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Abstract

A popular form of action to curb child labor and uphold international labor standards in general is a 'product boycott' by consumers. There are labeling agencies that inform us if, for instance, a carpet or a hand-stitched soccer ball is free of child labor. The presence of a consumer boycott will typically mean that products tainted by child labor will command a lower price on the market than ones certified to be untainted. It is popularly presumed that such consumer activism is desirable. The paper formally investigates this presumption and shows that consumer product boycotts can, in a wide class of situations, have an adverse reaction that causes child labor to rise rather than fall. This happens under weak and plausible assumptions. Hence, there has to be much greater caution in the use of consumer activism, and one has to have much more detailed information about the context where child labor occurs, before using a boycott.

Journal of Economic Literature Classification Numbers: O12, D10, K00, J20.

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1. Motivation

The use of product boycotts by consumers is one of the more enduring actions that have been contemplated and used to control child labor and the violation of other minimal labor standards in developing countries. Such action has become particularly popular because it does not involve the heavy hand of government. It seems as if ordinary consumers, going about their regular chores, can influence the world in certain desirable ways. While in the popular mind this is virtually an axiom, there is very little by way of serious analytical examination of it. The aim of this paper is to do precisely that.

Edmonds (2003) pointed out how children can get hurt by the very sanctions that are meant to help them if they live in regions where the alternative to work is dismal and when the sanctions are not complemented with alternative opportunities for the children. This is a natural conclusion if it is the case that children work because of their poverty and the lack of alternatives, such as decent schooling (Basu and Van, 1998; Swinnerton and Rogers, 1999; Dessy and Pallage, 2005). It has also been argued that child labor labels can hurt the overall welfare of developing nations where child labor exists (Baland and Duprez, 2007). Our formal analysis goes further. It shows that, quite paradoxically, the boycott of child labor-tainted products can actually cause the incidence of child labor to increase[1]. We refer to this as the `adverse reaction proposition.'

By a boycott we do not mean a total avoidance of the product but that consumers are willing to pay a price to avoid using products tainted by child labor. To understand the intuition behind the main result assume child labor is largely caused by the pursuit of

[1] Baland and Duprez (2007) get the result that the use of labels could cause a 'displacement effect,' whereby children simply move over to activities where there is no boycott. For other recent writings on this see Davis, 2005; Basu, Chau and Grote, 2006; Grossmann and Michaelis, 2007; Baland and Duprez, 2007.

poor families trying to escape extreme poverty, for which there is considerable evidence (see Kambhampati and Rajan, 2004; Edmonds and Pavcnik, 2005, for a survey). If consumers decide to boycott products that are produced by child labor, then firms will realize that the use of child labor will lower the price of their product. Hence, the existence of such a boycott will make child labor a less attractive input than it would have been otherwise. This will cause child wage to drop. In case children were working so as to avert extreme poverty for themselves and their families, as assumed above, then the lower wage will mean that they will have to work harder.

While for reasons of brevity we shall focus on the more surprising results, this is not to deny that there are circumstances where boycotts can cause child labor to decrease. The advantage of the theoretical exercise is that it provides us with a model for asking a host of related questions and helps us decide what the focus of future empirical studies in order for us to get more context-specific answers to some of these questions.

This is one area where, we know from past research, pathological reactions to policy interventions abound (Ranjan, 2001, Jafarey and Lahiri, 2002; Lopez-Calva, 2003; Krueger and Donohue, 2005; Basu 2005; Das and Deb, 2006; Dinopoulos and Zhao, 2007). This can explain why child labor has been such a stubborn problem in history, and has resisted government policy over large stretches of time. It is of course arguable that the policies that have been pursued are themselves endogenous (see Doepke and Zilibotti, 2005). But it is also possible that policy choices were caused by misinformation about the impact of those choices. The present paper is meant to be a small contribution to shed further light on the impact of a widely-used intervention, namely, consumer activism.

