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Author(s): Kaushik Basu and Pham Hoang Van

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The Economics of Child Labor

By KAUSHIK BASU AND PHAM HOANG VAN*

If child labor as a mass phenomenon occurs not because of parental selfishness but because of the parents' concern for the household's survival, the popular argument for banning child labor loses much of its force. However, this assumption about parental decision-making coupled with the assumption of substitutability in production between child and adult labor could result in multiple equilibria in the labor market, with one equilibrium where children work and another where adult wage is high and children do not work. The paper establishes this result and discusses its policy implications. (JEL J20, K31, D60)

According to the International Labour Organization (ILO), in 1990 there were almost 79 million children around the world who did regular work (see Kebebew Ashagrie, 1993 p. 16). This estimate of child labor would vary depending on how we define work, how we define a child, and how we collect the data, but no matter which estimate we take, the inescapable fact remains that this is a problem of gigantic proportions. Moreover, the magnitude of the tragedy is not captured by numbers alone, since the conditions of child labor can vary. There are children who work in hazardous industries, risking accident and injury; there are others working in conditions that take a slower but definite toll on the children's health.

As people become informed about child labor, the natural reaction is to seek ways to ban-

ish child labor. The easiest way to banish it—or so it seems—is to ban it. And across the world there has been an increasing chorus of opinion seeking a ban on child labor. Details of the proposals have varied. In the United States, the so-called Harkin's bill (Child Labor Deterrence Act of 1997) seeks to ban the import of those goods which have used child labor as input. International organizations and many citizens fora have talked about labeling products which are free from child-labor inputs so that individuals, by confining their consumption to such goods, can bring about an effective ban. It will be argued later that many of these well-meaning interventions can be counterproductive.

This is a field of study where prescription has outstripped analysis by a wide margin. It is the aim of this paper to construct a model of child labor which can then be used to ask and answer some policy questions. There is one central idea which is at the heart of our model. The next two paragraphs give an intuitive sketch of this idea.

In the popular mind, child labor is very often equated with child abuse. The phenomenon is taken to be a product of avaricious entrepreneurs seeking cheap labor and selfish parents who would prefer enjoying leisure while their children work. It seems to us that while this popular description of entrepreneurs may well be accurate, the parents are mischaracterized. We argue instead that the traditional model of the household, where parents take their children's interests into account, while somewhat

* Department of Economics, Cornell University, Ithaca, NY 14853. This paper has benefited from seminar presentations at Boston University, Cornell University, the Delhi School of Economics, DELTA, Georgetown University, Pennsylvania State University, the University of California-Berkeley, the University of Namur, and Yale University. We would like to thank Dilip Abreu, Jim Albrecht, Pranab Bardhan, Valerie Bencivenga, François Bourguignon, Martin Browning, Veena Das, Rajat Deb, Ron Ehrenberg, James Foster, Patrick Francois, Albert Hirschman, Alain de Janvry, Heraklis Polemarchakis, Debraj Ray, T. N. Srinivasan, Erik Thorbecke, John Toye, Susan Vroman, and Henry Wan, Jr. for comments and criticisms at different stages of this work. We are also grateful to three anonymous referees of the journal for helpful suggestions.

idealistic, is a better model. Thus, while not denying that child abuse does occur in all societies, we take the position that when we have children working as a mass phenomenon as in many less-developed countries, it is much more likely that this reflects not a difference in the attitude of the parents but the problem of stark poverty where the parents are compelled to send the children to work for reasons of survival. Even in England, which witnessed some of the worst excesses of child labor in the late eighteenth and early nineteenth centuries, a parliamentary report noted that "parents were desperately unhappy about the situations their children were in but could do nothing about it. The social system allowed them no choice." (Sara Horrell and Jane Humphries, 1995.)

Once we accept this description of household decision-making, the case for declaring child labor illegal gets considerably weakened but in some situations there may nevertheless be a more complicated and equilibrium-based reason for declaring child labor illegal. If we agree that sending children out to work is an act of desperation on the part of the parents, it seems reasonable to expect that parents would not send their children to work if their own wages were higher or employment prospects better. Now do the following experiment. Suppose all children are pulled out from work, say because of a total ban. What effect will this have? Clearly, the first effect of this will be a shortage of labor. And given that child and adult labor are usually substitutes, the wages of adults will rise in response to the excess demand for labor.¹ But as adult wages rise, it is possible, given our above assumption, that parents will not now want to send their children to work. Hence, the ban may become redundant. In brief, once a ban is imposed, the ban may become unnecessary. Essentially what we are claiming is that the labor market may be characterized by multiple equilibria—one in which wages are low and children work and another in which wages are high and children do not work.

¹ In case wages are rigid we would expect adult unemployment to decline.

In the scenario described here, the purpose of government intervention is very different from that in conventional models. In our model, intervention does not create a new equilibrium but simply jolts the economy out of one equilibrium to another *preexisting* equilibrium. In this model, partial bans can have unexpected adverse effects.

Economists seeking government intervention in the child-labor market have typically justified their recommendation by claiming that there are externalities to child labor or that private returns to education are smaller than social returns.² But such arguments need to be substantiated since "externalities" are too often treated as a catchall. What our model demonstrates is that in certain specific situations there may be a rigorous case for a ban simply based on the child-labor market's natural tendency to exhibit multiple equilibria.

There are many other aspects of child labor which are important—its dynamic implications, its relation to education and human capital, and its medical aspects. But those are not our concern here. Our focus is on the multiple equilibria which seems to be a natural and inherent (potential) characteristic of child-labor markets but have eluded researchers and observers in this field.

The plan of the paper is as follows. Section I presents some basic information on child labor and some accounts of historical experience which are relevant as backdrop to our model. Section II presents a basic model and introduces a diagrammatic technique for depicting equilibria. Section III suggests ways of generalizing the basic model. Policy questions and the subject of legislation form the subject matter of Section IV. Section V considers the implications of the model for the economics of fertility and suggests ways of extending this kind of modeling to other areas.

