Child Labor and Globalization

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The article embeds child labor in a standard general equilibrium, two-sector model of a small open economy facing perfectly competitive markets, efficiency wages, and free trade. The modern sector uses skilled adult labor and capital, and the agrarian sector uses unskilled (child and adult) labor and skilled adult labor. Trade policies, foreign direct investment, or both that increase the modern-sector output reduce the incidence of child labor. Emigration of skilled (unskilled) workers reduces (increases) the incidence of child labor. Child-wage subsidies increase the incidence of child labor, and a ban on child labor benefits unskilled adult workers but hurts skilled workers.

I. Introduction

A recent International Labor Organization (ILO) report (ILO 2006) reveals that in 2004 approximately 166 million children between the ages of 5 and 14 were classified as child laborers, accounting for about 14% of all children in this age group. In the same year, about 75 million child laborers were engaged in hazardous work that can affect adversely the child’s safety, health, or moral development. The Asian-Pacific region

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hosted more than half of working children, followed by sub-Saharan Africa and Latin America. Although the report documents that during 2000–2004 the number of child laborers declined by 11% and the number of children in hazardous work fell by almost 33%, this encouraging trend is not satisfactory: excessive effort, hazardous work, bonded labor, armed conflict, prostitution and pornography, long work hours, unhealthy working conditions, absence of schooling, malnutrition, and sexual harassment acquire a different meaning when applied to children.\(^1\) The phenomenon of child labor has been viewed as an epidemic of the global economy that must be eventually eliminated. Thus, analyzing the economic effects of globalization on the incidence of child labor constitutes a high research and policy priority.\(^2\)

Although there is a significant body of literature on the economics of child labor, the international economics of child labor remains in its infancy.\(^3\) Relatively speaking, only a few studies have formally addressed the link between globalization and child labor. Maskus (1997) has developed a two-sector, specific-factors model, where child labor is modeled as a specific factor employed in the exportable sector and adult labor is modeled as a mobile factor. Trade liberalization raises the output of the exportable sector and increases the demand for child labor and the child wage. Ranjan (2001) analyzed the effects of trade liberalization on the returns to education in the presence of credit constraints. Credit-constrained families can withdraw their children from the labor force when the family’s income reaches a minimum level. Trade openness affects a poor, unskilled-labor-abundant country by raising the return to unskilled labor and inducing parents to educate their children instead of sending them to work.

Meanwhile, the nexus between trade openness and credit constraints is the focus of Jafarey and Lahiri (2002), who developed a 2-period, two-good model with skilled and unskilled labor. Children can acquire skills

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\(^1\) According to the ILO (2002), in 2000 about 171 million children worked in hazardous conditions; 1.2 million children were involved in trafficking; 5.7 million, forced and bonded labor; 0.3 million, armed conflict; 1.8 million, prostitution and pornography; and 0.6 million, illicit activities.

\(^2\) For instance, in the conclusion section of his survey Basu (1999, 1114) recognizes the need for further analytical work on the economics of child labor and states: “Should child labor be banned outright? Should the WTO [World Trade Organization] be given the responsibility of enforcing restrictions on child labor through the use of trade sanctions? Should there be a legal minimum wage for adults so as to make it unnecessary for parents to send their children to work? The answer depends on the context.”

through training instead of working. In their model, poor families (headed by unskilled parents) choose less education than rich families (headed by skilled parents). Easier access to international capital markets reduces the interest rate and increases the return to education. As a result, the incidence of child labor is reduced in this case. Trade liberalization raises the price of unskilled-intensive goods, reduces the returns to education, and could lead to an increase in the incidence of child labor. Basu and Chau (2004) analyze the effects of trade openness in a dynamic model of child labor and debt bondage. Trade openness increases the short-run supply of child labor but does not affect the long-run incidence of child labor.