2. Model

The exogenous variable, the effect of which on various parameters is the focus of our study, is the boycott of products by consumers. Since our main concern is child labor, let us assume that what consumers may or may not wish to boycott is a commodity that has been produced using child labor. For example, consider the product of interest to be hand-knotted carpets or rugs. Very simply, we will assume that if p is the price of carpets that are free of child labor, then, given a consumer boycott of child labor, the price of carpets that have been produced using any positive amount of child labor will be a proportion α of p, where $\alpha < 1$. An increased boycott of child labor is thus equated with a drop in α. It is easy to derive this from utility maximizing behavior. In the formal exercise, we shall treat $\alpha \in [0, 1]$. If $\alpha = 1$, it means that there is no product boycott.

Let us now turn to the labor market. There are N identical worker households and each household has one adult and m children, and each child has the productive capacity of a fraction γ of one adult. We assume that adults supply labor inelastically, and children supply labor in order for the household to reach a minimal acceptable level of consumption, s. In other words, child labor is caused by the urge to avoid extreme poverty. This in turn implies that child labor is only supplied if the adult wage, w_A, is less than s. Children face wages w_C, and it will turn out to be that $w_C < w_A$. We shall also make the reasonable assumption that if $w_C \leq 0$, then the child labor supply is zero.

In other words, if x is the household's consumption and r the amount of leisure (or, more accurately, non-work) enjoyed by the children, then the labor-household's utility function is being assumed to be:

$$v(x,r) = \begin{cases} r, & \text{if } x \geq s \\ x - s, & \text{if x < s} \end{cases} \quad (1)$$

Since it is assumed that the adult always works, the labor-household maximizes the above utility function, subject to the budget constraint: $qx = w_A + w_C\,(m - r)$, where q is the price of the good that the worker household consumes. This is assumed to be constant. The good that the worker households consume is assumed to be different from the good produced by the workers and consumed by rich consumers (maybe in another country) and is the subject of possible product boycott. This is a very special utility function. We use it purely to keep the analysis simple. The essential idea is that the households are driven by some 'minimal target consumption' behavior.

Firms take labor as the only input; the resultant production function for a firm hiring A adults and C children is given by $F(A + \gamma C)$. In other words, each firm has a production function, $X = F(L)$, where X is the total output produced by the firm, and L is the amount of labor, measured in adult labor units, used by the firm. It will be assumed throughout that the production function satisfies the following properties: $F(0) = 0$ and for all $L \geq 0$, $F'(L) > 0$ and $F''(L) \leq 0$. In case $F''(L) < 0$, for some L, we shall assume that the Inada condition is true for both limits at 0 and ∞. This is purely for the mathematical convenience of having an interior solution.

Suppose now that a consumer boycott is introduced, such that a firm hiring any children will experience reduced demand for its product. Therefore, while a firm that hires no children faces price p for its output, a firm hiring any children faces a price αp, where $\alpha \in [0, 1)$. From here on, we will normalize prices such that $p = 1$.

Hence, the profit, Π, earned by a firm that employs A adults and C children is given by:

$$\Pi(A,C)=\begin{cases} F(A)-w_A A & \text{if } C=0 \\ \alpha F(A+\gamma C)-w_A A-w_C C & \text{if } C>0 \end{cases}$$

We can now establish a useful ‘separation result.’ Given the above assumptions, whenever $\alpha < 1$, there will be separation between firms that employ adults and firms that employ children. The intuition is straightforward. Once a firm employs children, its product is tainted, and the price is lower; and so it may as well go all the way. What is at first sight surprising is that the separation occurs no matter what the wages are for child and adult labors. Of course, in reality, the production function is more complex, and children and adults are not entirely substitutable. Therefore, in reality, we do find some adult labor in firms that employ children. For one, in a more complex model we would make the realistic assumption of at least some supervisory adult labor being needed in every firm. But the simplicity here is harmless.

Lemma 1. Let A and C denote the number of adults and children, respectively, hired by a firm. Given $\alpha < 1$, there will exist no firm such that $C > 0$ and $A > 0$.