I. Facts and Experience

To begin with the current scenario, the only thing that one can be certain about are the

² A more sophisticated claim is that child labor is a manifestation of failures in other markets, such as the market for capital or insurance (Christiaan Grootaert and Ravi Kanbur, 1995).

broad parameters of the problem. We know that a very large number of children—meaning persons below the age of 15 years—work. Most of these working children are in the Third World, with the exception of child prostitution, the incidence of which can be high even in industrialized nations. The bulk of child laborers belong to the 10-to-14-year age category; but there is also a substantial number of children below 10 years of age who work.

As we go behind such broad generalizations to actually construct numbers, we run into controversy. Employment surveys typically do not have respondents below 15 years of age. Some countries, such as India, have tried to officially count the number of children who work. But one can get very different answers depending on which source one turns to (for discussion, see Myron Weiner, 1991; Grootaert and Kanbur, 1995). For instance, in 1983 the national sample survey estimates showed that 17.4 million children worked, whereas a study by the Operations Research Group, conducted at the behest of the Ministry of Labour, estimated the number to be close to 44 million.

For an overall statistical picture, one can turn to the ILO estimates of 1993 collated and quoted in Ashagrie (1993 Table 4). Among children between 10 and 14 years of age, 70.9 million are laborers. If we look at “participation rates,” that is, the *percentage* of children who work among all children of that age-group, the figures can be quite alarming. For the world as a whole for the 10-to-14-year age-group, the participation rate is 13.7 percent, and in some parts of central Africa the figure can be as high as 32.9 percent.³

Historically, child labor was not the preserve of Africa, Latin America, and Asia. Some of the worst excesses occurred in Europe in the late eighteenth and early nineteenth centuries and especially in Britain during the Industrial Revolution.⁴ According to most

sources, the participation rates in Britain during its industrial revolution were very high—higher than the contemporary rates in all regions of the world with the sole exception of middle Africa. According to the 1851 census, in England and Wales 36.6 percent of boys aged 10–14 and 19.9 percent of girls in the same age-group were working. It is striking to note that these high participation rates in 1851 existed despite the main Factories Acts (of 1833 and 1844), which placed curbs on child labor, being already in place, and child labor arguably being on the wane.⁵

One important question is: what affect did the Factories Acts have on the incidence of child labor? The answer to this will help us speculate about the consequences of the many laws which are currently either in effect or under consideration. A study by Grootaert and Kanbur (1995) suggests that the incidence of child labor was declining even before the Factories Acts. Given that the nonpoor people in poor countries do not send their children to work, could we assert that child labor in Britain would vanish anyway as British prosperity rose, with or without laws to curtail children’s employment? The model we develop should help us ponder such questions, but in the remainder of this section let us try to elicit information from the historical literature in order to give shape to some of the *assumptions* that we use to build our model.

The popular instinct among most sections of our society is to support ideas such as those outlined in Senator Harkin’s bill in the United States, which seeks to ban the import of child-labor-tainted products. This popular instinct stems from the presupposition that the existence of child labor is the product of greed on the part of employers who employ the children and the parents who send the children to work. As stated in the introduction, we reject this

³ For a survey of the contemporary world situation pertaining to child labor, which goes beyond numbers and looks at institutional details, see Assefa Bequele and Jo Boyden (1988).

⁴ We confine most of our historical observations to Britain. The reader may refer to Weiner (1991) for a brief description of the experience of other European nations and also Japan and the United States.

⁵ A districtwise breakdown of this data is reported in Hugh Cunningham (1990). Though we say that child labor was on the decline by 1851, it is possible that the number of children who did some work peaked in 1874 (see Clark Nardinelli, 1990). However, the mitigating factor was that, by the late nineteenth century, most children were working only halftime. This was in response to the requirement of the Factories Act of 1874 that children attend school on at least a half-time basis.

view of the parents. And indeed there is overwhelming support for this rejection.

The first and foremost evidence is the contemporary fact that the children of the nonpoor seldom work even in very poor countries. This phenomenon is best explained by supposing that parents withdraw their children from the labor force as soon as they can afford to do so. In other words, children's leisure or, more precisely, nonwork⁶ is a luxury good in the household's consumption in the sense that a poor household cannot afford to consume this good but it does so as soon as the household income rises sufficiently. In our second model, we use the Stone-Geary utility function to capture this idea.

Another source of evidence comes from the late nineteenth-century census data for Philadelphia. Claudia Goldin's (1979) analysis of this data leads her to conclude (p. 124): "The higher the father's wage, the lower the probability of the child participating in the labor force."; and also: "The father's unemployment sent both boys and girls into the labor force, with a stronger impact on the former." A different kind of evidence comes from David Vincent's (1981) study of working-class autobiographies. The study showed that children who worked rarely blamed their parents, believing instead that it was poverty that drove the parents into making the children labor (see also Michael Anderson, 1971).⁷

By attributing to each household one utility function, our analysis does abstract from reality. There is evidence, for instance, that household consumption patterns differ depending on who takes the decisions and who

earns the money.⁸ Despite this abstraction, it is worth emphasizing that our model does not conflict with recent evidence and theories which ask for the rejection of the "unitary model" of the household. This is because we assume that a child's labor-supply decision is taken by a parent. There is no attempt to deny that this decision could be different if the decision-making were shifted to another member of the household.

More generally, all we want is to give primacy to the household or family wealth as a determinant of child labor. There has been some recent attempt to model parents and the children as being involved in bargaining conflicts (Carolyn M. Moehling, 1995; Manash R. Gupta, 1998). Such investigations are worthwhile but, if we were to have one representative model for analyzing child labor, we do not consider the bargaining model to be the right one. The model presented in the next section captures the essentials of our main theoretical idea.

Finally, it is important to emphasize that the phenomenon of child labor has important sociological and psychological issues at stake. The child-labor market does not always operate on the basis of voluntary exchange but involves coercion and psychological pressures (see Jonathan Silvers, 1996 p. 82). Nevertheless, we have stayed away from many of the larger issues and confine our attention to a rigorous, economic analysis because it is not clear to us how we can take on board different aspects of this important phenomenon—economic, sociological, psychological—all at once. There is no choice but to dissect such a large phenomenon into several parts and to analyze these one at a time. Moreover, we hope that our paper demonstrates how well-meaning spontaneous recommendations can often backfire. This is an area where what seems obviously the right thing to do may turn out, on deliberation, to be quite the opposite. As a consequence, this is also an area where individuals and groups, with their own self-interested agenda, can garner mass support for

⁶ Since the alternative to work may not necessarily be leisure. It could, for instance, be education.