The above-mentioned open-economy models are more appropriate to analyze the long-run effects of trade liberalization on the supply-side determinants of child labor. They assume that, in the presence of credit-market distortions, altruistic parents decide whether to educate their children or send them to work. They abstract from labor-market rigidities such as wage stickiness and interindustry wage differentials, which are common in developing countries and shape the demand for child labor. They also do not model explicitly a number of educational infrastructure distortions that are prevalent in developing countries: it is not easy to educate an older working child who has skipped several years of formal schooling, in the absence of special education and training programs. As such, these studies do not take into account the short- and medium-run reactions of profit-maximizing employers to globalization-related policies.

Is the behavior of firms (as opposed to households) important for the international economics of child labor? A partial affirmative answer to this question can be given by considering the following child-labor incidence from the Bangladesh garment industry. A recent ILO (2006) report states that in 1993, when faced with the threat of child-labor-related trade sanctions, garment producers dismissed in a very short period of time many thousands of child workers (as many as 50,000). There was speculation that many of these children were forced into hazardous work in the informal sector, including prostitution, instead of going to school. It took more than 2 years for the international organizations and the government of Bangladesh to reach an agreement that would remove the child workers from the garment industry and place them in education programs. According to the ILO (2006, 75) report, “It is acknowledged that in the context of the panic response in 1993 and unavoidable delays in getting project components in place, many children and their families became worse off. In the end economic forces were swifter than the interventions that sought to protect children.” It is hard to reconcile such an incidence with models that emphasize long-term supply-side determinants of child labor, according to which trade sanctions work through factor prices and the return to educational investments. There is a need
for more emphasis on demand-side determinants of child labor that are based on profit-maximizing producers operating in distorted labor markets that are prevalent in many developing economies.

In order to address formally the effects of globalization on the demand for child labor, we build a model in which the market for child labor is based on decisions made by selfish parents/guardians and profit-maximizing producers. These producers offer nutritional efficiency wages to child workers and effort-based wages to skilled adult workers. Our starting analytical framework is a standard two-sector small open economy producing two homogeneous goods. The modern sector employs sector-specific capital and skilled adult labor measured in efficiency units. Efficiency wages are used by firms in the modern sector to induce higher effort and labor productivity. The agrarian sector employs skilled adult workers and unskilled (child and adult) workers to produce a homogeneous good under perfect competition. In the absence of child labor, the model behaves as a small open economy with specific factors of production (capital and unskilled adult labor) and an endogenous, effort-based wage differential in favor of the modern sector.

The model allows us to derive definite, and in some instances surprising, conclusions regarding the impact of policies on the endogenous incidence of child labor and the wage structure. A decline in the relative price of the unskilled-labor-intensive good reduces the demand for skilled adult labor in the agrarian sector, the number of children employed, the real skilled adult wages, and the wage gap between the modern and agrarian sectors. The opposite is true of trade policies that raise the relative price of the agrarian good. These results imply that trade sanctions (as in the case of the Bangladesh garment industry) imposed on countries that export child-labor-intensive goods are effective in reducing the incidence of child labor. In contrast, studies that emphasize the supply-side determinants of child labor, such as Ranjan (2001) and Jafarey and Lahiri (2002), find that trade sanctions might not be effective in reducing child labor.

Inward foreign direct investment (FDI) in the (child-labor-free) modern sector leaves the structure of wages and commodity prices unaffected but reduces the incidence of child labor by expanding the size of the modern sector and by causing more skilled adult labor to move from the agrarian sector into the modern sector. Emigration of children (trafficking or legal emigration) reduces the endowment of children without affecting their wage and the number of working children. As a result, the incidence of

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4 Efficiency wages arise due to a firm’s desire to induce more effort from workers, avoid the formation of a labor union, reduce shirking and turnovers, etc. Stiglitz (1976), Solow (1979), Weiss (1980), Shapiro and Stiglitz (1984), and Akerlof and Yellen (1986), among others, have developed the foundations of efficiency-wage theory.
child labor measured by the proportion of children employed increases. Lower migration barriers that induce unskilled adult workers to migrate from poor to rich countries, alone or with their children, increase the incidence of child labor. In contrast, emigration of skilled adult workers reduces the incidence of child labor. A specific child-wage subsidy, which might take the form of midday meals, reduces the cost of child workers and increases the incidence of child labor.