Proof. Suppose a firm maximizes profits by hiring $A^* > 0$ adults and $C^* > 0$ children. Then its profits are given by $\Pi(A^*,C^*)=\alpha F(A^*+\gamma C^*)-w_A A^*-w_C C^*$. It will be shown that these profits are never higher than both the profits from hiring only children and the profits from hiring only adults. Let $\hat{A}=A^*+\gamma C^*$ and $\hat{C}=\dfrac{A^*+\gamma C^*}{\gamma}$. Then

$$\Pi(\hat{A},0)=\alpha F(\hat{A})-w_A\hat{A}, \text{ and}$$
$$\Pi(0,\hat{C})=\alpha F(\gamma\hat{C})-w_C\hat{C}$$

Assume:

$$\Pi(A^*, C^*) \geq \Pi(0, \hat{C}), \text{ and} \tag{2}$$

$$\Pi(A^*, C^*) \geq \Pi(\hat{A}, 0) \tag{3}$$

(2) implies:

$$\begin{aligned} \alpha F(A^* + \gamma C^*) - w_A A^* - w_C C^* &\geq \alpha F(\gamma \hat{C}) - w_C \hat{C} \\ &= \alpha F(A^* + \gamma C^*) - \frac{w_C A^*}{\gamma} - w_C C^* \end{aligned}$$

which implies:

$$w_C \geq \gamma w_A \tag{4}$$

(3) implies:

$$\begin{aligned} \alpha F(A^* + \gamma C^*) - w_A A^* - w_C C^* &\geq F(\hat{A}) - w_A \hat{A} \\ &= F(A^* + \gamma C^*) - w_A A^* - \gamma w_A C^* \end{aligned}$$

Hence:

$$(\gamma w_A - w_C) C^* \geq (1 - \alpha) F(A^* + \gamma C^*) \tag{5}$$

From (4), the left-hand side of (5) is negative. The right-hand side of (5) must be positive since $\alpha < 1$. Thus (5) cannot hold, and so (2) and (3) cannot both be true. ■

Note that an ingredient of the equilibrium (yet to be defined) is that firms must be maximizing their profits, and the firms employ a positive amount of adult labor. Since adult labor supply is positive, we can never have an equilibrium if adult labor demand is zero. In addition, let us here consider a case in which, in equilibrium, there is some child labor. This is all that we need, for now, for the next result.

Lemma 2. Assume $\alpha < 1$. Then, in equilibrium, if $F''(L) = 0$, for all L, then $w_C = \alpha\gamma w_A$; and if $F''(L) < 0$, for all L, then $w_C < \alpha\gamma w_A$.

Proof. By Lemma 1 we know that each firm will employ either all adults or all children. Let A^* be the equilibrium number of adults hired by firms only hiring adults, and define C^* analogously for all-children firms. Hence $A^* > 0$. Note that the profits from these two types of firms must be equal; if not, then a firm earning a lower profit could do better by hiring the kind of labor hired by firms earning higher profits. So we have:

$$\Pi(A^*, 0) = F(A^*) - w_A A^* = \alpha F(\gamma C^*) - w_C C^* = \Pi(0, C^*)$$

First, consider the case $F''= 0$. Then $F'(A)$ is a constant, for all A. If $F'(A^*) > w_A$, then demand for adult labor will be infinite and so will exceed supply of adult labor. If $F'(A^*) < w_A$, demand for adult labor is zero and so less than the supply of adult labor. Hence, in equilibrium, w_A must be such that:

$$F'(A^*) = w_A \tag{6}$$

By a similar logic, w_C must be such that:

$$F'(\gamma C^*) = \frac{w_C}{\alpha\gamma} \tag{7}$$

$F''= 0$ implies that the right-hand sides of (6) and (7) are equal, which means $w_C = \alpha\gamma w_A$.

Now consider the case where $F'' < 0$. Assume $w_C \geq \alpha\gamma w_A$. Clearly,

$$\begin{aligned}
\Pi(0, C^*) &= \alpha F(\gamma C^*) - w_C C^* \\
&\leq \alpha F(\gamma C^*) - \alpha\gamma w_A C^* \\
&= \alpha[F(\gamma C^*) - w_A(\gamma C^*)] \\
&= \alpha\Pi(\gamma C^*, 0) \\
&\leq \alpha\Pi(A^*, 0), \text{ by the definition of } A^* \\
&< \Pi(A^*, 0), \text{ since } \alpha{<}1 \text{ and, by } F'' < 0 \text{ and } A^* > 0,\ \Pi(A^*, 0) > 0
\end{aligned}$$

