

WORKING PAPER

Can Consumer Product Labels Deter Foreign Child Labor Exploitation?

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1. Introduction*

Consumer-driven mechanisms for improving working conditions in developing countries have become widespread over the last decade, particularly with regard to working children. Analytical support for product labeling as a strategy to improve working conditions for foreign workers has been provided by Freeman (1994). He argues that a market failure exists if western consumers have a private disutility for consuming goods produced under poor or dangerous working conditions. Such a market failure can be remedied if consumers are offered the opportunity to pay a premium for goods produced in a safer and more tolerable work environment.¹

Consumer product labels provide an appealing method to allow consumers to express their preference for and to pay for tolerable working conditions. Kirschhoff (1998) develops a general equilibrium model of product labeling with hidden action and costly monitoring of producer claims and analyzes the properties of an optimal policy from the point of view of the importing country. In the Kirschhoff analysis the importing country's objective is to employ product labels and monitoring to establish minimum ecological and labor standards that characterize the process employed to produce the import bundle.

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¹ Freeman argues that product labeling can be effective if the nature of the market failure is a *private* disutility for consuming goods produced under unacceptable working conditions. However, Freeman points out that product labeling cannot completely correct the market failure if the disutility is a *public* good.

However, this analysis applied to child labor is problematic. Presumably, the underlying ethical motivation for deterring child labor concerns the child's quality of life rather than merely the consumer's distaste for purchasing goods produced by children. To the extent that a product label premium paid by consumers deters manufacturers from employing children in the export sector, the opportunities for formerly-employed children are probably reduced so that the condition of their lives may, in fact, worsen. While consumers are, in some sense, better off if they are consuming goods produced only by adult labor, no claims can be made concerning the overall welfare of the children involved.

A certification and labeling program that merely eliminates or reduces the import of goods produced by children cannot guarantee that the former child worker's outcome is now better than previously.² Concern with the alternatives for former child workers has been made analytically by Maskus and Holman (1996) in the context of import restrictions and is acknowledged by many certifying agencies attempting to reduce child labor. It is a common practice of certification agencies to devote some portion of the licensing fee to maintain or contribute to child welfare programs.

There are two possible mechanisms through which a labeling program may improve the outcomes for child workers. First, widespread product labeling may be effective if the premium paid by consumers for adult-made products is sufficiently large that adult wages rise above a threshold at which families choose to remove their children from the labor force.³ A second possibility is that the licensing fee paid by a labeling firm is

² For example, UNICEF (1995) reports that 5,000-7,000 young girls have been trafficked from carpet factories in Kathmandu into the Indian sex trade following the decline in the Nepalese carpet industry.

³ Krueger (1996) finds that labor force participation by children falls to zero when per capita GDP reaches \$5000.

sufficiently large so that funds can be garnered by the certification agency to support displaced child workers.

We will show below, that neither of these conditions is likely to be satisfied. Much of the premium paid by consumers will be captured by the producers and never reach either the adult workers or child welfare programs. This is the case even if all markets are perfectly competitive and the certifying agencies are able to establish a credible monitoring program. We will demonstrate below that, even if consumers are willing to pay the full additional cost of a technology that uses adult labor only, wages of adults and children will be unaffected, labor force participation by children will be unchanged and no contributions will be made to the child welfare fund. In addition, the credibility of legitimate certification programs will be undermined by the free entry of fly-by-night certification programs that do not attempt to effectively monitor the employment practices of its licensees.

In section 2, we offer a brief history of product labeling and a typical certification and monitoring program is described. This will be followed in sections 3 and 4 with a theoretical model that is used to analyze the economic impact of licensing on firm behavior, adult and child wages, child employment and revenue raised for child welfare programs when credible monitoring can be established. In section 5, some possible program reforms are discussed that could improve the effectiveness of product labels in raising the standard of living of working children. In section 6, the issue of credibility of the certification agencies is discussed. Conclusions follow.

2. Characteristics of a typical certification program

Consumer product labels were first used in the United States during the last half of the 19th century as part of an organized lobbying effort to reduce the length of the workweek and to improve working conditions for women and children. More recently labels have been used in an attempt to reduce or eliminate illegal child labor in the manufacture of exports from developing countries. Several private or quasi-governmental agencies now certify and label certain Asian and Latin America exports that are produced exclusively by adults. Certification programs are most active in monitoring hand-knotted carpet producers in India, Nepal and Pakistan, the leather footwear industry in Brazil and the hand-stitched soccer-ball industry in Pakistan.

The *Jackciss* carpet weaving collective in Pakistan began during 1987 to certify carpets made exclusively by adult labor and to label their carpets to that effect.⁴ The *Abrinq Foundation* followed in 1990 with a certification program in the Brazilian footwear industry. Throughout 1994 and 1995, four additional agencies began certifying hand-knotted carpets in India, Nepal and Pakistan.⁵ In 1996 and 1997, two certification efforts began in the hand-stitched soccer ball industry in Sialkot, Pakistan.

Although there are a large number of child labor certification and labeling programs in existence, *Rugmark International* is considered to be the most rigorous and well known. Many certification programs imitate *Rugmark's* protocol to some degree.

⁴ For a complete description of product labeling efforts applied to child labor see Bureau of International Labor Affairs, U.S. Department of Labor (1997).

