) + c - w_c. \quad (15)$$

If this is zero or negative, it means that the net revenue currently generated by the child is greater than his bond value. The first of the (14) constraints will then be binding (parents would like to buy, not sell bonds). Despite the fact that they can neither borrow nor lend, parents will then not give their children as bonds.

If C is positive, and (13) – (14) are not binding, the solution satisfies

$$-\frac{\int_{\omega} \int_{\gamma} (\gamma x \omega V_1 + U^* V_2) f^{\omega} f^{\gamma} d\omega d\gamma}{u'(a)} = C \quad (16)$$

and

$$\frac{\int_{\omega} \int_{\gamma} [x\omega V_1 f_c^{\gamma} + (U_c^* f^{\gamma} + U^* f_c^{\gamma}) V_2] f^{\omega} d\omega d\gamma}{\int_{\omega} \int_{\gamma} \gamma U_y^* V_2 f^{\omega} f^{\gamma} d\omega d\gamma} \geq \frac{\omega^m}{Q_h}. \quad (17)$$

Figure 3 describes the choice of B . The straight line with slope C is the graph of (12), in (B, a) space. The curve with slope

$$-\int_{\omega} \int_{\gamma} (\gamma x\omega V_1 + U^* V_2) f^{\omega} f^{\gamma} d\omega d\gamma / u'(a)$$

is a contour of (11). Parents increase B to the point where the marginal disutility of sacrificing a child, and losing a future source of transfers, is just matched by the opportunity cost (the additional consumption for the rest of the family).

Figure 4 illustrates the choice of h . The kinked curve is the usual production frontier. The convex-to-the-origin curve, with slope

$$\int_{\omega} \int_{\gamma} [x\omega V_1 f_c^{\gamma} + (U_c^* f^{\gamma} + U^* f_c^{\gamma}) V_2] f^{\omega} d\omega d\gamma / \int_{\omega} \int_{\gamma} \gamma U_y^* V_2 f^{\omega} f^{\gamma} d\omega d\gamma,$$

is an *ex-ante* indifference curve. The picture is drawn under the assumption that parents invest to some extent in the education of their unbonded children, and thus equate their marginal valuation of these children's current consumption to the expected marginal return to education. But the solution could just as well be at the point with ordinate h_0 , where no such investment is made.

We have thus seen that B may be positive even if (13) is not binding. We may want to assume parental preferences to be such, that B is positive only if (13) would otherwise be binding. In other words, we might like to believe that parents will resort to giving their children away *only* if the alternative is starvation. But it should be clear that this is an additional assumption.¹⁶ Without it, child bonding is not a sure sign that the family is poor. On the other hand, if one of the (14) and at least one of the (13) constraints is binding, offering children as bond will not save the family from starvation. This may mean either that the family does not have enough children to offer ($C > 0$), or that bonding children would make things worse ($C \leq 0$). If that is the case, the parents will have to deliver themselves, as well or instead of their children, into bondage.

5 Discussion

We started this paper with the obvious remark that child labour is, in some cases, the family's only means of survival. We have shown that

¹⁶Bales (1999) reports evidence contrary to this assumption.

this may be due to the fact that the parents cannot borrow against their children's future earnings, and are thus unable to carry out the educational investments necessary to realize their children's potentials. In the most extreme case, the only way to survive is to deliver some of the children into "bonded labour", effectively slavery. In other cases, child labour is not essential for survival, yet it is the choice that maximizes the utility of the parents (and, possibly, also of the children). We even find instances in which child labour would be higher with, than without complete markets.

The closing section of a positive analysis of the determinants of the supply of child labour is not the place to embark on a discussion of whether child labour can ever be compatible with a social optimum.¹⁷ Two points relevant for such a discussion, and a question, emerge from the analysis nonetheless. The first point is that the social optimality of child labour cannot be ruled out if the objective of the social planner is to maximize some convex combination of the utilities of present adults, or even of present and future ones. The second is that child labour will be politically and operationally difficult to eradicate so long as it reduces the utility of a majority of present adults. The question arises from our analysis of bonded labour. Suppose that a factory opens in an area where children are at risk of ending up as bonded workers. If the factory pays children more than the going wage, that will raise the incidence of child labour, but lower the probability of bonded child labour. Is this a good or a bad thing?