⁷ The only exception to these findings occurs in the case of alcoholism on the part of parents. It is difficult to get data on alcoholism. We have simply been able to determine that in 1800, an average person in England and Wales consumed 27 gallons of beer per annum (Nardinelli, 1990). But it is difficult to judge from this alone (without information on the distribution of this consumption and the consumption of other types of alcohol) as to how heavy the drinking was. However, the sociological and historical writings cited above do not give the impression of alcoholism being particularly high and, therefore, the cause of mass child labor.

⁸ For discussion on this see, e.g., Amartya K. Sen (1990), Martin Browning et al. (1994), and Christopher Udry (1996).

policies which actually benefit them while superficially appearing to help the cause of the laboring children. Formalism and scientific inquiry can be a bulwark against this.

II. Child Labor: A Basic Model

What is nice about the results derived from this model and the one in the next section is that they are based on very weak assumptions. The two essential assumptions may be codified as the following two axioms.

The Luxury Axiom: A family will send the children to the labor market only if the family's income from non-child-labor sources drops very low.

The Substitution Axiom: From a firm's point of view, adult labor and child labor are substitutes. More specifically, child labor can be substituted by adult labor.

In constructing the models we shall use many special assumptions and functional forms but those are all expositional devices. They keep the analysis tractable. All our main results are, we believe, essentially derived from the luxury and substitution axioms. It is worth stressing here that the luxury axiom that we need is weaker than the word "luxury" suggests. (This is clarified in footnote 11.) These assumptions are not in themselves sufficient for generating multiple equilibria but they are sufficient for giving us a model with a *potential* multiplicity of equilibria. We discuss the conditions under which multiple equilibria actually occur, after describing the model formally. The above assumptions are built into the preference relations and production functions that we specify in this and the next section.

Assume that there are N identical families (or households) in the economy and that each family consists of one adult and one child. The latter of course may be simply a convention whereby we call the two parents "one adult" and the two children "one child." The family's preference, $>$, is described by a binary relation defined on the set

$$(1) \quad \{ (c, e) \mid c \geq 0, e \in \{0, 1\} \},$$

where c is consumption by each family member and e is the child's work effort which can

only take on values of 0 or 1. We are assuming that the adults always work, no matter what the wages are. And for simplicity, child and adult consumptions are presently assumed to be equal.

We shall now impose an assumption which is in keeping with the luxury axiom and the arguments presented in this section. It is, however, very strong. This is only for reasons of simplicity and is relaxed later. The assumption is as follows. A family prefers to send the child to work if and only if in the absence of income from the child, each individual's consumption falls below a certain exogenously fixed subsistence level, s . More formally, for all $\delta > 0$,

$$(2) \quad (c, 0) > (c + \delta, 1) \quad \text{if } c \geq s,$$

$$\text{and } (c + \delta, 1) > (c, 0) \quad \text{if } c < s.$$

The household's aim is to choose c and e so as to maximize its preference subject to the following budget constraint:

$$(3) \quad 2c \leq ew_C + w_A,$$

where w_C and w_A are the market wages for, respectively, child and adult labor. Each household treats these wages as given.

The solution to the household's maximization problem, therefore, is as follows:

$$(4) \quad c(w_A) = \begin{cases} \frac{w_A}{2} & \text{if } w_A \geq 2s \\ \frac{w_A + w_C}{2} & \text{if } w_A < 2s; \end{cases}$$

$$(5) \quad e(w_A) = \begin{cases} 0 & \text{if } w_A \geq 2s \\ 1 & \text{if } w_A < 2s. \end{cases}$$

It follows that labor supply of adults and children, denoted by S^A and S^C , are given by:

$$(6) \quad S^A = N;$$

$$(7) \quad S^C(w_A) = \begin{cases} 0, & \text{if } w_A \geq 2s \\ N, & \text{if } w_A < 2s. \end{cases}$$

Our next step is to derive the market demand for adult and child labor. To do so we invoke the substitution axiom and make the simplifying assumption that adults and children are substitutes in production subject to an adult-equivalent scaling, given by γ , where $0 < \gamma < 1$. So assume there are n identical firms, each producing a single consumption good. Each firm i 's production function is given by:

$$(8) \quad x_i = f(A_i + \gamma C_i), f' > 0, f'' < 0,$$

where x_i is firm i 's output of the consumption good, and A_i and C_i are respectively the numbers of adult and child laborers employed by firm i . The firm is a wage taker. Hence, firm i 's problem is as follows:

$$(9) \quad \max_{\{A_i, C_i\}} f(A_i + \gamma C_i) - A_i w_A - C_i w_C.$$

The solution to (9) is straightforward. If $w_A < w_C/\gamma$, then the firm will employ only adults. If $w_A > w_C/\gamma$, then it will employ only children. If $w_A = w_C/\gamma$, then it will be indifferent between adults and children. We call w_C/γ the "effective child wage," that is, the market child wage per adult-equivalent. In addition, each firm will always ensure that

$$(10) \quad f'(A_i + \gamma C_i) = \min \left\{ w_A, \frac{w_C}{\gamma} \right\}.$$

The aggregate demand for adult and child labor, D^C and D^A , is derived by multiplying each firm's demand by n . Hence, $D^A = D^A(w_A, w_C)$ and $D^C = D^C(w_A, w_C)$ are given implicitly by the following.

$$(11) \quad \text{If } w_A > \frac{w_C}{\gamma} \quad \text{then } D^A = 0$$

$$\text{and } f' \left(\frac{\gamma D^C}{n} \right) = \frac{w_C}{\gamma}.$$

$$\text{If } w_A < \frac{w_C}{\gamma} \quad \text{then } D^C = 0$$

$$\text{and } f' \left(\frac{D^A}{n} \right) = w_A.$$

$$\text{If } w_A = \frac{w_C}{\gamma}$$

$$\text{then } f' \left(\frac{D^A + \gamma D^C}{n} \right) = w_A = \frac{w_C}{\gamma}.$$