⁵By 1997, roughly 25 percent of the hand-knotted carpet dealers exhibiting at the Atlanta Home Furnishings Fair were affixing their own child labor-free labels on their carpets (U.S. Department of Labor, 1997).

Rugmark began certifying hand-knotted carpets in India in 1994. *Rugmark's* primary goals, as stated in its program literature, are to eliminate child labor in the carpet industry and to rehabilitate former child weavers.

A carpet manufacturer who wishes to apply for a license to use the *Rugmark* label first submits a list of all looms owned by the manufacturer and each loom's location. The number of looms is compared to the applicant's previous year's production level as a device for ensuring that all of the applicant's looms have been reported. A random sample of the applicant's looms is then inspected by *Rugmark* agents. If child workers are found on two separate inspections, the application is rejected. Otherwise the applicant becomes a certified *Rugmark* licensee.

Each of the looms of a licensee is assigned an individual identification number. Each purchase order received by the licensee must be registered with *Rugmark* and is assigned a serial number. During the production process, the site is subject to random inspections in order to determine whether children are employed. If children are found working during two separate inspections, the licensee is permanently decertified. However, if the carpet is completed with fewer than two violations, then the licensee receives a *Rugmark* label imprinted with the assigned serial number. The label is then placed on the back of the carpet and can be identified by the consumer.

Licensed exporters and manufacturers pay a fee of 0.25% of the sale price that is used to finance inspections and monitoring. Firms that are licensed to import and sell labeled carpets pay an additional fee of one percent of the sale price that is contributed to a child welfare fund to support former child weavers. *Rugmark* maintains two schools in Bhadohi. One school serves the children of adult weavers and a second center attempts

to rehabilitate and educate former child weavers found during *Rugmark* inspections of participating firms.⁶

Rugmark employs an array of devices to maintain the credibility of the inspection process. Inspectors must be university graduates and are paid significantly above the region's average wage. Rotating teams of two inspectors receive assignments each morning detailing which looms are to be inspected.

As of June 1997, *Rugmark* India had 18,400 registered looms. During the preceding year, *Rugmark* conducted 22,800 inspections. During these inspections 1,060 children were found working on 635 looms. Of the children found, 15 to 30 percent were bonded child laborers.⁷

3. The Analytical Framework

Turning now to the analysis, we focus on a small price-taking economy that produces two final goods. Both the import-competing sector M and the export sector X employ adult and child labor, which are imperfect substitutes in production. The M -sector is taken as child-labor intensive. Production functions are characterized by constant returns to scale and all markets are perfectly competitive. Unit-value isoquants for each sector are depicted in *figure 1* tangent to the \$1-isocost line. The X -sector isoquant touches the A -axis, indicating the feasibility of an adult-only technology. In the initial pre-labeling equilibrium, X -sector firms employ a technology given by point n and M -sector firms employ a technology given by point m .

⁶ Both schools have a long waiting list. Children frequently pass the age of admission before they have an opportunity to attend the school.

⁷ See U.S. Department of Labor (1997) for more details on the monitoring procedure followed by *Rugmark* and other certification agencies.

The international terms of trade determine the relative price P_X / P_M . Foreign consumers are willing to pay a premium L for X -sector goods that are produced using only adult labor. We will denote the premium-inclusive price by $P_L = P_X + L$.

X -sector firms can enlist with a certification agency, claiming that they intend to employ adult labor only. In this section we will assume that the agency has perfect credibility with consumers. However, the agency may or may not be able to perfectly monitor the hidden actions of the firm.

In each period, a licensing firm makes a decision as to whether to remain in compliance, hiring only adult labor, or to cheat and hire both adults and children. In the event that the firm remains in compliance, it faces an average total cost of $ATC_A = w_A A^*$, where w_A is the wage paid to adults and A^* is the unit input requirement for adult labor when the adult-only technique of production is employed. In terms of *figure 1*, a compliant firm's *isocost* line for producing $X = 1/p_x$ worth of output is given by line K . (For ease of exposition, we will take $w_A = 1$ in the initial pre-labeling equilibrium.)

A firm that chooses to cheat, employs both adults and children and faces average total cost of $ATC_C = w_A A + w_C C$, where w_C is the wage paid to children and A and C are the unit input requirements of adult and child labor if both adults and children are employed. In terms of *figure 1*, a deviant firm's *isocost* line for producing $X = 1/p_x$ worth of output is given by line H .

The certification agency is assumed to follow a trigger strategy. Firms in compliance with the terms of the license and undetected cheaters receive a label that commands the price P_L and are permitted to remain in the certification program in the next period.

Deviant firms can expect to be detected with probability π . If caught, they do not receive

a label and, therefore, are paid only price P_X . In addition, such a firm is decertified for all future periods.

The certification agency also levies a payment T on its licensees. The accrued revenue is used by the agency to fund child welfare services.

X-sector firms that do not enter the certification program earn

$$EV_N = \sum_{t=0}^{\infty} \frac{P_X - ATC_C}{(1+i)^t} \quad (1)$$

where i is the discount rate. The profit for a non-certified firm is zero when evaluated at *pre-labeling* factor-prices, reflecting the assumption of perfect competition. Such firms produce at point n in *figure 1*.

The present discounted value of profits for a licensed *X-sector* firm that employs adult labor only is given by

$$EV_A = \sum_{t=0}^{\infty} \frac{P_L - ATC_A - T}{(1+i)^t} = \frac{P_L - ATC_A - T}{i}. \quad (2)$$

A compliant firm uses the adult-only technology, producing at point a in *figure 1*.

