

Cigno, Alessandro

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Alessandro Cigno

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Poschingerstr. 5, 81679 Munich, Germany

Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de

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Abstract

Basu and Van (1998) show that a ban on child labour may be self-enforcing under the extreme assumption that, above the subsistence level, no amount of consumption can compensate parents for the disutility of child labour. We show that a partial ban may be self-enforcing also in a more general model where education is an alternative to work, and the disutility of child labour can be compensated by higher present consumption or future income, but a total ban may not. We also show that, in the absence of informational asymmetries, child labour can be eliminated and a First Best achieved if the ban is combined with a credit-backed policy including a subsidy to parents, and a tax on skilled adults. A First Best is out of reach of the use children make of their time when they are neither at school, nor working in the labour market is private information, because the policy maker then faces an incentive-compatibility constraint. The Second-Best policy reduces child labour, but not to zero.

JEL-Codes: H310, J220, O120.

Keywords: child labour, education, fertility, credit, taxes, subsidies, uncertainty, asymmetric information.

Alessandro Cigno
University of Florence / Italy
alessandro.cigno@unifi.it

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1 Introduction

Basu and Van (1998) show that, if the economy admits a multiplicity of equilibria, some with and some without child labour, a ban on the latter may be self-enforcing in the sense that, once an equilibrium without child labour is established, parents have no incentive to depart from it.¹ That is a valuable result, because it implies that a major obstacle to human and economic development can be eradicated without coercion. However, the assumptions under which this result is obtained are rather extreme. One is that there are no opportunities for increasing a child's future earnings by investing in the child's education. Another is that, at or above the subsistence level, parents would rather see their children do nothing and consume the subsistence minimum, than work even only a little and consume more than the minimum. The present paper asks four questions. First, under which conditions does the result hold? Second, does the result hold not only under Basu-Van assumptions, but also under the more usual assumption that education is an alternative to work, and that the disutility of child labour can be compensated by the expected utility of future consumption? Third, if a ban is self-enforcing under these, more usual, assumptions, will it increase or decrease efficiency? The answer is not straightforward, because there are at least three obstacles to full-time education.

Baland and Robinson (2000) demonstrate that education may be inefficiently low, and child labour inefficiently high, because children cannot commit to pay back a loan. As pointed out in Cigno and Rosati (2005), this implies not only that parents will not lend to their children (they can only may make them presents), but also that parents cannot borrow on their children's behalf. As pointed out in Ranjan (2001), only the children of sufficiently rich and generous parents then receive the efficient amount of education. Pouliot (2006) demonstrates that child labour could be inefficiently high even if parents were not credit rationed, because education may be a safe investment (if individual risks are uncorrelated) from society's point of view, but it is a risky investment where parents are concerned. Realistically assuming that insurance in general, and educational insurance in particular, is not available, parents will then give children less than the efficient amount of education. Dessy and Pallage (2001) argue that child labour may be inefficiently high because of a lack of coordination between parents investing in their children's education, and firms investing in skill-intensive technology.

¹The general idea, more fully developed in Basu (2002, 2011), is that, if more than one equilibrium exists, it may be possible to nudge the economy towards a socially more desirable equilibrium at (almost) no cost.

Solving only one or some of these problems would not bring education to the efficient level.

We show that, in the absence of informational asymmetries, the government can solve the three problems at once by announcing in advance that it will ban child labour, borrow from the international credit market, subsidize parents, and tax skilled workers in order to pay the loan back with interests. The policy achieves a First-Best Social Optimum. If the allocation of the children's time is private information, however, the government's choice of policy is subject to an incentive-compatibility constraint that puts a First Best out of reach. The outcome is then a Second Best, where children work less than they would without the policy, but still do.

2 The original model

We start by outlining the basic model in Basu and Van (1998), with some minimal and uninfluential changes that will make it easier to extend. There is a large number of identical firms demanding labour, and an equally large number of identical families supplying it. This allows us to reason in terms of a representative family, and a representative firm. Firm owners are neither workers, nor parents of potential workers, so that their profits do not end up in the workers' pockets. Adult labour, denoted by L_a , and child labour, denoted by L_c , are perfect substitutes in the production of the numeraire good at the constant rate γ . We may thus conduct the analysis in terms of a single market for adult-equivalent labour,

$$L = L_a + \gamma L_c, \quad 0 < \gamma < 1,$$

instead of two interrelated ones. The representative firm maximizes its profit

$$P = F(L_a + \gamma L_c) - wL_a - w_c L_c, \quad (1)$$

where w is the adult wage rate, w_c the child wage rate, and $F(\cdot)$ the production function, increasing and strictly concave. From the first-order conditions for an interior solution, we find that

$$F'(L) = w \quad (2)$$

and $w_c = \gamma w$.

A family consists of the parental couple, and n school-age children. Each adult is endowed with one unit of time, and each child with γ units of adult-equivalent time. There are two critical values of w . One, denoted by \bar{w} , is the minimum wage rate that would allow the entire family to survive if the parents worked full time, and the children did

not work at all. The other, denoted by \underline{w} ,² is the minimum wage rate that would allow the entire family to survive if everybody worked full time. Clearly, $2\bar{w} = (2 + \gamma n) \underline{w}$ is the subsistence level of family consumption. Decisions are taken by parents. Their preferences are such, that the family will supply $L = 2$ units of adult labour if w is at least equal to \bar{w} , or $L = 2 + \gamma n$ units of adult-equivalent labour if w is less than \bar{w} . It is thus implicitly assumed that, at or above \bar{w} , no amount of the numeraire good can compensate the parents for even a very small amount of the child labour bad (preferences are lexicographic). If the wage rate falls below \bar{w} , child labour ceases to be a bad. Given such preferences, it is not possible to draw indifference curves, and no utility function exists.