6 References

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¹⁷For a review of the issues, and a survey of the empirical evidence, see Cigno, Rosati and Tzannatos (2002).

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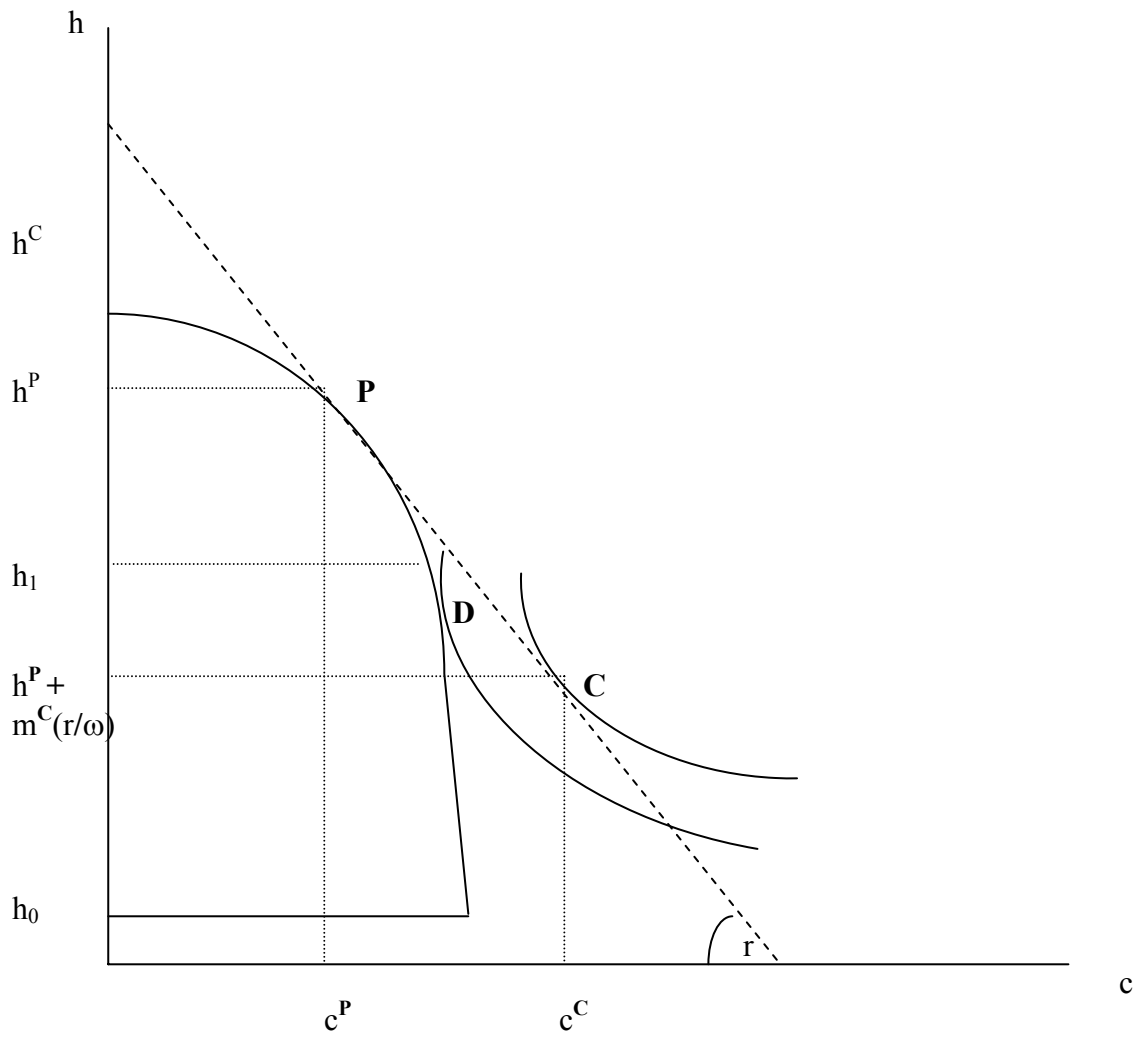