Finally, a deviant firm that labels but employs both children and adults can expect to earn

$$\begin{aligned} EV_C &= [\mathbf{p}(P_X - ATC_C - T) + (1-\mathbf{p})(P_L - ATC_C - T)] \sum_{t=0}^{\infty} \frac{(1-\mathbf{p})^t}{(1+i)^t} \\ &= [\mathbf{p}P_X + (1-\mathbf{p})P_L - ATC_C - T] \frac{1+i}{i+\mathbf{p}}. \end{aligned} \quad (3)$$

Equation (3) is derived under the assumption that decertified firms will be confined to activities that earn zero economic profits in periods following detected cheating.

4. Wages and the employment of children when products are labeled

We now turn to the determination of wages and employment in the model following the introduction of product labeling. We will consider two cases: perfect costless monitoring and imperfect monitoring.

4.1. Case 1: Perfect costless monitoring

Consider first, the possibility that perfect monitoring can be undertaken costlessly and that consumers are willing to pay a premium for products made only by adults that is sufficient to cover the additional cost of the adult-only technology. That is,

$L = ATC_A - ATC_C + \epsilon$, where $\epsilon > 0$ can be made arbitrarily small. This brings us to

Proposition 1.

Proposition 1. If the labeling premium L offered by consumers for adult-made products is slightly larger than the amount necessary to compensate firms for the additional cost of the adult-only technology in the X -sector evaluated at pre-labeling factor prices then adult and child wages will be unchanged, labor force participation by children will be unchanged and the child welfare fund will be approximately empty.

In order to demonstrate *Proposition 1*, we must first show that the participation constraint, the incentive compatibility constraint and the zero-profits conditions can all be satisfied at the pre-labeling set of factor prices. The participation constraint faced by the certification agency requires that

$$EV_A = \frac{P_L - ATC_A - T}{i} \geq 0 \quad (4)$$

and the incentive compatibility constraint requires that

$$EV_A \geq EV_C. \quad (5)$$

At the initial equilibrium factors and goods prices when $\pi=1$ we have from equation (3)

that

$$EV_C = P_X - ATC_C - T \leq 0. \quad (6)$$

That is, cheating firms cannot earn positive profits. This is the case because with perfect monitoring, firms that license and then cheat earn zero economic profits but lose their licensing fee. Therefore, if $EV_A \geq 0$ then it is also the case that $EV_A \geq EC_C$. That is, only the participation constraint binds and can be satisfied by setting $EV_A = 0$.

The participation constraint will be satisfied for labeling *X-sector* firms as long as $T=e$ since by assumption the label premium is only slightly greater than the amount sufficient to cover the added cost of the adult-only technology. That is,

$$EV_A = \frac{P_L - ATC_A - T}{i} = \frac{P_X + (ATC_A - ATC_C + e) - ATC_A - T}{i} = 0. \quad (2')$$

Note that since the licensing fee, T , must be approximately zero, the child welfare fund is virtually empty.

In terms of *figure 1*, *M-sector* firms remain at point m , nonlabeling *X-sector* firms remain at point n , the labeling premium is equal to the distance $PC+e$ and labeling *X-sector* firms produce at point a . So, at the initial equilibrium factor prices all firms earn

zero profits. It remains only to demonstrate that the labor markets will be in equilibrium at the pre-labeling factor prices.

Turn now to *figure 2* where we have depicted the allocation of adult and child labor between the X and M sectors. Initially adult and child labor are allocated according to point N at the intersection of the pre-labeling factor proportions rays, r_X and r_M .

With unchanged factor prices, the labor force participation by adults and children will be unchanged. So the supply of adult and child labor will not change. However, some portion of adult labor will be deployed to adult-only X -sector firms, as indicated by the distance $O_X D$ in *figure 2*.

D is indeterminate since X -sector firms earn zero profits whether or not they label their products. The only constraint on D is that it not be so large as to create an excess demand for adult labor at the initial set of factor prices. If this happens, then w_A will rise and labeling firms will no longer break even.

The remaining adult and child labor will be allocated to the non-labeling X -sector and all M -sector firms according to point Q . We can see that the only effect of product labeling in this case is to move some children from the export sector to the import-competing sector.

The interesting question, then, is if wages, employment and firm profits do not change, then what happened to the labeling premium paid by consumers? It did not end up in the child welfare fund because T was set approximately equal to zero in order to satisfy the participation constraint. The answer is that the labeling premium was dissipated by the inefficient use of the adult-only technology by the labeling X -sector firms. Western consumers may feel some satisfaction that the goods they are consuming

were not made by children, but neither the children nor their families themselves gain as a consequence.

Next, consider the possibility that consumers might be willing to pay a labeling premium that is discretely larger than PC in *figure 1*. That is, they are willing to pay more than enough to compensate firms for the use of adult-only technology. As a consequence, labeling *X-sector* firms will now be earning positive profits at the set of pre-labeling factor prices.

At this point, the certification agency has two choices. First, it can simply capture the extra normal profits by raising T above zero. In this case, the labor force participation by children will still remain unchanged. However, the child welfare fund will begin to accumulate resources. Children may now benefit from the existence of a labeling program because the certification administrators have resources available to fund educational or other child services. This conclusion is summarized in *Proposition 2*.