Fig. 1 illustrates the possible equilibria.³ The (inverse) labour supply function is represented by the broken **SS** curve. Below \underline{w} , there is no labour supply, because there are no workers. The (inverse) demand for labour function is represented by the downward sloping **DD** line. The labour market has two possible equilibria, one at point *A*, where $w > \bar{w}$ and $L = 2$, the other at point *C*, where $\underline{w} < w < \bar{w}$ and $L = 2 + \gamma n$. If the equilibrium is initially *C*, and child labour is banned, the only possible equilibrium left is *A*. At that equilibrium, firms have an interest in offering to employ children at a wage rate lower than γw_1^A , but parents would reject such an offer because they abhor child labour. The Basu-Van result thus applies.

Notice that, if the **DD** line did not cut the **SS** line at or above the point where children do not work, a ban on child labour would not be self-enforcing. If it cut the **SS** line only at that point, a ban would be pointless. For the result of interest to apply, it must then be true that

$$\underline{w} \leq F'(2 + \gamma n) < \bar{w} \leq F'(2). \quad (3)$$

Assuming that $F'(\cdot)$ satisfies the conditions for the existence of a demand for labour function, (3) implies that this function must be sufficiently elastic for the equilibrium wage rate to jump from below to above \bar{w} as children are banned from the labour market.⁴ If the demand is more than unit-elastic as pictured, family income and thus family consumption decrease as child labour is reduced.

²The original authors do not actually mention \underline{w} , but it matters.

³Having assumed an equal number of families and firms, the quantity of labour demanded, and the quantity of labour supplied by the market are divided by that same number.

⁴How elastic depends on γn . Even though a child cannot do as much work as an adult, if the children are many, the adult-equivalent labour force can be several times as large as the number of adults. Therefore, taking all children out of the labour market can have a substantial effect on the equilibrium wage rate even if the demand for labour is not very elastic.

3 An alternative formulation

Let us now consider a more conventional setting, where children have access to education, and education raises the expected future wage rate. For simplicity, we make the common "equivalence-scale" assumption that the children's consumption is proportional to the parents'. There are two dates, indexed $t = 1, 2$. At date 1, a family consists of the parental couple, and n school-age children as in the last section. Here, however, the parents take decisions that affect not only the entire family's current consumption, but also their children's future incomes. At date 2, the parents will be dead, and their children will be adults. Firms still maximize (1). For comparability, we assume that the demand for labour function exists, and is more than unit-elastic as in last section.

At date 1, all workers are unskilled. The date-1 wage rate, denoted by w_1 , is known with certainty. At date 2, a child's wage rate, denoted by w_2 , will be equal to w^S with probability $\pi(e)$, or $w^U < w^S$ with probability $1 - \pi(e)$, where e is the amount of adult-equivalent time that the child spends in education at date 1. This time is defined to include not only school attendance, but also rest and homework, because the probability of a favourable educational outcome is positively affected by those too.⁵ The function $\pi(\cdot)$ is increasing and strictly concave. Assuming $\pi(0) = 0$, so that $w_2 = w^U$ for $e = 0$, we shall refer to w^U as the unskilled, and w^S as the skilled wage rate.

At each date, an adult is again endowed with one unit of time, and a child with γ units of adult-equivalent time. At date 1, the parents supply the labour market with 2 units of time. The children supply it with a nonnegative amount of adult-equivalent time,

$$(\gamma - e)n \geq 0. \quad (4)$$

A child's education has an opportunity-cost $w_1 e$, proportional to e , and a fixed out-of-pocket cost p , which includes the tuition fee and the cost of the essential didactic material. Given this fixed cost, there may be equilibria where children are not enrolled at school.

Let s denote the amount that the parents save at date 1 for each of their n children. Let r be the interest factor, so that a child's future income is

$$y = w_2 + rs. \quad (5)$$

Given that they will not be around at date 2 to pay back a debt incurred at date 1, and cannot commit their children to do so on their behalf

⁵If a child comes to school without her homework done, or falls asleep during lessons because he did not get enough rest at home the day before, the educational outcome will not be as good as it otherwise would for the same amount of school attendance.

for the already mentioned Baland-Robinson argument, parents cannot borrow,

$$ns \geq 0. \quad (6)$$

Using (5), we represent parental preferences by the Expected Utility Function

$$EU = u_1(c) + n \{ \pi(e) u_2(w^S + rs) + [1 - \pi(e)] u_2(w^U + rs) \}, \quad (7)$$

where c denotes current consumption, and the function $u_t(\cdot)$ is increasing and strictly concave,⁶ implying risk aversion. We assume that $u'_t(c)$ tends to infinity as c approaches the subsistence level. For $e = 0$, (7) reduces to

$$U = u_1(c) + nu_2(w^U + rs). \quad (8)$$

If (p, r, w_1, w^S, w^U) is such that children are enrolled at school, (c, e, s) maximizes (7) subject to the (4) and (6) nonnegativity constraints,⁷ and to the budget constraint

$$c + n(p + s) = w_1 [2 + n(\gamma - e)]. \quad (9)$$

We show in Appendix that, either (6) is not binding, and the Marginal Rate of Substitution of c for y ,

$$MRS := \frac{u'_1(w_1 [2 + (\gamma - e)n] - (p + s)n)}{\pi(e) u'_2(w^S + rs) + [1 - \pi(e)] u'_2(w^U + rs)}, \quad (10)$$

is equated to r , or it is binding, and MRS is higher than r . Similarly, either (4) is not binding, and the expected Marginal Return to Education,

$$MRE := \frac{\pi'(e) [u_2(w^S + rs) - u_2(w^U + rs)]}{u'_1(w_1 [2 + (\gamma - e)n] - (p + s)n)}, \quad (11)$$

is equated to w_1 , or it is binding, and MRE is greater than w_1 . We also show that MRE is a decreasing function of e and s . Assuming diminishing Absolute Risk Aversion, these effects become larger as c decreases.

Otherwise, if children are not enrolled at school, $e = p = 0$, and (c, s) maximizes (8) subject to (6), and to (9) with. Once again, either (6) is not binding, and the Marginal Rate of Substitution of c for y , now given by

$$MRS := \frac{u'_1(w_1 (2 + \gamma n) - (p + s)n)}{u'_2(w^U + rs)}, \quad (12)$$

⁶The function $u_1(\cdot)$ may differ from the function $u_2(\cdot)$ due to time-preference or imperfect altruism.