Figure 1 Low interest rate

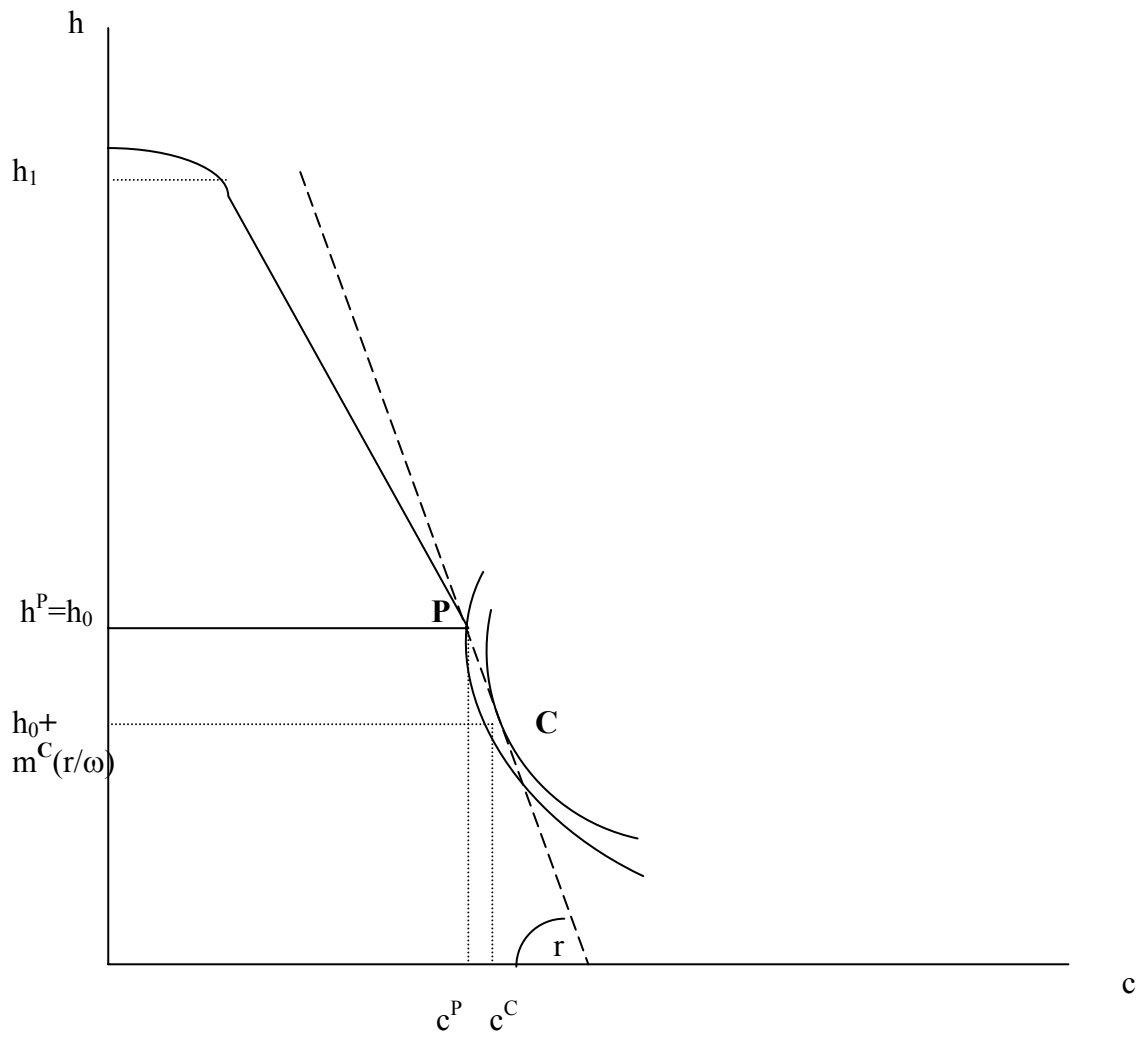


Figure 2 High interest rate