Proposition 2. If the labeling premium paid by consumers exceeds the additional cost of the adult-only technology and the certifying agency diverts the excess premium into a child welfare fund then the child welfare fund will not be empty but labor force participation by children will be unchanged. Therefore, children will be better off with a certification program if the proceeds of the child welfare fund are spent to advance the interests of children.

Nevertheless, it should be noted that the fund would have been larger if consumers had been willing to pay the premium without the caveat that imports be produced by adult labor only. In the latter case, all of the premium paid by consumers could have

been contributed to the child welfare fund, not just the amount above the added cost of the adult-only technology.

As long as consumers require that imports be produced with the adult-only technology, a production inefficiency exists which absorbs some of the premium paid by consumers. Thus, the child welfare fund would be maximized, without altering the labor force participation by children, if consumers eliminate the production inefficiency by paying a premium that is not contingent on child labor-free imports.

Alternatively, T may remain at zero, allowing profits to emerge for labeling firms. Positive profits will draw additional firms into the X -sector, bidding up the cost of adult labor. Eventually w_A will rise until the extra-normal profits earned by labeling X -sector firms are eliminated. The rise in the cost of adult labor will render the non-labeling X -sector firms nonviable. Only the labeling X -sector firms and the child-labor intensive M -sector firms will survive.

Equilibrium is illustrated in *figure 3*. The dashed line, H , depicts the pre-labeling \$1 *isocost* line, with firms initially producing at points a , n , and m . Firms at a are earning positive profits since the labeling premium, L , is greater than the additional cost of using the adult-only technology.

As the adult wage rises the cost of the adult-only technology rises. A new equilibrium will be reached when the \$1 *isocost* line rotates to H' where the labeling premium, L , once again satisfies the condition that $P_L = ATC_A$ at the new set of factor-prices. M -sector firms now use the technique of production given by m' . Non-labeling X -sector firms are no longer viable since the unit value isoquant for X -sector firms lies uniformly above the post-labeling \$1 *isocost* line.

Now what happens to child workers? In this scenario adult wages rise and child wages fall. If the labeling premium is sufficiently large that adult wages rise enough to induce families to draw children out of the work force, then children will be better off. In addition, the fall in the wages of children lowers the opportunity cost of education in which case some families may decide to send their children to school rather than work.

However, while this is a theoretical possibility it may not be the case in practice. For most communities in which child labor is common, the adult wage is far below the level at which children would be drawn out of the labor force. In addition, the educational opportunities in communities in which labor force participation by children is high are poor and expensive. It is more likely that, if working children are drawn out of the labor force, it will be to replace home work done by mothers who enter the labor force attracted by higher adult wages.

4.2. Case 2: *Imperfect monitoring*

Although the assumption of perfect monitoring generates straightforward results, it is unrealistic. Perfect monitoring was perhaps achieved by *Reebok International* in the hand-stitching of their soccer balls when it centralized stitching in a single guarded facility in Sialkot, Pakistan. However, perfect monitoring has almost certainly not been the case in the hand-knotted carpet or footwear industries. For example, it is argued that in India alone there are "...280,000 looms spread out over 100,000 square kilometers..."⁸ Looms are generally sunk into mud-floored huts or small weaving sheds that are spread

⁸ This point is argued by the Secretary General of *Care and Fair*, a carpet labeling agency based in Hamburg. (See U.S. Department of Labor, 1997, P.46.)

out over a huge geographic area. So we now turn to the case in which monitoring is carried out imperfectly.

We begin again using the pre-labeling factor prices as a point of reference and assume that the labeling premium will be too small to generate funds for child welfare programs. Unlike in the case with perfect monitoring, there will not be a labeling equilibrium at the pre-labeling set of factor prices. This result is summarized as follows.

Proposition 3. If $T \gg 0$ when $p < 1$ and the participation and incentive compatibility constraints are satisfied, then the profits of deviant and compliant firms are strictly positive when evaluated at the pre-labeling set of factor prices.

As before, the participation constraint for the certification agency requires that $EV_A \geq 0$, which in turn requires that the labeling premium L be at least as large as the increased cost of using the adult-only technology. That is, $L \geq ATC_A - ATC_C$. In terms of *figure 4*, the difference $ATC_A - ATC_C$ is given by the distance between the dashed lines H and K . Hence the participation constraint requires that L be at least as large as the distance PC at initial pre-labeling factor prices.

The incentive compatibility constraint requires that $EV_A \geq EV_C$. However, if consumers are willing to pay a labeling premium such that the participation constraint is just satisfied, then the profit of a deviant firm, EV_C , is strictly positive. This is the case since in any period in which undetected cheating occurs, the deviant firm earns at least the distance PC in *figure 4*. That is, the deviant firm receives P_L for output that only costs ATC_C to produce. Profits fall to zero only after cheating is detected.

As a consequence, the incentive compatibility constraint is more stringent than the participation constraint in this case. That is, the expected value of cheating is strictly positive, requiring that the expected value of compliance be strictly positive as well.

We can satisfy the incentive compatibility constraint by increasing the labeling premium above PC . It is straightforward to demonstrate by comparing *equations 2 and 3* that $EV_A - EV_C$ is increasing in L as long as the probability of detection is not trivially close to zero.⁹ Hence, in terms of *figure 4*, the incentive compatibility constraint requires that L must be greater than PC by some distance such as IC . That is, profits for compliant and deviant X -sector firms are strictly positive when evaluated at the pre-labeling set of factor prices.