Finally, the model allows us to analyze the effects of an enforceable ban on child labor. This policy reduces the wage of skilled adult labor, raises the wage of unskilled adult workers, and removes the economy’s wage stickiness. The effect of a child-labor ban on the income of families headed by unskilled parents with a working child is ambiguous; its effect on the income of a family headed by a skilled worker without working children is negative, whereas the effect of a child-labor ban on a family headed by an unskilled worker with stay-at-home children is positive. Since the share of working children is below 15%, these results imply that the majority of unskilled adult workers would support a ban on child labor, whereas skilled adult workers would oppose it. Doepke and Zilibotti (2005) arrive at a similar conclusion using a dynamic model of child labor with endogenous fertility and human capital formation.

The rest of this article is divided into four parts. Section II develops the structure of the model by describing the determination of efficiency wages in the modern sector, the demand for adult and child labor in the agrarian sector, and the allocation of resources across the two sectors. Section III examines the impact of globalization and domestic policies by performing the standard comparative-statics exercises. Section IV discusses the model’s implications for the economics of child labor, and Section V offers several concluding remarks.

II. The Model

This section incorporates child labor in a standard two-sector, general equilibrium model of a small open economy facing perfectly competitive markets, efficiency wages, and a free-trade policy. The modern sector produces a homogeneous good (which is used as the numeraire good) using skilled adult labor and capital and offering effort-based efficiency wages. The agrarian (traditional) sector produces a homogeneous good under perfect competition using three types of labor: child labor, unskilled adult labor, and skilled adult labor. Working children receive nutritional efficiency wages.

Following the literature on child labor, we introduce the following assumptions (postulates) that allow us to incorporate child labor into a general equilibrium model and analyze its effects and determinants. First, we adopt the standard assumption that child labor and unskilled adult
labor are perfect substitutes (e.g., Basu and Van 1998; Ranjan 2001; Doepke and Zilibotti 2005; Genicot 2005). In other words, we suppose that unskilled adult workers can do what children can do. The assumption of perfect substitutability between child and unskilled adult labor allows us to identify conditions under which globalization can eliminate the incidence of child labor and to analyze the economic effects of a ban on child labor. Second, we assume that agrarian skilled adult labor is an imperfect substitute for unskilled (child and adult) labor, following the literature on globalization and child labor cited above. This assumption means that more child workers increase the productivity of skilled adult workers and vice versa. Third, we assume that adult workers are fully employed, whereas children could be underemployed. Full employment of adult workers is assumed for analytical convenience and can be readily relaxed. The assumption of underemployed children is empirically relevant since less than 15% of children work (ILO 2006), and it allows us to study the effects of globalization on the incidence of child labor. Fourth, we assume that children are employed only in the agrarian sector, which produces the unskilled-labor-intensive good. In other words, we postulate that the intensity of child labor differs across sectors by supposing that all children in the modern sector are staying at home. One way to justify this assumption is to think of families consisting of an adult and a child, with skilled adult parents earning a sufficiently high wage that allows them to send their children to school, whereas unskilled adult parents earn a lower income, which forces them to send their children to work.

The determination of the child wage is based on nutritional efficiency considerations. The idea of nutritional efficiency wages was introduced in the economic-development literature by Leibenstein (1957) and has been used by an extensive body of literature on nutrition-based productivity and wages (e.g., Rodgers 1975; Stiglitz 1976; Dasgupta and Ray 1986, 1987; Basu 1992; Dasgupta 1993; Genicot 2005). In this article, we model the child wage determination process by embedding a version of

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5 Matusz (1994, 1996, 1998) has developed several general equilibrium models of trade and equilibrium unemployment based on efficiency-wage considerations.