⁷There is no need for a nonnegativity constraint on education also because, having paid p , the parents will choose e positive.

is equated to r , or (6) is binding, and MRS is greater than r .

In Fig. 2, the vertical axis measures w_1 and MRE . The horizontal axis measures L from left to right, and en from right to left. The (inverse) demand for L is represented by the **DD** line tracing (2). The **MR** curve traces the MRE schedule under the assumption that (6) is binding, and s consequently zero. In other words, we realistically assume that the couple is too poor to save and make bequests to their children. We show in the Appendix that, if (6) were relaxed, the **MR** curve would shift upwards. In other words, the marginal return to a child's education would be higher if this form of investment could be paid for by borrowing against the child's expected future earnings. The labour market has two possible equilibria. One is at point C , where the wage rate is w_1^C , and children work full time ($L = 2 + \gamma n$). The other is at point B , where the wage rate is w_1^B , and children divide their time between work and study ($2 < L^B < 2 + \gamma n$). At this equilibrium, a share $\pi(e^B)$ of the date-2 population earns w^S , and the rest w^U . Suppose that the equilibrium is initially at C . The equilibrium can be nudged towards point B , where children work less and study more, by imposing a ceiling on child labour equal to $L^B - 2$ (or, equivalently, making education compulsory up to e^B). Once the new equilibrium is established, there is no further need for a ceiling. A partial ban would thus be self-enforcing. A total ban would not, because A is not an equilibrium.

Dessy and Pallage (2001) demonstrate that, if the ban were announced sufficiently in advance, employers would be led to expect an increase in the share of skilled workers in the date-2 adult workforce, and parents to expect an increase in the date-2 skilled wage rate. Firms would consequently invest more in skill-intensive technology,⁸ and families in skill-enhancing education. The coordination problem would then go away. Would A become an equilibrium? Other things being equal, if w^S increases relative to w^U , the numerator of MRE will rise. Given, however, that parents are risk-averse, and realistically assuming that insurance in general, and educational insurance in particular, is hard to come by in developing countries, we have the Pouliot problem that the rise will not be as large as it otherwise would. Indeed, if we assume diminishing Absolute Risk Aversion (see Appendix), and the demand for labour function is more than unit-elastic as assumed, the ban will make parents more risk-averse, because it will reduce their current income. The denominator of MRE also will rise. Given that parents are credit constrained for the Baland-Robinson problem, the reduction in current family income caused by the ban will in fact translate into lower consumption, and thus in higher marginal utility of the same. Indeed, given

⁸In Cigno et al. (2018), this investment comes from foreign firms.

that $u'_1(c)$ tends to infinity as c falls towards its subsistence level, MRE will tend to zero as w_1 rises towards \bar{w} . If children are banned from the labour market, the **MR** curve may thus shift upwards, but not enough to cut the **DD** line at or above point A . The policy announcement may well solve the Dessy-Pallage problem, but if the Baland-Robinson and Pouliot problems are still in place, the incentive for parents to invest in their children's education will be stifled by the rise in the marginal utility of current consumption, and aversion to take risks.

If full-time education is efficient, and information is symmetric, a total ban will be self-enforcing if it is supplemented by other policy measures. Let $w_2 = \omega(e^*)$, where e^* denotes the equilibrium value of e , and $\omega(\cdot)$ is an increasing function taking value 1 for $e = 0$, and value greater than 1 for $e > 0$. Let full-time education be efficient in the sense that, at the internationally determined risk-free interest factor, which we normalize to unity, the expected wage increase is at least as large as the full cost of full-time education,

$$\pi(\gamma) [\omega(\gamma) - 1] \geq p + \gamma F'(2). \quad (13)$$

Let the government announce in advance that it will borrow from the international credit market the amount

$$\sigma = p + \gamma F'(2) \quad (14)$$

per school-age child, use the loan to subsidize parents at the rate σ per school-age child at date 1, and levy a tax

$$\tau = \omega(\gamma) - 1 \quad (15)$$

on every skilled worker at date 2. In light of (13), the tax revenue will be sufficient for the government to pay its international creditors back with interests. The government can thus do what the parents cannot, borrow on the children's behalf.

The credit-backed policy we have outlined removes the Dessy-Pallage problem, because it aligns employers and parents' expectations. It solves the Baland-Robinson problem, because it relaxes the credit constraint, and the Pouliot problem, because it fully insures parents against the risk of an educationally unfavourable outcome. In so doing, it also takes away the incentive for parents to invest in education, because their children's after-tax wage rate are the same irrespective of education, but that does not matter, because the ban leaves parents with no say over e . Children benefit nonetheless, because they receive a positive s (instead of zero as in the absence of policy). With the policy, the Marginal Return to

Education is given by

$$MRE := \frac{u_2(1+rs)}{u'_1(2w_1 + (\sigma - s)n)}, \quad (16)$$

and thus certain. In Fig. 2, (16) is represented by the dashed **MR'** curve, higher than **MR**. The equilibrium is at point A' , higher than A . We show in the Appendix that, at point A' , MRE is greater than w_1 , and MRS equal to r . With the policy, the equilibrium is thus efficient. The policy yields a First Best.

4 Asymmetric information

Throughout the developing world, a large part of the work children do is private information, because it occurs in the family farm or family business, or in the home carrying out household chores, rather than in the labour market.⁹ School attendance is public information, but what happens outside school hours is not. Having defined e to include rest and homework as well as school attendance, therefore, education also is private information. The government can thus ban children from the labour market, or oblige them to attend school,¹⁰ but it cannot prescribe e as it would in the absence of informational asymmetry. The issue is examined by Cigno (2012) in a context where the demand for labour is infinitely elastic, and families are heterogeneous. Given that the wage rate does not respond to changes in labour supply, the focus there is on the equity-efficiency tradeoff. Here that the wage rate responds to changes in labour supply, the focus is on the effects of banning the observable component of the children's work.