A labor-market equilibrium in this simple model is a pair of wages, (w_A^*, w_C^*) , such that

$$(12) \quad D^A(w_A^*, w_C^*) = N, \quad \text{and}$$

$$D^C(w_A^*, w_C^*) = S^C(w_A^*).$$

At first sight it may seem that what we have described is a *partial* equilibrium. However, it is easy to embed this model in a general equilibrium framework without having to modify the above description. One way is to think of this as an economy where the firms' profits are not shared with the households but instead are consumed entirely by the entrepreneurs of the firms. In that case the labor-market equilibrium would fully characterize the closed-economy general equilibrium.⁹ Alternatively, we could assume this to be a small open economy which would imply that the goods market will trivially clear and the same results would derive. One implication of viewing this as a general equilibrium will be that both equilibria will be Pareto efficient by the fundamental theorem of welfare economics, though, of course, the labor households may be better off in one equilibrium rather than another.

We now develop a diagrammatic technique for depicting this equilibrium. The geometry, apart from aiding intuition, turns out to be a very useful instrument for doing policy analysis. It also helps us see very clearly how this model *may* exhibit multiple equilibria so that in the same economy, children working and children not working can be part of equilibrium behavior.

In Figure 1, consider first the (w_A, w_C) -space. The axes of this space are marked $\mathbf{O}w_C$ and $\mathbf{O}w_A$. For wage pairs above the horizontal line $w_A = 2s$, children will not work, $e = 0$;

⁹ We are grateful to Heraklis Polemarchakis for discussion on this.

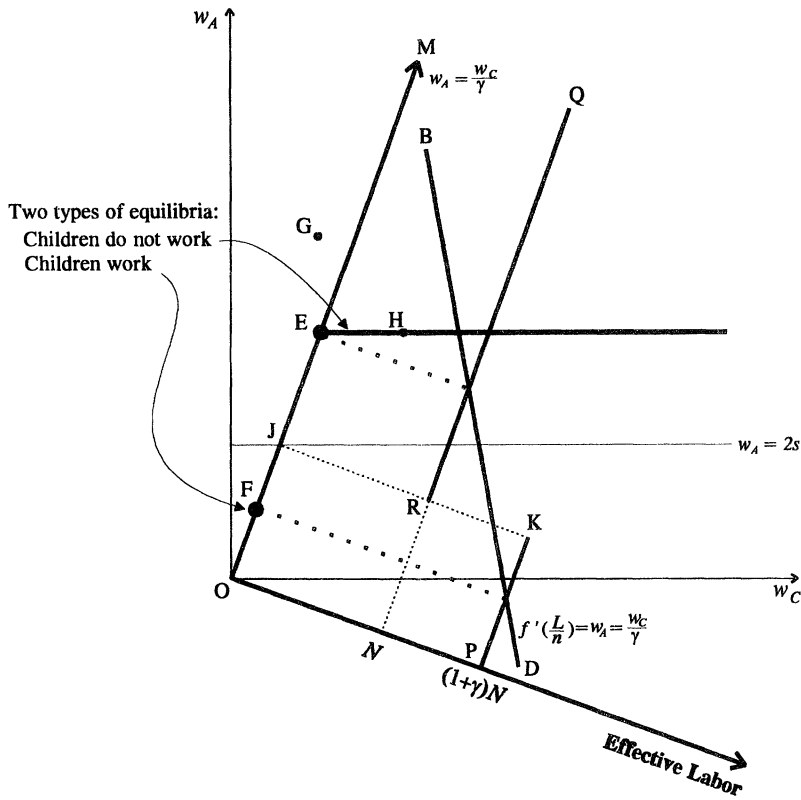


FIGURE 1. EQUILIBRIUM IN THE CHILD- AND ADULT-LABOR MARKETS

and below this line $e = 1$. In this space draw the graph of the function $w_A = w_C / \gamma$. This is the line OM . Since $\gamma < 1$, this line is steeper than 45° . This is a very significant line and will be referred to here as the “ridge.” If (w_A, w_C) is above the ridge, then the demand for adult labor is zero; if (w_A, w_C) is below the ridge, then the demand for child labor is zero. What happens if the market wages lie on the ridge? Let us define the “effective labor” used or demanded by a firm to be the total amount of labor measured in adult-equivalents being used or demanded by the firm. So if a firm i employs A_i adult laborers and C_i child laborers, its effective labor employment is $A_i + \gamma C_i$. If the market wages for adult and child laborers lie on the ridge then we know from (11) that each firm’s effective demand for labor, L_i , is given by $f'(L_i) = w_A = w_C / \gamma$. In other words, firm i facing such a (w_A, w_C) will be

willing to employ any combination of adult labor, A_i , and child labor, C_i , as long as $A_i + \gamma C_i = L_i$. Since all n firms are identical, the aggregate effective labor demand in the market is $L = nL_i$, which allows L to be implicitly defined by $f'(L/n) = w_A = w_C / \gamma$.

Consider the ridge as the “vertical” axis and draw a line through O which is orthogonal to the ridge and going eastward. The thick line, labeled “Effective Labor” in Figure 1, represents this line. Now, to start with, consider only wages which lie on the ridge. We shall call the two-dimensional Euclidean space in which the “vertical” axis is the ridge and the “horizontal” axis effective labor the “tilted Euclidean space.” For every point on the ridge (showing a particular wage pair) mark off the firms’ effective labor demand on the axis marked “Effective Labor.” That will give us a downward-sloping curve in the tilted

Euclidean space. The line **BD** is an n -fold “horizontal” (“horizontal” within quotes will from now on always mean horizontal in the tilted Euclidean space) blowup of such a line and therefore represents the firms’ aggregate effective demand for labor for wage pairs lying on the ridge. Hence, if (w_A, w_C) is point **E**, the aggregate effective demand for labor is given by **ON**.