6 This assumption is consistent with evidence reported in Cigno and Rosati (2002) that in the case of India, the participation rate of child laborers in agriculture was 4.9% as opposed to 1.9% in nonagricultural activities for 1994. Edmonds and Pavnčik (2002) report that in the case of Vietnam, during 1993, 26% of children between the ages of 6 and 15 worked in agriculture, and only 4% worked for nonagricultural enterprises.

7 This interpretation is consistent with a weak version of the “luxury axiom” introduced by Basu and Van (1998), which states that when the household income exceeds a certain minimum level parents either keep their children at home or send them to school.

8 See also Strauss and Thomas (1998) for a review of the empirical literature on efficiency (productivity) and nutrition.
the partial equilibrium model developed by Gupta (2000) into a general equilibrium framework. A typical agrarian family consists of an unskilled adult worker and a child. The former acts as the child’s guardian and negotiates the child’s wage with a prospective employer. Each employer in the agrarian sector offers a nutritional efficiency wage to each child worker, which is paid in kind (say, food consisting of a midday meal) and in a fixed cash premium over the value of the nutritional wage to each child’s guardian. This compensation scheme prevents the guardian from taxing the child’s wage because doing so reduces the child’s productivity and therefore deprives the employer of additional profits. We believe that the present model is the first to explore the general equilibrium implications of nutritional efficiency wages in the context of globalization and child labor.

A. The Modern Sector

The modern sector produces a homogeneous good with a specific factor and skilled adult workers and offers effort-based wages. Several manufacturing industries such as computer software, electronic components, batteries, toys, automobile parts, and electrical appliances fall into the category of modern sectors in many developing countries such as India, Brazil, and China. The interpretation of the sector-specific factor as capital permits the analysis of FDI.

The technology in the modern sector is described by the following production function:

\[ Y = AZ(E, K), \]

where \( A \) is a technological parameter capturing the level of total factor productivity in the modern sector, \( Z(\cdot) \) is a constant-returns-to-scale production function, \( E \) is total labor measured in efficiency units, and \( K \) is sector-specific capital. We model labor in the sector as \( E = eH_s \), where \( H_s \) is the number of skilled adult workers employed and function \( e(\cdot) \) measures the level of efficiency (i.e., effort or work hours) per worker.

We assume that the level of efficiency per worker is an increasing and concave function of the difference between the efficiency wage \( w_y \), offered by firms in the modern sector, and the wage of skilled adult workers in the agrarian sector \( w_a \), which acts as the effective reservation wage:

\[ e \equiv e(w_y - w_a). \]

The function \( e(\cdot) \) is defined over the domain \( w_y \geq w_a > 0 \) and has the

\(^9\) Gupta (2000) models the cash component of each child’s wage as the outcome of generalized Nash bargaining between the guardian and the child’s employer. Here we assume that this premium equals a fixed parameter that captures the relative bargaining power between the two negotiating parties.
following standard properties: \( e(0) = 1, e_1 > 0, \) and \( e_{11} < 0, \) where Arabic subscripts are used to denote the partial derivatives.\(^{10}\) The absence of a wage differential yields \( e = 1 \) and \( E = H_y. \) In addition, we assume that the level of effort depends positively on the wage gap and exhibits diminishing returns. For instance, the function \( e = 1 + b_1(w_y - w_s)^{\ell_1} \) satisfies the above properties for \( w_y \geq w_s \) and \( b_1, b_\ell \in (0, 1). \)