Let d (for "domestic") denote the amount of adult-equivalent time that a child spends working in the family ambit, so that the amount worked in the labour market is now $\gamma - d - e$. The latter is observable by the government, the former is not. Let $G(nd)$ be the income produced by n children, each working d units of time within the family, where $G(\cdot)$ is another production function, increasing and strictly concave like $F(\cdot)$. If children are enrolled at school, the parents' choice of (d, e, s) maximizes (7) subject to the nonnegativity constraints

$$nd \geq 0, \quad (17)$$

$$(\gamma - d - e)n \geq 0 \quad (18)$$

⁹See Cigno and Rosati (2005).

¹⁰Even that is doubtful, however, because children falsely claim to be ill when they are actually working in the family ambit, especially at peak times when their contribution is in greatest demand in the family farm or family business; see Fasih (2008).

and (6),¹¹ and to the budget constraint

$$c_1 + (p + s)n = w_1 [2 + n(\gamma - d - e)] + G(nd). \quad (19)$$

If children are not enrolled at school, (d, s) maximizes (8) subject to (18) and (19) with $e = p = 0$.

We show in Appendix that, as in the model of the last section, if (6) is not binding, the Marginal Rate of Substitution of c for y , now given by

$$MRS := \frac{u'_1 ([2 + (\gamma - d - e)n] w_1 + G(nd) - (p + s)n)}{\pi(e) u'_2 (w^S + rs) + [1 - \pi(e)] u'_2 (w^U + rs)}, \quad (20)$$

is equated to r . Otherwise, it will be greater than r . If children are enrolled at school, and (18) is not binding, the expected Marginal Return to Education, now given by

$$MRE := \frac{\pi'(e) [u_2 (w^S + rs) - u_2 (w^U + rs)]}{u'_1 (w_1 [2 + n(\gamma - d - e)] + G(dn) - n(p + s))}, \quad (21)$$

is equated to the higher of w_1 and $G'(nd)$. Otherwise, it will be greater than either of them. We continue to assume that $w^S = \omega(e^*)$ and $w^U = 1$, where e^* denotes the equilibrium value of e (exogenous where parents are concerned).

The introduction of a second form of child work multiplies the number of equilibrium types. In Fig. 3, the horizontal axis measures the two forms of work from left to right, and education from right to left. The vertical axis measures the marginal returns to the different uses of time. The MRE schedule is again represented by the **MR** curve, and $F'(L)$ by the **DD** line. The $G'(nd)$ schedule is represented by the **MP** line. In the case illustrated there are again two possible equilibria. One is at point B' , where children divide their time between education and work within the family. As only adults work in the labour market, the equilibrium wage rate is w_1^A . The other equilibrium is at point C , where children work full time in the labour market, and the equilibrium wage rate is w_1^C . If the equilibrium is initially at C , banning children from the labour market would leave B' as the only alternative. Paradoxically, asymmetric information may thus make a total ban on labour market work self-enforcing. The paradox is only apparent, however, because child work does not disappear, it goes underground. The ban reduces child work nonetheless, because it makes $G'(nd^{B'})$, lower than w_1^A , the opportunity-cost of e .

¹¹There is no need for a similar constraint on en because, having spent p for each child, parents will choose e positive.

Once again, a ban can be usefully complemented by a credit-backed combination of subsidies for parents and taxes on skilled workers. Given that information is asymmetric, however, the government cannot tax and subsidize as much as it otherwise would, because it must satisfy the incentive-compatibility constraint represented by the first-order condition on the parents' choice of d . Geometrically, the equilibrium is then restricted to be a point on the **MP** line. We show in the Appendix that, without the policy, $G'(nd)$ could be higher than, equal to, or lower than w_1 . With the policy, $G'(nd)$ can be at most equal to w_1 . Banning children from the labour market, subsidizing current adults, and taxing educationally successful future ones, will then cause the equilibrium point to slide up the **MP** line, but only as far as point A' , where $G'(nd)$ is equal to w_1^A . At that point, children work less than at B' , but they still do, because the subsidy is not large enough to cover the cost of full-time education, and the tax is not large enough to equalize future after-tax wage rates. Therefore, the subsidy relaxes the credit constraint, but not as much as would be necessary to induce full-time education. The tax provides some insurance, but not full insurance. The outcome is a Second Best.

Matters are further complicated if parents choose not only d , e and s , but also n . Given that an increase in the number of children a couple have tightens their budget constraint, if a policy aimed at raising e raises also n ,¹² the unintended effect will offset the intended one. The latter will then be smaller than it otherwise would, and may even have the wrong sign. Cigno et al. (2003) model policy design as a Principal-Agent problem, with the government in the role of Principal, and parents in that of Agents, in an endogenous fertility setting where child labour is not explicitly mentioned. As in the simpler model sketched out in the present section, the Second-Best policy subsidizes and insures parents,¹³ but not as far as it would if all parental actions were observable by the government. Due to the policy maker's limited administrative capacity, the policies actually implemented in developing countries fall rather short of that. They typically rely on only one instrument at a time when several would be called for. In particular, policies aimed at curbing child labour, or fostering education, do not take into account the fertility side effect. It is thus little wonder if real-life policies show disappointingly modest results, or are even counterproductive. Where the effect of a partial or total ban on child labour is concerned, Piza and Souza (2016) find that the 1998 change in the Brazilian constitution, which raised the minimum legal working age from 14 to 16, reduced the

¹²See Cigno and Rosati (2005).

¹³It also redistributes, because, in this model, parents have different wage rates.

labour force participation of boys, but not of girls. Bargain and Boutin (2017) find that the same legislative change had no effect on child labour. Studying the effects of India's 1986 Child Labour Act, which prohibited work under the age of 14 in some but not all sectors, Bharadwaj et al. (2020) find that child labour participation actually rose, and that it rose more in sectors where the prohibition applied, than in sectors where the prohibition did not apply. Self-reported school attendance fell.