It is now easy to read off the respective demand for labor for wage pairs which are not on the ridge. In the (w_A, w_C) -space, suppose (w_A, w_C) happens to be a point vertically above **E**. Then clearly, adult wage exceeds effective child wage, $w_A > w_C/\gamma$. Hence, from (11) and (12), the firms’ aggregate demand for adult labor is zero and the firms’ aggregate demand for child labor expressed in adult-equivalents is **ON**. Thus the wage determining the amount of effective labor demanded by firms is the child wage. Or, to put it differently, given a wage pair at **G**, the aggregate effective demand for labor is given by moving vertically down from **G** to **E** on the ridge and then “horizontally” to the line **BD**. Hence, the effective demand is **ON**. For points above the ridge the effective demand is exclusively effective demand for *child* labor. The reader should satisfy himself or herself that for wage pairs below the ridge the same exercise is carried out by moving horizontally to the ridge and, of course, the demand for labor is now exclusively for adult labor. Hence, given a wage pair at **H**, the demand for child labor is zero and the demand for adult labor is **ON**.

In Figure 1, let us now draw the effective labor supply (that is, aggregate labor supply measured in adult-equivalents) corresponding to wage pairs that lie on the ridge. Note that for all wage pairs on the ridge and above **J**, the supply of child labor is zero [see (7)]. Hence, for all such wage pairs the effective supply of labor is **ON**, where $\overline{ON} = N$ (that is, the number of adults in the economy). If the wage pair is below **J**, the aggregate effective supply of labor is given by $N + \gamma N$ since all children are now out to work. Hence, the aggregate, effective supply of labor in the tilted Euclidean space is given by the two line segments **QR** and **KP**.

We shall first locate equilibria that may lie on the ridge. This is done simply by looking

at the tilted Euclidean space and the points of intersection between the aggregate (effective) demand and supply curves. In the case illustrated in Figure 1 there are two equilibria given by the wage pairs **E** and **F**. At **F** both adults and children work, adult wage is very low and children’s wage even less. At **E**, adult wage is high, no children offer labor on the labor market, and the entire demand for labor is met by the supply of adults.

To complete the search for equilibria, we must now check if there are any equilibria off the ridge. Using the “ridge equilibria” as benchmark, this is easy to do. All wage pairs on the horizontal line through **E** and **H** and to the right of **E** constitute equilibrium wage pairs. Since, in this simple model, these are trivial extensions of the equilibrium at **E**, we shall in the remainder of this section focus attention only on the “ridge equilibria.”

The occurrence of multiple equilibria is by no means necessary in this model. If a country’s labor force becomes more productive (because of better technology, for instance), so that the aggregate demand curve, **BD**, shifts to the “right” (that is, in the tilted Euclidean space), we shall soon have an economy with a unique equilibrium where only adults work. We believe that industrialized countries are in such a situation. If on the other hand, labor is very unproductive, so **BD** shifts to the “left,” we could have a unique equilibrium and child labor is a necessary phenomenon.¹⁰

There may not be a case for banning child labor in such a situation. As can be checked from Figure 1, a ban in such a model will raise adult wage but will nevertheless be less than $2s$. As long as this new adult wage is less than the previous adult wage plus the child wage, all laboring households will be worse off. The popular support for a child labor ban in such situations usually stem from other hidden agenda such as protectionism or misguided

¹⁰ It is arguable that Britain in the early nineteenth century had only the bad equilibrium; then in the mid-nineteenth century the bad and good equilibria; and by the start of the twentieth century only the good one. Policy intervention would be important mainly in the middle case. It would be redundant by the century’s end, and very difficult to effectively implement and also of dubious welfare consequences at the start of the nineteenth century.

concern for labor. Any argument for a ban has to be much more sophisticated. We discuss this matter in detail in Section IV.

Return now to the case of two equilibria as shown in Figure 1, and suppose that the economy is currently at the "lower" equilibrium—that is, at **F**. While a model is never an exact mirror of reality, it is possible that Europe towards the end of the nineteenth century, in the last years of its industrial revolution, resembled this equilibrium better than any other. Wages were low; children worked for wages but labor productivity was moderately high.

The policy issue here is very interesting. A ban on child labor can very well be justified. If there is a total ban on child labor, effectively, the supply curve of labor in Figure 1 will be the "vertical" line from **Q** through **R**, all the way down to **N**. Hence, the equilibrium at **F** ceases to be an equilibrium. The only possible equilibrium occurs at **E**. At this equilibrium there is no child labor. What is interesting, however, is that the legislation banning child labor, which has so big an effect moving the economy from **F** to **E**, ceases to be a legislation of any consequence after this change. That is, even if the legislation were to be subsequently revoked, the economy would remain at **E**. This is a consequence of multiple equilibria. "Interventionist policy" clearly acquires a new meaning in economies with multiple equilibria. Such a policy will be called *benign* intervention, since such a policy ceases to constrain anybody's behavior simply by virtue of being there. Its entire effect is in terms of its *initial* impact. We return to further discussion of policy and welfare in a later section.

At the cost of more algebra, several aspects of this model can be generalized. A model which allows for a more realistic utility function and larger family size is developed in the next section. One can also raise the question of heterogeneity in family size, preferences, and productivity. To the extent that our central claim is an existential one, that is, one that asserts that there may exist multiple equilibria, it is not essential for our purpose to pursue such a generalization. Also the model in this section and the next makes it evident that our model is not critically dependent on the homogeneity of agents. However, to raise *further* questions of policy and impact on different

kinds of households it will be natural to generalize along these lines in the future.