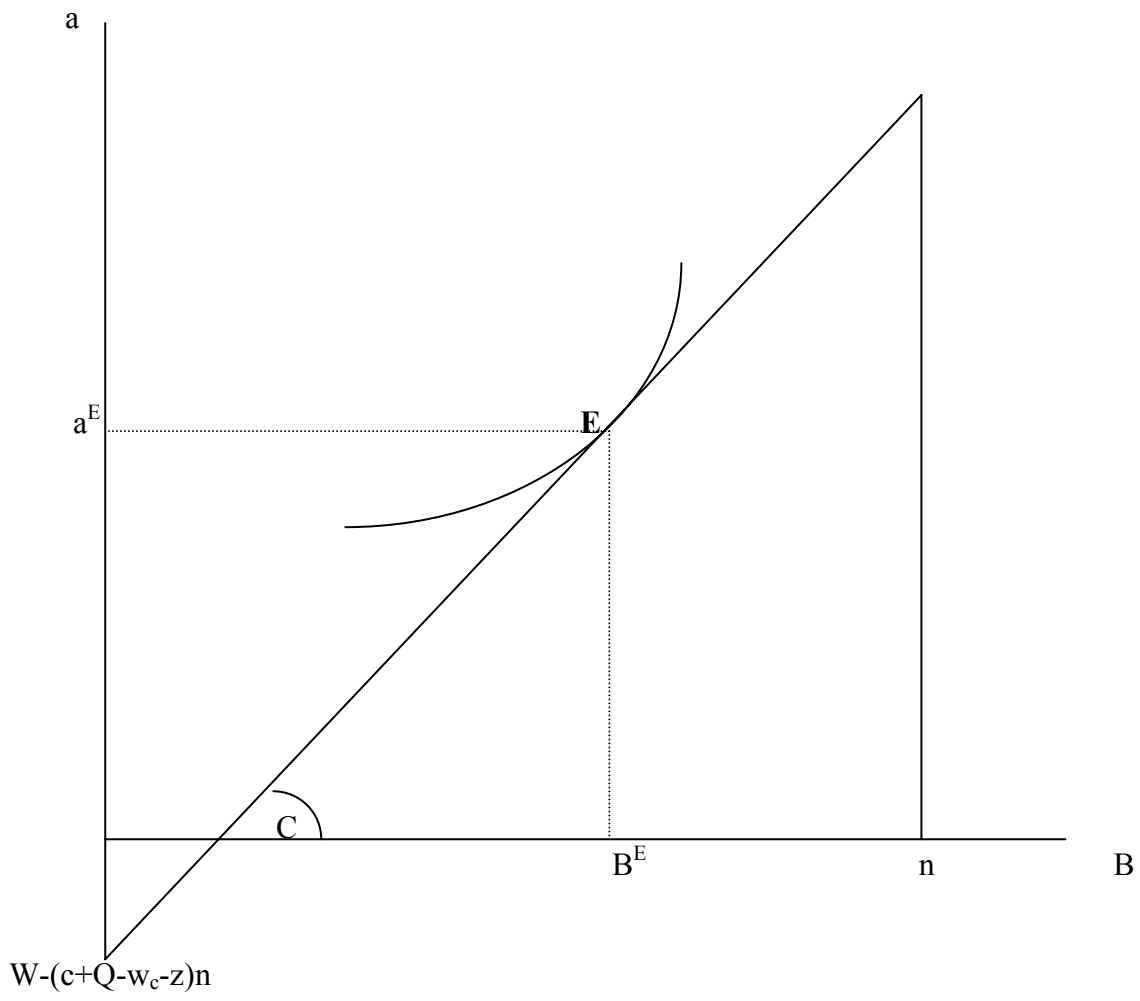


Figure 3 Bonded child labour