It will become clear below that the results of the analysis hold also in the absence of an effort-based endogenous wage gap. However, equation (2) adds realism to the model by capturing a fundamental feature of a typical dual developing economy, where the wage in the modern sector exceeds the wage in the agrarian sector. It also captures the spirit of a strand of the efficiency-wage theory that analyzes the determinants of interindustry wage differences. For instance, studies by Stiglitz (1974), Shapiro and Stiglitz (1984), Akerlof and Yellen (1986), Bulow and Summers (1986), and Copeland (1989), among others, formalize the idea that firms in an industry can increase profits by raising wages above the market-clearing price (i.e., wages in other industries). These wage differentials reduce monitoring costs, since workers are induced to provide greater effort by the threat of termination and thus a wage reduction. Leamer (1999) builds a model of effort-based wages that captures the concept that a firm in an industry can contract with workers regarding both the wage level and working conditions. The elements of the contract that enhance labor productivity but are disliked by workers are called “effort,” and the labor market thus offers a set of wage-effort contracts with higher wages offsetting higher effort. Both approaches provide rigorous micro foundations for the existence of a positive relationship between interindustry wage differentials and effort-induced labor productivity. For the purpose of illustrating the equilibrium geometrically, we assume that the wage differential in equation (2) takes an additive (as opposed to a multiplicative) form, following the approach of Bulow and Summers (1986).

The representative firm in the modern sector maximizes profits:

\[
\pi_y \equiv AZ(E, K) - w_y H_y - r_y K_y \tag{3}
\]

with respect to its wage \( w_y, \) employment \( H_y, \) and sector-specific capital \( K_y, \) for any given reservation wage \( w_s, \) price \( P_y = 1, \) and rental of capital \( r_y. \) In what follows, we will use the lowercase letter \( r \) with the appropriate subscript to denote the wage of a sector-specific factor (capital, child labor, and unskilled adult labor). In addition, we will use the lowercase letter \( w \) to denote the wage of the mobile factor (skilled adult labor). Furthermore, in the case of skilled adult labor, the lowercase subscript \( x \) or \( y \)

\(^{10}\) Strictly speaking, eq. (2) must be written as \( e = \max(w_y - w_s, 0) \) to guarantee that more effort is associated with a positive wage differential for all \( w_y, w_s \geq 0. \) We will use eq. (2) instead, in order to keep the notation simple.
will denote the sector. The first-order conditions for the firm’s maximization problem are

\[ \frac{\partial \pi_y}{\partial H_y} = AZ_1(eH_y, K)e - w_y = 0, \]

(4)

\[ \frac{\partial \pi_y}{\partial w_y} = (AZ_1(eH_y, K)e_1 - 1)H_y = 0, \]

(5)

\[ \frac{\partial \pi_y}{\partial K} = AZ_2(eH_y, K) - r_K = 0. \]

(6)

Combining equations (4) and (5) yields the standard efficiency-wage equilibrium condition

\[ e_1(w_y - w_e) = \frac{e(w_y - w_e)}{w_y}. \]

(7)

That is, the equilibrium marginal value of effort, captured by the left-hand side of equation (7), must be equal to effort per dollar.

The reservation wage \( w_e \) determines the allocation of skilled adult labor between the modern and agrarian sectors. It is therefore important to analyze the effects of \( w_e \) on the efficiency wage \( w_y \), aggregate effort \( E \), and sector-wide employment of skilled adult labor \( H_y \). Totally differentiating equation (7) yields

\[ \frac{d w_y}{d w_e} = 1 - \frac{e_1}{e_1w_y} > 1, \]

(8)

which implies that an increase in the reservation wage increases the efficiency wage by more than the former and raises the wage gap \( w_y - w_e \). This property depends on the assumption that work effort exhibits diminishing returns in the excess wage (i.e., \( e_{11} < 0 \)), which guarantees a unique interior equilibrium. To see this, consider a marginal increase in the reservation wage \( w_e \). For any given value of the efficiency wage, the efficiency-wage gap declines. Then the marginal value of effort increases due to diminishing returns, leading the right-hand side to exceed the left-hand side in equation (7). The original equality is restored only if the efficiency wage increases in such a way that the new equilibrium is characterized by a larger efficiency-wage gap. Therefore, an increase in the reservation wage leads to a larger increase in the efficiency wage as shown formally in equation (8).