III. Child Labor: Sketch of a General Model

In the general model each household is assumed to have one adult and $m (\geq 1)$ children; and each child consumes $\beta (< 1)$ of what the adult in the household consumes. Let c be the adult's consumption, and $e \in [0, 1]$, each child's effort. Hence, $1 - e$ is each child's leisure. Effort is now chosen from a continuum of possibilities. We shall represent the household preference by the Stone-Geary utility function:¹¹

$$(13) \quad u(c, e) = \begin{cases} (c - s)(1 - e), & \text{if } c \geq s \\ c - s, & \text{if } c < s, \end{cases}$$

where $c \geq 0$, $e \in [0, 1]$ and $s > 0$ is a parameter. The household maximizes u with respect to c and e subject to the budget constraint:

$$(14) \quad c + m\beta c = mew_C + w_A.$$

From the first-order conditions we get the following effort function.

$$(15) \quad e(w_A, w_C, m) = \begin{cases} 0 & \text{if } s + sm\beta + mw_C \leq w_A \\ 1 & \text{if } s + sm\beta - mw_C \geq w_A \\ \frac{mw_C - w_A + s + sm\beta}{2mw_C} & \text{otherwise.} \end{cases}$$

¹¹ It is easy to check that this implies that the child's leisure is a luxury good because a doubling of household wealth (from non-child-labor sources) leads to a more than doubling of child leisure. However, as will be transparent as we go along, we do not really need the child's leisure to be a luxury good "everywhere." Essentially what we need is that there exists a positive household wealth where children begin to consume leisure and a higher wealth where they cease to work.

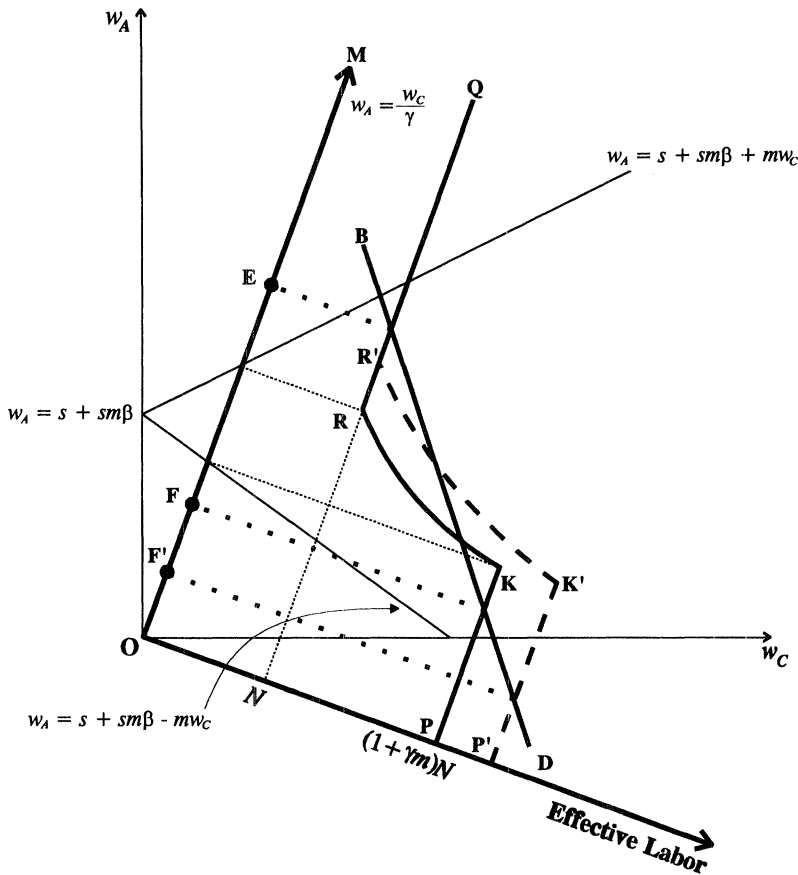


FIGURE 2. EQUILIBRIUM WITH VARIABLE EFFORT AND FAMILY SIZE

The aggregate labor-supply functions for adult and child labor are respectively:

$$(16) \quad S^A = N$$

$$S^C(w_A, w_C, m) = mNe(w_A, w_C, m).$$

The demand for adult and child labor is exactly the same as in Section II. Hence, with m held constant we define (w_A^*, w_C^*) to be an equilibrium if

$$(17) \quad D^A(w_A^*, w_C^*) = N, \quad \text{and}$$

$$D^C(w_A^*, w_C^*) = S^C(w_A^*, w_C^*, m).$$

It is worth noting here that equilibrium wages depend on m and, at times, we shall refer to

the equilibrium wages as $w_A^*(m)$ and $w_C^*(m)$ to emphasize this dependence.

Using the geometric technique developed in Section II we can represent the aggregate effective labor supply and demand. Supply is given by the line $QRKP$ in Figure 2. By inserting the demand curve for labor, BD (as before), it is clear that we shall have an odd number k of equilibria, of which $(k + 1)/2$ will be stable. The stable equilibria are denoted by points E and F .

The generalized model can be used to analyze policy as well as the effect of changing age structure of the population on child labor. To do this note that the length of NR in Figure 2 in terms of the adult wage at point R is clearly given by $s(1 + m\beta)/(1 - m\gamma)$.

First assume $1 - m\gamma > 0$. Then as m increases, NR becomes longer, and beyond some

point an equilibrium where children do not work at all will vanish. This can, somewhat approximately, be paraphrased to say that child labor is more likely to occur in a society with relatively more children. If $1 - m\gamma \leq 0$ or $1/\gamma \leq m$, it is evident from Figure 2 that the equilibrium where children do not work does not exist anyway.

More generally, check that as m increases, the supply curve of labor, **QRKP**, moves (weakly) to the "right" to, for instance, the broken line **QR'K'P'**, where **K'P'** may be shorter than **KP**, but it may also be longer. Originally there are two equilibria at **E** and **F**. The high-wage equilibrium is still at point **E** but the low-wage equilibrium has moved from **F** to **F'** where both adult and child wages have fallen.

It is now easy to see what happens to child labor. Suppose the "downward-sloping" demand curve for labor in the tilted Euclidean space is **BD**. It is evident that if, to start with, there was a bad equilibrium at point **F**, then as m increases, all children will continue to work (and of course there are more children now) and wages of both children and adults will be lower at the new low-wage equilibrium **F'**.

On the other hand, imagine that if, to start with, there was no bad equilibrium (that is, the demand curve went over **K**), then as m increases, a bad equilibrium can come into existence. In other words, a rise in the relative number of children can generate child labor. This seems to be consistent with the evidence (Grootaert and Kanbur, 1995).