5 Discussion

We set out to investigate whether the celebrated proposition in Basu and Van (1998), that a ban on child labour may be self-enforcing, holds not only under those authors' extreme assumptions, but also under the more usual ones that education is available, and that the disutility of child labour may be compensated by the utility of present consumption or future income. There are at least three reasons why education may be inefficiently low, and child labour inefficiently high. The first, pointed out by Baland and Robinson (2000), is that children cannot commit to pay back a loan. As noted by Ranjan (2001), and Cigno and Rosati (2005), this implies not only that parents will not lend to their children (they can only make them presents), but also that parents cannot borrow on their children's behalf. The second, pointed out by Pouliot (2006), is that education may be a safe investment where society is concerned, but it is a risky investment from the parents' point of view. Without insurance, risk-averse parents would then invest less than the efficient amount even if they were not credit constrained. The third, pointed out by Dessy and Pallage (2001), is that the expected return to education may be inefficiently low because of lack of coordination between firms investing in skill-intensive technology, and parents investing in skill-enhancing education. Parents may not invest enough in education because the expected return is low. Firms may not invest enough in technology because the expected number of skilled workers is small.

We have shown that, depending on the properties of the demand for labour function, a partial ban may be self-enforcing even under conventional assumptions, but a total ban may not even if full-time education is efficient. If that is the case, child labour can be eliminated, in the absence of informational asymmetries, by the government announcing in advance that it will borrow from the international credit market, use the loan to subsidize parents, and tax future skilled workers to pay back the international creditors. This policy solves at once the Baland-Robinson, the Pouliot and the Dessy-Pallage problems, because it relaxes the credit constraint, fully insures families against the risk of an unfavourable educational outcome, and aligns the expectations of the

firms with those of the parents.¹⁴ The resulting equilibrium is a First Best. Cigno (1993, 2006) demonstrated the possible existence of a self-enforcing, renegotiation-proof family rule such that adults will transfer a specified amount of income to their elderly parents, and another to their young children.¹⁵ Such a rule gets round the problem that parents cannot lend to their children, but not the one that they cannot borrow on their children's behalf, because any credit parents might acquire towards their children by fulfilling their family obligations cannot be legally passed on to a third party. The government does not face this restriction, because it can claw back any subsidy it gives parents by taxing their children's future wages. It can thus do what parents cannot, borrow on the children's behalf.¹⁶

In reality, information is asymmetric. The work that children do in the labour market is observable by the government, but the work they do in the family farm or family business, and performing household chores, is not. Similarly, school attendance is observable by the government, but a child's educational results depend also on time spent resting and carrying out school assignments outside school hours, which is private information. Therefore, the government can ban children from the labour market, and oblige them to attend school, but it cannot stop them working for their parents outside the labour market, or oblige them to leave enough time for rest and homework. Consequently, a ban on children's work may be only apparently self-enforcing, and education only apparently compulsory. A ban may still reduce the total amount of work a child does, however, because the opportunity-cost of education is then the marginal product of the unobservable component of the child's work, which in equilibrium cannot be higher and may be lower than the wage rate. Therefore, a ban can still play a useful role, but the government cannot tax, subsidize and insure as much as it would without the informational asymmetry, because it must satisfy an incentive-compatibility constraint. The policy will consequently raise education, but not to the efficient level, and insure parents, but not fully. The resulting equilibrium is a Second Best.

Epstein and Kahana (2008) examine another possible remedy for high child labour and low education, namely emigration and migrants'

¹⁴Endogenous fertility makes policy optimization more complicated, if the policy measures that discourage child labour participation or encourage education induce parents to have more children.

¹⁵Cigno et al. (2021) demonstrate the persistence of such a rule in the face of mixed marriages (unions of individuals with different characteristics).

¹⁶Therefore, specialized enforcement (in the case in point, by the government) in the sense of Acemoglu and Wölitzky (2020) beats community (in the present case, family) enforcement.

remittances. The effects are similar to those of the credit-backed policy examined in the present paper. As the authors themselves point out, however, not enough adults may emigrate, and their remittances may not be large enough, for the education of the children back home to reach the efficient level. To this we would add that the cost of emigration is not negligible as the article implicitly assumes, because the destination countries are increasingly reluctant to take in more immigrants. This prompts the consideration that unwanted immigration may be prevented or reduced more humanely, and possibly at lower cost, if instead of causing people to drown or freeze to death trying to get in illegally, and locking them up or repatriating them if they succeed in getting in, the destination countries subsidized the countries of origin that carry out the policy outlined in the present paper. That would make it less necessary for the countries of origin to borrow from the international credit market in order to carry out the policy.

Compliance with ethical standards

The author declares to have no conflict of interest.

No data were used and none are thus available.

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7 Appendix

We demonstrate some of the statements made in the main text.

7.1 All child work is observable

If children are enrolled at school, parents maximize the Lagrangian expression obtained substituting (9) into (7), and appending (4) and (6),

$$\begin{aligned} E\Lambda = & u_1 (w_1 [2 + n(\gamma - e)] - n(p + s)) \\ & + n \{ \pi(e) u_2 (w^S + rs) + [1 - \pi(e)] u_2 (w^U + rs) \} \\ & + \lambda (\gamma - e) n + \mu ns, \end{aligned}$$

where λ is the Lagrange-multiplier of (4), and μ that of (6). The FOCs on e and s ,

$$-nw_1u'_1 + n\pi' [u_2(w^S + rs) - u_2(w^U + rs)] - \lambda n = 0 \quad (22)$$

and

$$-nu'_1 + nr \{ \pi(e) u'_2(w^S + rs) + [1 - \pi(e)] u'_2(w^U + rs) \} + \mu n = 0, \quad (23)$$

may be re-written, using (10) and (11), as

$$MRE = w_1 + \frac{\lambda}{u'_1}$$

and

$$MRS = r + \frac{\mu}{\pi(e) u'_2(w^S + rs) + [1 - \pi(e)] u'_2(w^U + rs)}.$$

At the optimum, for the Kuhn-Tucker theorem, either (4) is not binding, and $MRE = w_1$, or it is binding, and $MRE > w_1$. For the same principle, either (6) is not binding, and $MRS = r$, or it is binding, and $MRS > r$.