The existence of positive profits for both compliant and deviant firms in the X -sector necessary to satisfy the incentive compatibility constraint implies that there cannot be a labeling equilibrium at the pre-labeling factor prices when $T \gg 0$. There are two different ways in which equilibrium can be restored. We can equilibrate the X -sector market either by changing factor prices or by raising T above zero.

Equilibrium when $T \gg 0$ and $p < 1$.

We will first find equilibrium by changing factor prices. Positive profits will be eliminated by entry into the X -sector. Since X is the *Adult labor-intensive* good, consider a rise in the relative wage paid to adults. The $\$1$ -isocost line will rotate to H' . M -sector firms will move to a point such as m' .

⁹ In particular, $p/(1-p) > i^2/(1+i)$.

In order to find the new equilibrium, we must satisfy the incentive compatibility and participation constraints at a point where all firms earn non-positive profits. Equilibrium is characterized as follows.

Non-labeling *X-sector* firms now earn negative profits and so are no longer viable. This is the case since the unit value *X-sector* isoquant now lies uniformly above the \$1 *isocost* line. More importantly, deviant *X-sector* firms now earn negative profits in the period in which detection occurs.

A deviant *X-sector* firm would produce most cheaply at point d , earning positive profits PC' per dollar of sales in periods in which cheating is undetected and earning negative profits IC' in the period in which detection occurs. The zero-profits condition requires that the rise in w_A be sufficient to guarantee that $EV_C \leq 0$.

For compliant firms, the zero-profits condition, the incentive compatibility constraint and the participation constraint can all be satisfied if $EV_A = 0$. This condition will be satisfied if the labeling premium equals L' in *figure 4*. Notice, that the consumer is paying only for the additional cost of the adult only technology at the *new* equilibrium prices. However, this amount exceeds the additional cost of the adult-only technology at pre-labeling factor prices.

It is important to realize at this point that the equilibrium presented in *figure 4* may not exist if the probability of detection is too small. This is the case because as w_A rises it is necessary to increase the labeling premium in order to satisfy the zero-profits condition for compliant firms. But the larger L the greater the expected gain from cheating. If the probability of being caught is too small then the gain from cheating will be greater than the negative profits incurred in the period in which detection occurs.

To see this point, we begin with a labeling premium that just satisfies the participation constraint for compliant firms. That is, the labeling premium is large enough to satisfy $P_x + L = ATC_A$. At this point we know that $EV_A = 0$. However, as noted above, the profit from cheating is positive. That is $EV_C > 0$.

Now consider an increase in the relative wage paid to adults, w_A / w_C , that satisfies the zero-profits conditions for compliant *X-sector* firms and *M-sector* firms. In order to satisfy the zero-profits condition for compliant *X-sector* firms, the labeling premium must be constantly adjusted to compensate firms for the higher cost of adult labor. That is

$$dL = A^* dw_A. \quad (7)$$

In order to satisfy the zero-profits condition in the *M-sector* we know that the change in relative wages must satisfy

$$dw_C = -\frac{\mathbf{q}_{AM} w_C}{\mathbf{q}_{CM} w_A} dw_A \quad (8)$$

where \mathbf{q}_{ij} is factor i 's cost share in sector j .

Next turn to the profits of the deviant firm. The question we need to answer is whether deviant firm profits are falling if factor prices and the labeling premium are changed according to equations (7) and (8). Differentiating equation (3), making use of equations (7) and (8) we have

$$dEV_C = \{(1-p)ATC_A - ATC_C[\mathbf{q}_{AX} - \mathbf{q}_{CX} \frac{\mathbf{q}_{AM}}{\mathbf{q}_{CM}}]\} w_A \frac{1+i}{i+p} dw_A. \quad (9)$$

We know that the term in square brackets of equation (9) is less than one because X is the adult-labor intensive sector. Also, we know that $ATC_A > ATC_C$ since it is more costly to

employ only adult labor. Therefore, the only way that EV_C will decline when w_A rises is if π is sufficiently close to one.

If dEV_C / dw_A as implied by equation (9) is not negative, then the profits of a deviant firm will rise further above zero when adult labor becomes more expensive. Hence, cheating will continue to be more attractive than compliance when the probability of detection is too small.

We will not find a labeling equilibrium by lowering w_A / w_C either. A rise in the wage paid to children will disadvantage the *M-sector* relative to the *X-sector* so *M-sector* firms must shut down. However, children must be employed somewhere. Since compliant firms do not employ children, then child workers must be employed by nonlabeling *X-sector* firms in a labeling equilibrium. In order for *X-sector* firms to remain in business, they must have nonnegative profits. However, we have seen above that if both nonlabeling and compliant labeling *X-sector* firms earn nonnegative profits then deviant *X-sector* firms earn positive profits when $\pi < 1$. Therefore, we cannot satisfy the incentive compatibility constraint and the zero-profits conditions by raising the relative cost of child labor above the pre-labeling wage.

Equilibrium when $T > 0$ and $p < 1$.

We can reliably find an equilibrium at the pre-labeling factor prices in which labeling firms use the adult-only technology, but it requires that consumers be willing to pay a premium that is greater than the additional cost of the adult-only technique of production. In order to find an equilibrium at pre-labeling factor prices, we need only to find the

conditions under which all firms earn zero profits and both the participation and incentive compatibility constraints are satisfied.