Thus, $\Pi(A^*,0) \neq \Pi(0,C^*)$, which is a contradiction; therefore, $w_C < \alpha\gamma w_A$.■

3. Equilibrium and the Adverse Reaction Proposition

To fully describe the equilibrium, we must write down the aggregate labor supply and demand functions. Let us suppose that there are N worker households. From what was stated above in words, each household's labor supply is given by:

$$l(w_A, w_C) = \begin{cases} 1, & \text{if } w_A \geq s \text{ or } w_C \leq 0 \\ 1+\gamma \min\left\{m, \dfrac{s-w_A}{w_C}\right\}, & \text{otherwise} \end{cases} \tag{8}$$

The household's labor supply, measured in adult labor units, is denoted by l. If $w_A \geq s$, children do not work because adult work guarantees the household reaches the threshold tolerable income, s. Also, if $w_C \leq 0$, children do not work, as it would be pointless. Hence, the household labor supply is equal to the amount of adult labor in each household, namely one unit. In all other cases, that is when $w_A < s$ and $w_C > 0$, children work enough to help the household reach an income level of s. By this logic, the household should supply x units of child labor, where $w_C x = s - w_A$. But the maximum child labor the household possesses is m. Hence it supplies $\min\left\{\dfrac{s-w_A}{w_C}, m\right\}$. Converting this into adult labor units requires us to multiply this by γ. This explains equation (8).

Hence the aggregate labor supply, S, is given by

$$S = Nl(w_A, w_C)$$

Let us next suppose, as described above, that there are M identical firms in the economy. We know from Lemma 1 that each firm will be either an adult-labor-only firm or a child-labor-only firm. It is easy to see that a firm will be indifferent between hiring children-only or adults-only if and only if the following condition holds:

$$\max_A \; [F(A) - w_A A] = \max_C \; [\alpha F(\gamma C) - w_C C] \tag{9}$$

Note that (9) implicitly defines a function:

$$w_C = \phi(w_A, \alpha) \tag{10}$$

That is, given α and w_A, firms will be indifferent between being adults-only or children-only if and only if $w_C = \phi(w_A, \alpha)$. Lemma 2 has already described some properties of this equivalence function.

Assuming (10) holds, let us work out a firm's demand for labor. Consider a firm that chooses to be adults-only. Its demand for labor is implicitly given by:

$$F'(A) = w_A \tag{11}$$

which is the first-order condition, derived from the firm's maximization problem. The value of A that solves (11) can be written $a(w_A)$. That is, $F'(a(w_A)) = w_A$.

Next consider the first-order condition of a children-only firm:

$$\alpha F'(\gamma C) = \frac{w_C}{\gamma}$$

Let the total amount of labor—i.e. γ multiplied by the number of children—demanded by this firm be written as $c(w_C, \alpha)$. In other words, $\alpha F'(c(w_C, \alpha)) = \frac{w_C}{\gamma}$.

An interesting feature of this model is now apparent. A children-only firm employs at least as much labor, measured in adult units, as an adults-only firm. That is:

$$c(w_C, \alpha) \geq a(w_A) \tag{12}$$

To prove this, observe:

$$F'(a(w_A)) = w_A, \text{ and}$$
$$F'(c(w_C,\alpha)) = \frac{w_C}{\alpha\gamma}$$

Lemma 2 implies $\frac{w_C}{\alpha\gamma} \leq w_A$, with equality only if *F''*= 0. Hence, if *F''*= 0, a children-only firm and an adults-only firm employ equal amounts of labor, measured in adult units. If *F''*< 0, $F'(a(w_A)) > F'(c(w_C,\alpha))$, and a children-only firm employs more labor than an adults-only firm. Hence (12) must be true.