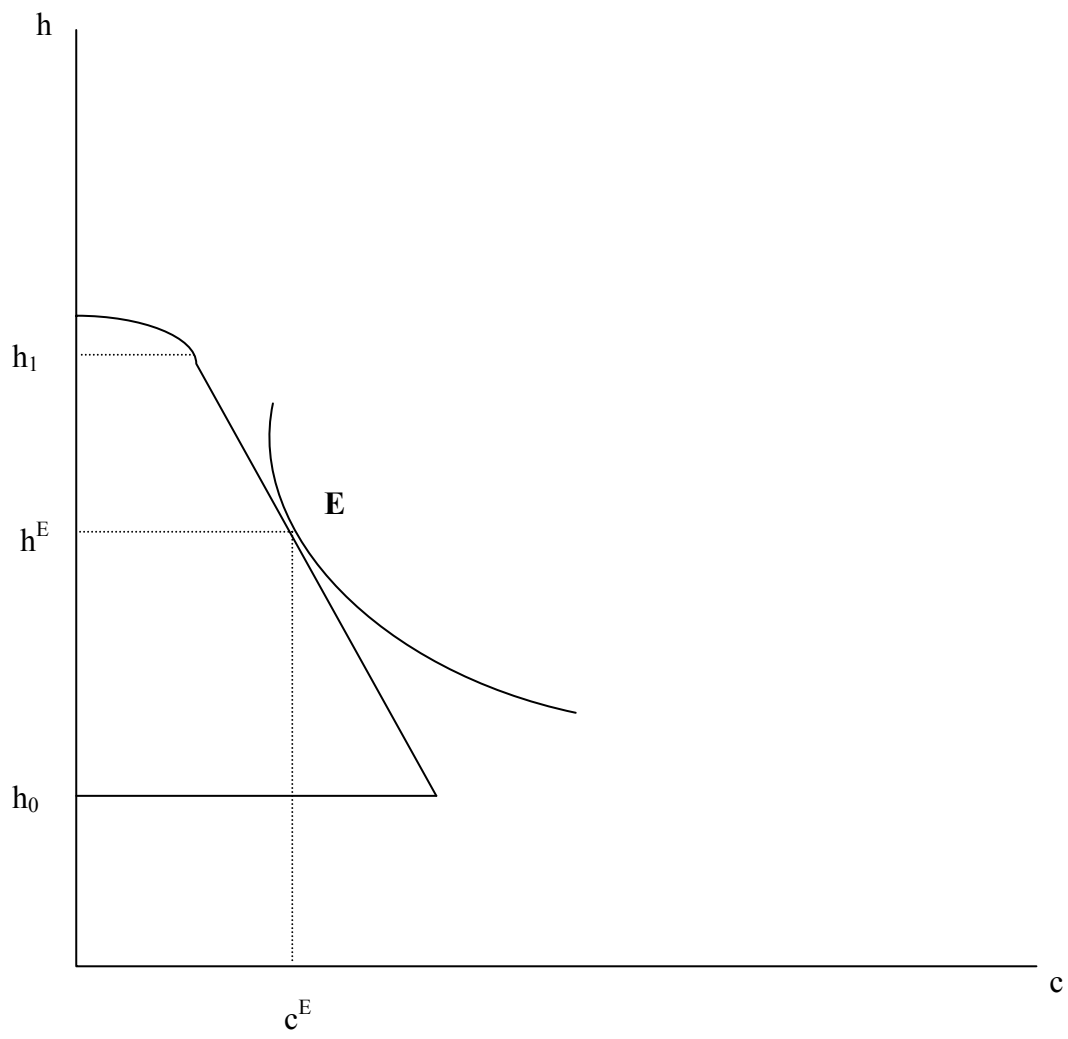


Figure 4 Human capital investment in the presence of bonded child labour