First, since factor prices are unchanged from the pre-labeling equilibrium, it follows that profits for *M-sector* firms and non-labeling *X-sector* firms are still zero. Next, we set the licensing premium so that the profit from cheating is negative. Setting $EV_C < 0$ from equation (3) under the assumption that non-labeling firms are breaking even, we have that $T \approx (1-p)L$.

We now turn to compliant firms. Both the participation and incentive compatibility constraints require that $EV_A \geq 0$ and the zero-profits condition requires that $EV_A = 0$. So setting equation (2) to zero and using the fact that $T \approx (1-p)L$, we find that the labeling premium must be

$$L \approx \frac{ATC_A - ATC_C}{p}. \quad (10)$$

It is clear from equation (10) that the labeling premium must exceed the additional cost of the adult-only technology and that the smaller the probability of detection then the greater the labeling premium must be. This brings us to *Proposition 4*.

Proposition 4. If monitoring is imperfect then an equilibrium exists at the initial factor prices only if consumers are willing to pay a label premium that is larger than the additional cost of the adult-only technology.

The logic of the above result is straightforward. When consumers are only just willing to cover the cost of the adult-only technology, then all of the labeling premium is absorbed by the labeling firms to cover the additional cost of adult-only production.

Hence, the licensing fee must be zero. Since the licensing fee is zero, there is no penalty that the certifying agency can impose on the licensee that pushes the profit of a deviant firm negative in any period, even in the period in which cheating is detected. As a result, cheating profits are strictly positive so we do not have an equilibrium.

The only way in which the certifying agency can push cheating profits below zero is if it is able to impose a licensing fee. But a licensing fee is possible only if consumers are willing to over-compensate compliant firms for hiring adults only.

Three final observations are worth making about this case. First, since we have left factor prices unchanged, labor force participation by children is unchanged. The only effect of labeling on child labor is to divert working children from the export sector to the import-competing sector.

Second, the excess labeling premium paid by consumers in order to satisfy the participation constraint is not captured by the firms. Rather, this excess accrues to the child welfare fund. Consequently, even though children are working as much as before labeling is introduced, they may still be better off if the fund is used for their benefit.¹⁰

Third, if consumers are willing to pay a labeling premium that exceeds the amount necessary to satisfy the participation and incentive compatibility constraints then labeling firm profit will be positive. The certifying agency again has the option of taxing away the excess in the form of a larger licensing premium or allowing factor prices to change.

¹⁰ Curiously, the funds that have accrued in child welfare funds established by certification agencies have frequently gone unspent. *Rugmark International* has been successful in depleting their fund and have an excess demand for their child welfare services. The agency that sponsors the *Kaleen* label in India had accumulated \$500,000 as of 1997 but only 6.3% of the fund had been spent on child welfare programs. Similarly, *Care and Fair*, a Hamburg-based association of carpet importers had \$2.5 million of unspent funds as of 1997. *Care and Fair* claims that the failure to fund child welfare programs stems from India's strict regulations concerning foreign contributions to welfare programs. For a further description of the operation of the child welfare funds, see U.S. Department of Labor (1997).

As in the perfect monitoring case, the price of adult labor will rise, rendering unlicensed *X-sector* firms unprofitable.

5. Program reforms

We concluded in the previous section that, if the certification agency is to satisfy both the participation and incentive compatibility constraints, then consumers must pay a labeling premium that exceeds the additional cost of the adult-only technology evaluated at pre-labeling factor prices. We also found that there may not even be a labeling equilibrium if the probability of detection is too small. If these characteristics are regarded as weaknesses, then a minor adjustment in the structure of the labeling contract will correct the deficiencies.

Under the typical contract, licensees pay a fee of T each period, whether or not they are in compliance with the contract. However, licensees could also be required to post a bond, B , upon entering the certification program. The bond would pay interest i each period. The principle would be recovered if the licensee voluntarily decertifies. But if a deviant licensee is decertified after detection, then the bond is forfeited.

The existence of the bond would not enter into the profit calculation of compliant firms. But defectors face the added cost of losing the bond. We can now rewrite the expected value of cheating as

$$EV_C = [pP_x - pB + (1-p)P_L - ATC_C - T] \frac{(1+i)}{i+p}. \quad (11)$$

Following the discussion in section 4.1 we can tax away all of the expected profits of cheating using the bond. That is $B \approx (1-p)L/p$ so that the profit from cheating is zero.

This value of B implies that $EV_C = 0$. Therefore, the participation and incentive

compatibility constraints both require only that $EV_A \geq 0$. If we now set $T = 0$, the labeling premium that satisfies the participation and incentive compatibility constraint is simply $L = ATC_A - ATC_C$ 2). That is, the labeling

at pre-labeling factor prices. Use of a bond also produces an equilibrium when the probability of detection is low because it increases the potential punishment that the

6.

Up to this point we have assumed that the certification agency has perfect credibility with the consumer. However, as a practical matter, this is not the case. When introduced its labeling program in India in 1994, it endeavored to design a monitoring scheme that at least makes a good faith effort to monitor its licensees.

largely to have had the intent of distorting the product quality signal provided by the more rigorous labeling efforts. For example, the Carpet Export Promotion Council *Kaleen* label in

patterned on the *Rugmark*

11

The CEPC retains the Academy of Management Studies to undertake monitoring.