IV. Policy Intervention and the Law

In the light of the above analysis, how should government intervene and how should legislation be used to enhance the well-being of families that are compelled to send children to work? The present section seeks answers to this question under the assumption of consumer sovereignty or, more appropriately, household sovereignty. In other words, in evaluating household welfare we assume that the household knows what is in its interest and we evaluate policies to enhance household welfare.

We are aware that our assumption does get violated in some situations. We wish to com-

ment here on one kind of violation, brought to our attention by Albert Hirschman.¹² In gist, the argument is that certain impositions on consumer sovereignty are at times desirable because they may result in a genuine shift in consumer preference or morality. Much of what we consider moral or immoral depends on what we are used to. We may call this "acquired morality." Certain practices in far-away societies or times which look obviously immoral to us may not appear so to those societies. Likewise it is worth being aware that we may have certain common practices in our society which will appear shockingly immoral to our descendants when they look back at the late twentieth century. These acquired moralities then influence our behavior and preference. Corporal punishment for children is a good example of such moral relativism. To some societies such punishments are natural or even desirable, and to others abominable. This may explain why child labor is not only tolerated in certain societies but considered natural and nothing to protest about. But if our aversion to child labor is an acquired morality, then one way to remove child labor is to try and make it customary for children not to work. If for instance, child labor is banned for some time, then it is conceivable that our judgment in that matter will change—so that after some time, even if the law is revoked, we would not *want* to send our children to work regardless of household income.

This leads also to multiple equilibria working through social norms. This is an eminently plausible argument. However, in what follows, we work within the confines of traditional economics, where household preferences or judgments do not change. Our aim is to argue that, *despite* this, we reach nontraditional policy conclusions.

One of the central policy conclusions is the important role of benign policy interventions. Consider Figure 2 and suppose there is an aggregate demand curve, **BD**, that cuts through **QR** and **KP**. Then there are at least two potential equilibria. Suppose an economy is caught in the bad equilibrium, that is, at point

¹² Personal communication to K. Basu, dated February 15, 1995.

F. Then a total ban on child labor could deflect the equilibrium all the way to the good equilibrium at point **E**. Hence, all working-class households would be better off. And the policy is self-liquidating in the sense that once in place it plays no role and constrains no one's behavior. This is, of course, a consequence of there being more than one equilibrium. All this we have discussed in Section II, and so we need not dwell on this anymore.

Suppose now that there is only one equilibrium, the bad one. This is because the aggregate demand curve (for labor) travels below point **R** and cuts the supply curve exactly once, on the segment **KP**. What will be the effect of a total ban on child labor?¹³

The ban will clearly cause adult wage to change from $f'((N + \gamma mN)/n)$ to $f'(N/n)$. Since $f'' < 0$, all we know is that the ban will cause adult wage to rise. The extent of the rise could vary depending on the nature of the production function, f . To see if the ban helps or hurts worker households, describe the utility levels of the household with and without a ban by, respectively, U^B and U^N . Since with no ban we have a bad equilibrium,

$$(18) \quad U^N = \frac{[m\gamma + 1]f'\left(\frac{N + \gamma mN}{n}\right)}{m\beta + 1} - s.$$

In the case with the ban, consumption per person is

$$(19) \quad c = \frac{f'\left(\frac{N}{n}\right)}{1 + m\beta}.$$

If this consumption level exceeds s , clearly the household benefits from a ban. If $c < s$,

$$(20) \quad U^B = \frac{f'\left(\frac{N}{n}\right)}{1 + m\beta} - s.$$

¹³ It is interesting to note that some of the same effects of a ban on child labor can be achieved through the implementation of a minimum-wage law.

Hence, a ban on child labor hurts workers if

$$(21) \quad f'\left(\frac{N}{n}\right) < (m\gamma + 1)f'\left(\frac{N + \gamma mN}{n}\right).$$

Clearly we can find parameters under which this inequality may or may not hold. Hence, a ban could hurt worker households and also benefit them.¹⁴

Let us consider the case where a total ban cannot be implemented. This could be because of difficulties in monitoring. Children can be stopped from laboring in factories but there is little that government can do to stop children laboring on their own family farms. Similarly, Senator Harkin's bill in the United States can conceivably drive child labor out of the export industries in the Third World but can do precious little to prevent child labor in industries which produce for the domestic market. In anticipation of this bill becoming law, the Bangladesh Garment Manufacturers and Exporters Association took steps to fire children from their factories. "The children went from jobs in garment factories to much worse jobs, such as breaking bricks in the hot sun or, even worse, prostitution" (Sarah L. Bachman, 1995 p. 3). Another problem with some of these well-meaning suggestions for intervention is that they can provide a refuge for people and lobbies with other agendas that are not as well meaning, such as protectionism.

¹⁴ We have in our analysis ignored the fact that a small but nonnegligible number of children belong to no family. They are "abandoned," and make their own decision to work or not work. A blanket ban on child labor, without any provision for such children, will almost always work against the interest of these children. A model that explicitly deals with the problem of "street children" (for an empirical account, see William Myers, 1988) would have to be based on very different assumptions from the ones we have used here.

It is therefore important to investigate the effect of partial bans. To model such an intervention, let us introduce an innocuous difference between the n firms in the above model. Suppose n_1 firms are run by red-headed entrepreneurs and $n_2 (= n - n_1)$ firms by greenheaded ones. Government, we assume, can only administer a ban on the "red" firms. What will be the effect of such a ban?

So we start from a bad equilibrium (w_A^* , w_C^*) and then have a ban announced for the n_1 red firms. The consequence of this depends on the size of n_1 .

Note that each firm's demand for effective labor in the equilibrium is $(1 + m\gamma)N/n$. Hence, total demand for labor from the red firms is $n_1(1 + m\gamma)N/n$. Suppose that the number of red firms, n_1 , is so few that the following is true:

$$(22) \quad \frac{n_1(1 + m\gamma)N}{n} \leq N.$$

In other words, define $n' \equiv n/(1 + m\gamma)$; and suppose $n_1 < n'$. Then the ban has no effect. All the red firms employ adults and the green firms employ the remaining adults and all the mN children.