Therefore, given that (10) always holds, for every (w_A,α) the aggregate demand for labor, *D*, is anywhere between $Ma(w_A)$ and $Mc(w_C,\alpha) = Mc(\phi(w_A,\alpha),\alpha)$ since each firm is indifferent between employing children-only or adults-only. Thus what we have is not a demand function, but a demand correspondence. Ignoring the indivisibility of firms (assume *M* is large), we can write the aggregate demand correspondence as:

$$D = [Ma(w_A), Mc(w_C,\alpha)]$$

The aggregate supply function of labor is given by:

$$S = Nl(w_A, w_C)$$

Given that demand is a *correspondence* and supply a *function*, how do we define an equilibrium? Basically, an equilibrium is a configuration of wages, w_A and w_C, such that demand equals supply for both child labor and adult labor. Since we know that adult labor supply is *N*, an equilibrium occurs if the aggregate demand for child labor, which can be calculated as a residual, equals the aggregate supply of child labor. Given w_A, if *K* is the number of firms that have to demand adult labor so that the aggregate demand adds up to *N*, then $Ka(w_A) = N$. Hence, the number of firms demanding child labor will be

$M-\dfrac{N}{a(w_A)}$, and the total demand for child labor is $\left[M-\dfrac{N}{a(w_A)}\right]c(w_C,\alpha)$. Since the supply of child labor is $Nl(w_A, w_C) - N$, we can now define the equilibrium formally.

Given α, the wages w_A^* and w_C^*, constitute an equilibrium if they satisfy equation (12), and the following equation is true:

$$\left[M-\frac{N}{a(w_A^*)}\right]c(w_C^*,\alpha)=Nl(w_A^*,w_C^*)-N$$

Now we are in a position to state the main result of the paper, the adverse reaction proposition. As will be clear from the proof of the theorem and the remark following it, this is not a stray special case, but happens over a class of situations.

Theorem 1. There exist labor market equilibria such that, if α declines, the incidence of child labor increases.

Proof. The proof will be given by constructing a class of examples where this is always true. Let us consider the case where the production function, F, is linear: $F(L) = bL$, where $b > 0$. Assume that:

$$s-m\alpha\gamma b<b<s \tag{15}$$

It is easy to see that equilibrium adult wage will be such that:

$$w_A^*=b \tag{14}$$

Since adults-only firms earn zero profit, we know that in equilibrium the children-only firms will earn zero, and thus:

$$w_C^*=\alpha\gamma b=\alpha\gamma w_A^* \tag{15}$$

By (13) and (14), $w_A^* < s$. Therefore, in equilibrium children work. Also, by (13), $s - mw_C^* < w_A^*$. Hence, by (15), $s - m\alpha w_A^* < w_A^*$, or $\frac{s - w_A^*}{w_C^*} < m$. From (8) it follows that the child labor supplied by the household is $\frac{s - w_A^*}{w_C^*}$.

Let us now see what happens to labor supply if α drops. Adult labor supply of a household is of course fixed at 1. With adult wage at w_A^*, child labor supply is, by (8),

$$\frac{s - w_A^*}{w_C^*} = \frac{s - w_A^*}{\alpha\gamma w_A^*}$$

Hence, as α falls w_C^* falls, and child labor supply increases. Since the demand curve is horizontal, a rise in child labor supply implies that the amount of child labor increases. ■

Remark 1. The adverse reaction result applies to a larger class of situations than the one described in the proof of the theorem. The general class may be described as follows: All we need is a stable equilibrium in which $w_C > 0$ and $w_A < s$.

The theorem should not be taken as a denial that there are contexts where boycotts can curb child labor. The most obvious case is where $\alpha = 0$. In this case consumers will not buy a tainted product unless the product is free. If $\alpha = 0$, a firm will not employ children if $w_C > 0$. Thus for firms to have any demand for child labor, w_C has to be zero. But if wage is zero, labor supply will be zero. So $\alpha = 0$ would eliminate child labor.

But a total boycott, where no one buys any goods that have any child labor input and a positive price, is quite extreme. Can child labor be eliminated under milder boycotts? The answer is yes. To see this, define:

$$\tilde{\alpha} = \frac{\max_A [F(A) - sA]}{F(\hat{L})} \tag{16}$$

Any production function for which $F'(0) > s$, will have $\tilde{\alpha} > 0$. Since $F(\hat{L})$ is the largest possible output, and $s > 0$, it must be that $\tilde{\alpha} < 1$.