The effectiveness of the various monitoring schemes is discussed more fully in U.S. Department of Labor (1997).

monitoring intensity maintained by *Rugmark*. Virtually all of *Rugmark*'s looms are inspected once or twice a year.

The outcome of the monitoring effort has been uninspiring. During the first year of *Kaleen* inspections (October 1995-October 1996), 22 percent of the looms targeted for inspection were either sold or could not be found by the inspectors. Of the looms inspected, 43% were idle. As a consequence, the inspector could not determine whether the operator was typically an adult or a child. Therefore, the actual annual inspection rate was only about 4.5% of registered looms. Finally, out of 9,400 *Kaleen* inspections, only 100 illegal child weavers were found. By contrast, during 22,800 inspections by *Rugmark*, monitors located 1,060 children, which is about five times the discovery rate achieved by *Kaleen*.

Other programs have provisions for decertification of licensees but no monitoring program at all. For example, the *Abrinq Foundation for Children's Rights* in Brazil has no formal monitoring procedure. Rather, they rely on reports of violations by employees, subcontractors, suppliers, buyers or other affiliates. However, it was generally found that *Abrinq* licensees do not publicize their policies regarding child labor. Not surprisingly, no reports have ever been made and no licensee has ever been decertified.

There is a substantial literature on self-regulation, of which product labeling is an example.¹² In all cases the regulating agency arises due to the lack of information that consumers have concerning product quality. Consumers are able to acquire information concerning the reliability of the regulating agency by evaluating the quality of previously certified products. However, it is difficult to apply such logic to the labor practices of

¹² See, for example, Donabedian (1995), Donnenfeld, Weber and Ben-Zion (1985), Gehrig and Jost (1995), Bagwell and Staiger (1989) and Palma and Deneckere (1995).

foreign firms since the consumer never has an opportunity to gain information on the labor quality characteristics by consuming goods produced. For this reason, producers agencies such as *Rugmark* international or governmental agency.

7. Conclusions

We have analyzed the economic mechanics and consequences of consumer product appealing because it allows consumers who have a disutility for poor working conditions (or environmental degradation) to express their values in the market place and pay for

However, when the mechanism of product labeling is applied to child labor, we find that even in the most optimistic case in which consumers are willing to pay the full the labor practices of its licensees and the certification agency has perfect credibility with consumers, there is no reduction in the labor force participation of children. The

Children are found to benefit only if consumers pay an additional amount that can be contributed to a child welfare fund or that bids up the price of adult labor to the point

Furthermore, if the certifying agency cannot monitor perfectly and consumers pay the additional cost of hiring only adults at the pre-labeling set of factor prices, then all firms

will cheat. A labeling equilibrium can be found only if consumers are willing to pay an additional amount to provide an incentive for firms to comply with the terms of the license.

Finally, we have found that free entry of fly-by-night certification agencies will likely undermine the credibility of legitimate certification programs. Thus, we conclude that from an analytical point of view, product labeling is unlikely to materially improve the standard of living for working children and from a practical perspective it is virtually impossible to design a workable labeling program.

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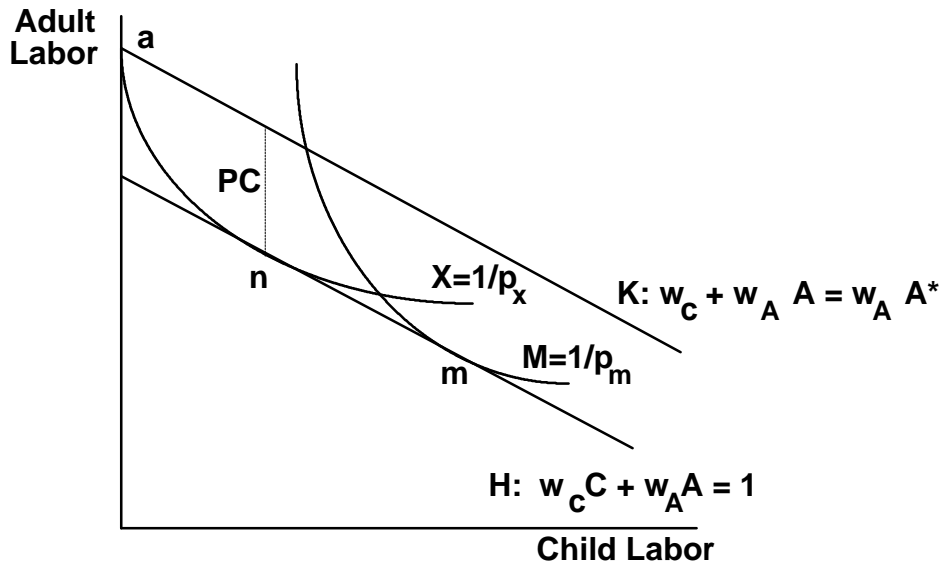