Now suppose $n_1 > n'$. Evidently the pre-ban demand for labor by the banned red firms exceeds the supply for adult labor. Hence, the pre-ban equilibrium cannot be sustained since we now have an excess demand for adult labor (and excess supply of child labor). Several possibilities arise in this case. One interesting situation would arise if there exists (\tilde{w}_A , \tilde{w}_C) such that

$$(23) \quad \tilde{w}_A \leq s + sm\beta - m\tilde{w}_C;$$

$$(24) \quad f' \left(\frac{N}{n_1} \right) = \tilde{w}_A;$$

$$(25) \quad f' \left(\frac{\gamma m N}{n_2} \right) = \frac{\tilde{w}_C}{\gamma}.$$

Combining (23)–(25), we can equivalently write the following condition:

$$(26) \quad f' \left(\frac{N}{n_1} \right) \leq s + sm\beta - \gamma m f' \left(\frac{\gamma m N}{n - n_1} \right).$$

If n_1 satisfies (26) then we have, after the ban, an equilibrium where adult wage is \tilde{w}_A and child wage \tilde{w}_C . The red firms employ only adults, the green firms only children. All children still work. And since \tilde{w}_C is clearly less than w_C^* , child wage is less after the ban. From the point of view of banishing child labor, the ban would, in this case, have to be considered a failure. It does not diminish child labor, only child wage. This is the possible predicament that one has to worry about in recommending a legislation which can only effect a partial ban.

It is worth noting, however, that even if (26) is satisfied and the ban is a failure from the point of view of controlling child labor, it may or may not lower the utility of the worker households. That depends on the following. If (26) is satisfied and \tilde{w}_A and \tilde{w}_C are such that

$$(27) \quad \tilde{w}_A + \tilde{w}_C < w_A^* + m w_C^*,$$

then the ban not only worsens the child-labor condition but it lowers household utility as well. If the inequality in (27) is reversed, then household utility rises. If, on the other hand, n_1 is very large, and close to n , it is easy to see that the ban works *as if* it were a total ban and the labor market would settle at the good equilibrium.

The above discussion is at best a surrogate analysis of what would happen in a developing country if its exports which use child labor were banned. A fuller model can potentially be used to address a variety of policy questions in this regard. Suppose, for instance, the export industry is competitive and therefore runs on a slender profit margin and this is a small country and so it faces a fairly elastic demand. Then a ban on child labor can increase the cost of production and cause the export industry to shrink sharply, leaving the worker households worse off. But, for a formal analysis we need to build on our simple model more complicated structures so that such questions can be formally taken up.

There are many other kinds of policy—taxes, subsidies, and other restrictions—the effects of which can be checked out using our model.

To sum up, bans are a powerful instrument but by no means unequivocally desirable. One has to be very careful about the empirical context before using this instrument. If there are multiple equilibria in the labor market, a ban is a benign policy intervention and worthwhile. But if the market has only one equilibrium which is likely in very-poor countries, then a ban can worsen the condition of the labor households. Partial bans are especially likely to backfire and cause deterioration in labor conditions. The first-best policy is to attack the problem at its source. This entails improving the condition and scope for adult labor.

V. Concluding Remarks: Fertility and Gender

The model built in this paper has implications for analyzing fertility and population policy. It seems likely that the multiple equilibria in the labor market could bring about a multiplicity of equilibria pertaining to fertility choices of the household, once such choices are endogenized.¹⁵ If our conjecture is right, then this will have implications for the kinds of population policy that we espouse.

Suppose an economy is at an equilibrium where fertility is high and children work. It is pointless in such a situation to send extension workers to households to explain to them the irrationality of large households. This is because the large family is a conscious, rational decision. This is, of course, a widely held view. What is interesting is that even though there is no individual irrationality at this equilibrium, the equilibrium may well be exhibiting *group* irrationality. Everybody would not only be better off if everybody had small families, but every individual family may prefer to be small if other families were small. Hence, the policies we would have to conceive of

would attempt to deflect the economy from the high-fertility equilibrium to the low-fertility one.

More generally, the framework developed in this paper, including the diagrammatic technique, should be applicable to several areas other than child labor. Whenever we have two or more variables being supplied by one decision maker, some of the same issues discussed here are likely to crop up. Several gender-related matters belong to this category. Traditional households, where the husband decides not only about his own work but also that of his wife's, may give rise to female labor-supply functions such that we would have multiple equilibria with women being excluded totally from the labor market in some of the equilibria. There is however a caveat to this noted in the next paragraph. If the policy maker does not share the husband's judgment, then she could use this kind of model to decide how best to intervene in the market in order to enhance or curb women's employment. There may also be important issues of gender within the domain of child labor. There is evidence that the labor-supply response of girls and boys to changes in labor-market conditions can be very different (see, e.g., Goldin, 1979). Our model can, in principle, be extended to study the markets of boy-labor and girl-labor.

If we do use this kind of a model to analyze gender issues and, in particular, the supply of female labor, one important real-life difference needs to be kept in mind. There is some evidence that when women begin to work outside the household and contribute to the household's income they also have more influence on household choices and decisions (see, e.g., John Strauss and Duncan Thomas, 1995; Nancy E. Riley, 1997). Hence, it is natural to expect that a man will take this into account when he decides to send his wife out to work. In addition, even if the initial decision about whether a woman works or not belongs to her husband, once she begins working the decision whether she continues to work or not may cease to be the husband's decision. This anticipated shift in decision-making is likely to introduce some important complications to modeling female labor, as distinct from child labor.

¹⁵ The link between the market for child labor and fertility behavior has been studied in the literature (see, for instance, Mead Cain and A. B. M. Khorshed Alam Mozumder, 1981) but the possibility of multiple equilibria in this context seems to have been overlooked.

Finally, one important area of practical concern to which models such as these can be brought to bear is the debate on international labor standards. Because of the importance of this topic in international politics, there is now a growing literature commenting on it (see, e.g., Gary S. Fields, 1994; Dani Rodrik, 1995). These are matters which, despite the growing interest, are still discussed without an accepted formal analytical framework. Combining the model of this paper with trade could take us towards a formal framework.

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