Our claim is that, if the intensity of product boycott is greater than that represented by $\tilde{\alpha}$ (i.e. if $\alpha < \tilde{\alpha}$), then child labor will be eliminated. To prove this, rewrite (16) as:

$$\begin{aligned} \max_A \; [F(A) - sA] &= \max_L \; \tilde{\alpha} F(L) \\ &= \max_C \; [\tilde{\alpha} F(\gamma C) - 0 \cdot C] \end{aligned}$$

Hence for all $w_A < s$,

$$\max_A \; [F(A) - w_A A] > \max_C \; [\tilde{\alpha} F(\gamma C) - 0 \cdot C] \tag{17}$$

By (9), (10), and (11), we know that, for all $w_A < s$, $\phi(w_A, \tilde{\alpha}) < 0$. Next, note that $\alpha < \alpha'$ implies $\phi(w_A, \alpha) < \phi(w_A, \alpha')$. Hence what we have proved is this: If $w_A < s$, and $\alpha < \tilde{\alpha}$, then $w_C \equiv \phi(w_A, \alpha) \le 0$.

Suppose now there is a boycott so strong that $\alpha < \tilde{\alpha}$. If the equilibrium adult wage, w_A^*, is less than s, then $w_C^* = \phi(w_A^*, \alpha)$ will be non-positive. Thus child labor supply is zero, making the incidence of child labor zero. If, on the other hand, $w_A^* \ge s$, child labor supply is again zero, and so the incidence of child labor is zero. Therefore, $\alpha < \tilde{\alpha}$ is sufficient to eliminate child labor.

This does not mean that setting α so low that it eliminates child labor will always be beneficial for children. In fact, typically child welfare will decline with such a boycott. The exception is if the model has multiple equilibria, as in Basu and Van (1998). Then a strong boycott, like a legislative ban, can deflect the economy from an equilibrium with a high incidence of child labor to another pre-existing equilibrium with no child labor; as was shown in Basu and Van (1998) (see, also, Emerson and Knabb, 2006), in that case, child welfare rises as child labor is eliminated, and the boycott is worthwhile both because it removes child labor and raises child welfare. There are also models with imperfect capital markets where a ban on child labor results in a Pareto improvement (e.g., Baland and Robinson, 2000). If the demand for labor is very elastic, for instance, infinitely so, then the multiple equilibria result of Basu and Van (1998) cannot occur (Dixit, 2000). But the adverse reaction result can nevertheless happen in such a situation.

Finally, note that, since we set p equal to one, effectively the price of the untainted good was treated as constant. A more general way to proceed would be to allow for the fact that a boycott could cause the price of the clean product to rise. We would then have to write the price of the clean product as $p(\alpha)$, and the price of the tainted product as $\alpha p(\alpha)$, and assume that, as α declines, $p(\alpha)$ rises and $\alpha p(\alpha)$ declines.

This more general model would simply mean that the adverse reaction proposition would apply in a smaller class of contexts. To see this let us use the production function that was used in the proof of Theorem 1. The adult wage will then be $p(\alpha)b$. Child labor occurs when the adult earning is not sufficient to meet the household's subsistence needs. Hence, if we use τ to denote the amount of child labor supplied by a household, it must be the case that:

$$s - p(\alpha)b = \tau\alpha\gamma p(\alpha)b,$$

or $$s = p(\alpha)b + \tau\gamma b\alpha p(\alpha).$$

It is immediately clear that, as α falls, even if *p(α)* rises, there are parameters for which τ will have to rise for the above equation to hold, which establishes the adverse reaction result. If $p'(\alpha) = 0$, we are of course back to our original assumption.

We believe that a boycott is unlikely to have a substantial effect on adult wage. Suppose that, as a consequence of a boycott in the U.S. of carpets produced in Pakistan by children, the demand for 'clean' carpets rises, and so does the demand for adult labor rises. But since adult labor in Pakistan works in all sectors across the economy an increased demand for adult labor in the few sectors where children work, is unlikely to have a significant effect on adult wages. But, admittedly, this is an empirical matter.

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