The partial derivatives of MRE with respect to e and s ,

$$\begin{aligned} \frac{\partial MRE}{\partial e} &= \pi''(e) \frac{u_2(w^S + rs) - u_2(w^U + rs)}{u'_1(w_1[2 + n(\gamma - e)] - n(p + s))} \\ &\quad - nw_1\pi'(e) A(e) \frac{u_2(w^S + rs) - u_2(w^U + rs)}{u'_1(w_1[2 + n(\gamma - e)] - n(p + s))} \end{aligned}$$

and

$$\begin{aligned} \frac{\partial MRE}{\partial s} &= \pi'(e) r \frac{u'_2(w^S + rs) - u'_2(w^U + rs)}{u'_1(w_1[2 + n(\gamma - e)] - n(p + s))} \\ &\quad - n\pi'(e) A(e) \frac{u_2(w^S + rs) - u_2(w^U + rs)}{u'_1(w_1[2 + n(\gamma - e)] - n(p + s))}, \end{aligned}$$

where

$$A(c) := -\frac{u''_1(w_1[2 + n(\gamma - e)] - n(p + s))}{u'_1(w_1[2 + n(\gamma - e)] - n(p + s))}$$

is the Arrow-Pratt measure of absolute risk aversion, are both negative for strict concavity of $\pi(\cdot)$ and $u_t(\cdot)$.

If children are not enrolled at school, parents set $p = e = 0$, and maximize the Lagrangian obtained substituting (9) into (8), and appending (6),

$$\Lambda = u_1(w_1(2 + n\gamma) - ns) + nu_2(w^U + rs) + \mu ns.$$

Apart from the fact that e is held at zero, the solution has the same properties as in the case where children are enrolled.

7.2 Not all child work is observable

If children are enrolled at school, the couple maximize the Lagrangian obtained substituting (19) into (7), and appending (6), (18) and (17),

$$\begin{aligned} E\Lambda = & u_1 (w_1 [2 + n(\gamma - d - e)] + G(nd) - n(p + s)) \\ & + n \{ \pi(e) u_2 (w^S + rs) + [1 - \pi(e)] u_2 (w^U + rs) \} \\ & + \lambda(\gamma - d - e)n + \mu ns + \varphi nd, \end{aligned}$$

where λ is now the Lagrange-multiplier of (18), and φ is the multiplier of (17). The FOCs on e , d and s are, respectively,

$$-w_1 n u'_1 + n \{ \pi'(e) [u_2 (w^S + rs) - u_2 (w^U + rs)] - \lambda \} = 0, \quad (24)$$

$$[-w_1 + G'(nd)] n u'_1 + (\varphi - \lambda) n = 0 \quad (25)$$

and

$$-n u'_1 + nr \{ \pi(e) u'_2 (w^S + rs) + [1 - \pi(e)] u'_2 (w^U + rs) \} + \mu n = 0. \quad (26)$$

Given that either or both (18) and (17) may be binding, (25) tells us that $G'(nd)$ may be greater than, equal to, or smaller than w_1 . Using (21) and (20), we may re-write (24) and (26) as, respectively,

$$MRE = w_1 + \frac{\lambda}{u'_1} -$$

and

$$MRS = r + \frac{\mu}{\pi(e) u'_2 (w^S + rs) + [1 - \pi(e)] u'_2 (w^U + rs)}.$$

The former tells us that, either (18) is not binding, and $MRE = w_1$, or it is binding, and $MRE > w_1$. The latter similarly tells us that, either (6) is not binding, and $MRS = r$, or it binding, and $MRS > r$.

If children are not enrolled at school, parents set $p = e = 0$, and maximize

$$\Lambda = u_1 (w_1 [2 + n(\gamma - d)] + G(dn) - ns) + n u_2 (w^U + rs) + \lambda(\gamma - d)n + \mu ns + \varphi dn.$$

Except for e , the solution has again the same properties as in the case where children are enrolled.

Suppose the government stops children working in the labour market, so that

$$\gamma - d - e = 0, \quad (27)$$

subsidizes parents at the rate σ per school-age child at date 1, and levies a tax τ on skilled workers at date 2. Parents then lose a decision

variable. They now choose (d, s) so as to maximize the Lagrangian obtained substituting (19) and (27) into (7), and appending (6) and (17),

$$E\Lambda = u_1 (2w_1 + G(nd) - n(p + s) + \sigma) + n \{ \pi(\gamma - d) u_2 (w^S - \tau + rs) + [1 - \pi(\gamma - d)] u_2 (w^U + rs) \} + \mu ns + \varphi nd.$$

The FOCs on d and s are, respectively,

$$[-w_1 + G'(nd)] nu'_1 + \varphi n = 0 \quad (28)$$

and

$$-nu'_1 + nr \{ \pi(\gamma - d) u'_2 (w^S - \tau + rs) + [1 - \pi(\gamma - d)] u'_2 (w^U + rs) \} + \mu n = 0. \quad (29)$$

Condition (28) may be re-written as

$$w_1 - G'(nd) = \frac{\varphi}{u'_1}. \quad (30)$$

With the policy, therefore, $G'(nd)$ cannot be larger than w_1 . It will be equal to w_1 for (17) not binding, greater than w_1 for (17) binding. Condition (29) may be re-written as

$$MRS = r + \frac{\mu}{\pi(\gamma - d) u'_2 (w^S - \tau + rs) + [1 - \pi(\gamma - d)] u'_2 (w^U + rs)},$$

where MRS is now given by

$$MRS^{SB} := \frac{u'_1 (2w_1 + G(nd) - n(p + s) + \sigma)}{\pi(\gamma - d) u'_2 (w^S - \tau + rs) + [1 - \pi(\gamma - d)] u'_2 (w^U + rs)}.$$

Therefore, the Marginal Rate of Substitution of c for y may still be greater than, or equal to r depending on whether (6) is or is not binding.