figure 1

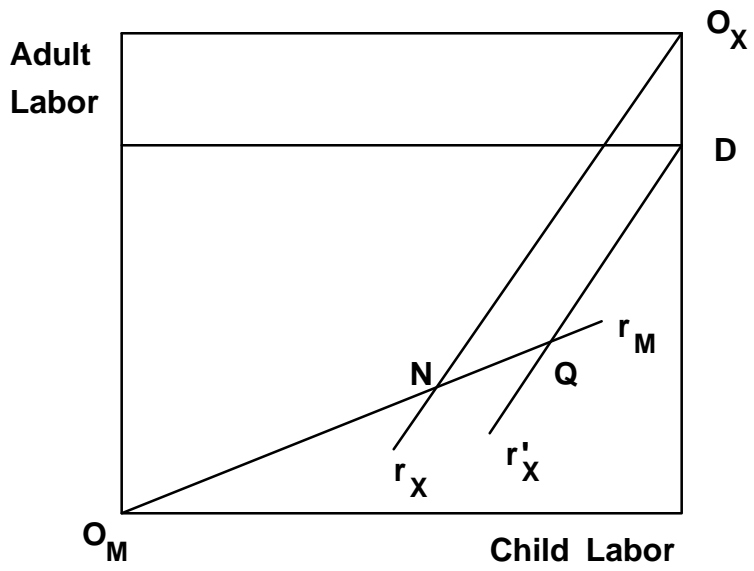


figure 2

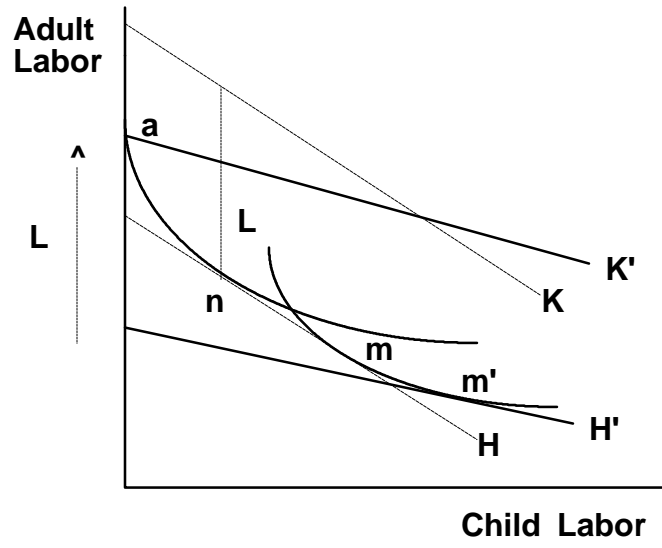


figure 3

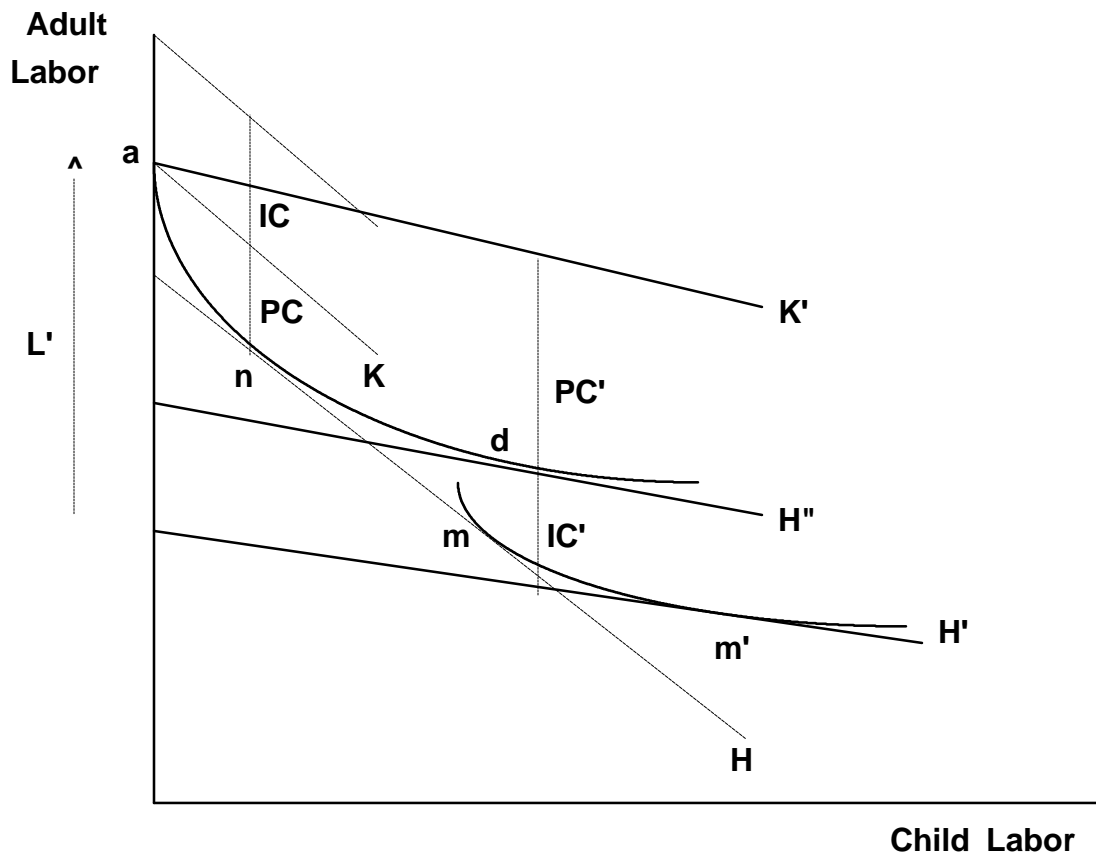


figure 4

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