If the government aims to maximize education, it wants d to be as low as possible compatibly with the incentive-compatibility constraint (30). Given that $G'(nd)$ is a decreasing function, the lowest possible value of d is then that which satisfies (30) as an equation, implying that φ will be zero, and (17) will not be binding (children may do some work outside the labour market). The government's choice of (σ, τ) then satisfies

$$G'(nd) = F'(2)$$

and

$$\sigma = \pi(\gamma - d) \tau,$$

and the parents' choice of d given (σ, τ) satisfies

$$\frac{\pi'(e) [u_2 (w^S - \tau + rs) - u_2 (w^U + rs)]}{u'_1 (w_1 [2 + n(\gamma - d - e)] + G(dn) - n(p + s) + \sigma)}.$$

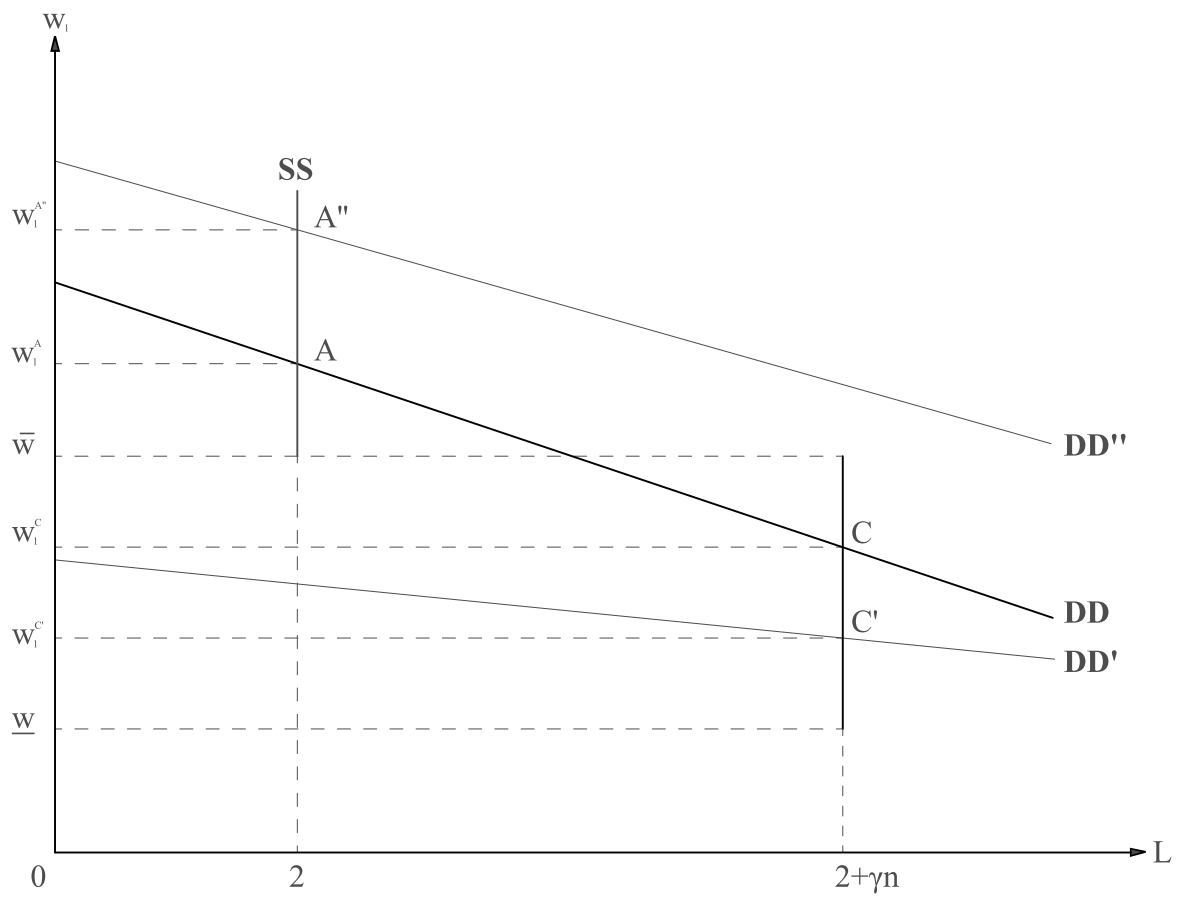


Fig. 1

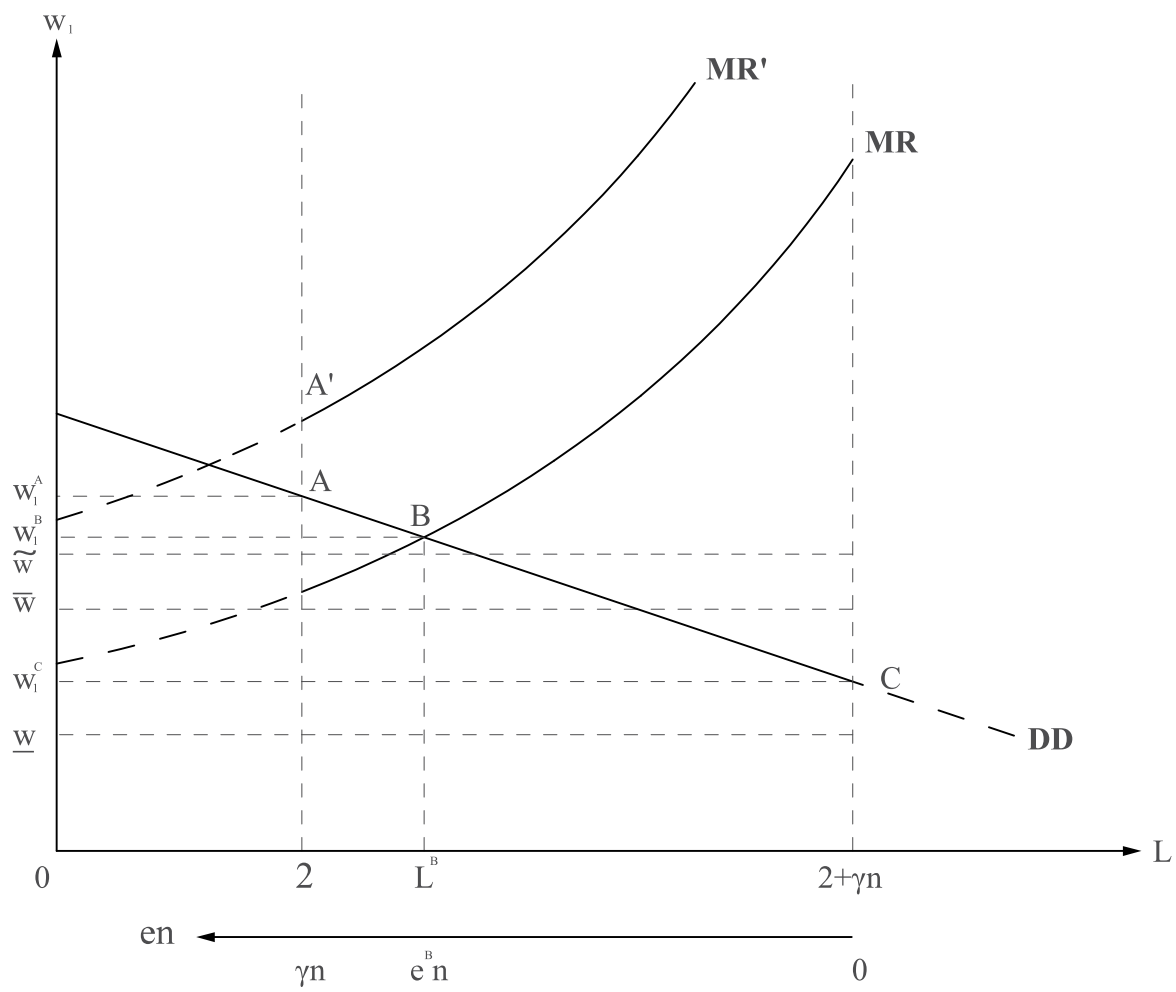


Fig. 2

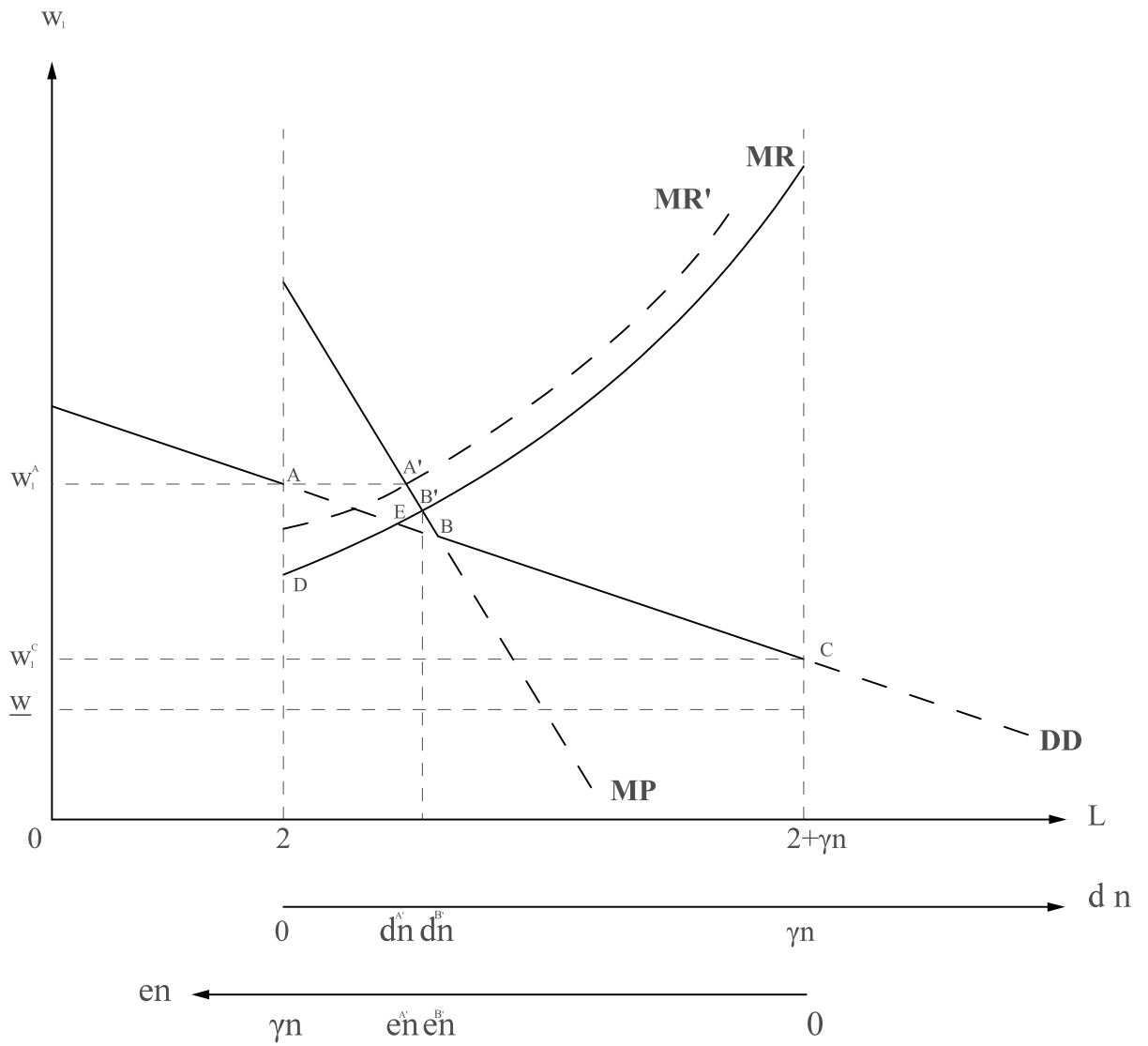


Fig. 3 Education and child labour with asymmetric information