The dependence of workers employed in the modern sector on the
reservation wage can be established by totally differentiating equation (5) and using equation (8):

\[
\frac{dH_y}{dw} = \frac{Z_y e_{t1} + e_y Z_{11} H_y}{e e_{t1} w_x Z_{11}} < 0. \tag{9}
\]

Equation (9) states that an increase in the reservation wage reduces the number of skilled adult workers in the modern sector. In addition, using equations (8) and (9), total differentiation of \( E = e(w_x - w_y)H_y \) yields \( \frac{dE}{dw_x} = Z_y/(w_y Z_{11}) < 0 \). In other words, an increase in the reservation wage reduces the aggregate amount of effort and the level of output in the modern sector. The following lemma summarizes these results:

**Lemma 1.** An increase in the reservation wage \((w_y \uparrow)\) raises the level of effort per worker \((e \uparrow)\), the efficiency wage \((w_x \uparrow)\), the wage gap \([(w_y - w_x) \uparrow]\), and the value of effort \((w_y/e \uparrow)\) but reduces the employment level \((H_y \downarrow)\), the aggregate level of effort \((E \downarrow)\), and the level of output in the modern sector \((Y \downarrow)\).

Lemma 1 establishes an inverse relationship between the reservation wage and both employment and output in the modern sector. This relationship can be interpreted as a downward-sloped demand curve for adult labor, which makes the allocation of labor between the modern and agrarian sectors similar to that in the standard sector-specific factors model. This property enhances the tractability of the analysis.

**B. Nutritional Efficiency Wages**

In general, child labor is considered socially undesirable due to a variety of reasons such as sexual harassment, unhealthy working conditions, excessive effort, and obstructing a child’s access to education. In some cases, child labor is believed to be coerced, forced, bonded, slaved, unfair in wages, and injurious to the health and safety of children. We model child labor using analytical building blocks from Gupta’s (2000) partial equilibrium model, which incorporates the idea that some parents are selfish and not interested in the well-being of their children. In other words, unlike Basu and Van (1998), among many others, we assume away the presence of parental altruism.\(^{11}\) The selfish parents/guardians ask their children to work for an employer who can also hire skilled adult workers and unskilled adult workers. The former are imperfect substitutes and the latter are perfect substitutes for child labor, as would be the case for many tasks in agriculture and manufacturing workshops. For instance, skilled adult workers can be used as foremen, supervisors, or machine operators,

\(^{11}\) Parsons and Goldin (1989) provide evidence that parents were partially motivated by their own self-interests when seeking employment opportunities for their children. However, Basu and Van (1998) review empirical studies that support the assumption of altruistic parents.
whereas children and unskilled workers can supply raw materials to machinists and package the finished product. Each child’s productivity depends on nutrition, which in turn depends positively on the level of the child’s consumption of food according to the standard consumption efficiency-wage hypothesis introduced by Leibenstein (1957). We assume the following nutritional efficiency function:

\[ h = h(r_c), \]  

(10)

where \( r_c \) is the wage (value of food) that accrues to the child worker and is consumed by the child itself. We assume, of course, that the child’s guardian does not (or cannot) tax this portion of the child’s payment and, in fact, does not have an incentive to do so since the child’s productivity will decline and the firm will not hire an unhealthy child. Alternatively, one can think of \( r_c \) as the portion of the child’s wage paid by the employer in food and clothing and the fixed markup as the monetary fraction of the wage that goes to the guardian. This interpretation can be readily applied to children working as domestic servants or as agricultural workers.

We also assume that the function \( h(r_c) \) has the following standard properties: \( h(r_c) = 0 \) if the child wage is less than some positive number \( r_c^* \), it is concave for \( r_c > r_c^* \) (i.e., \( h_1(r_c) > 0; h_1(r_c) < 0 \)), and it is bounded from above. The last restriction guarantees the existence of a nutritional efficiency wage. The employer pays a cash premium \( (\theta - 1)r_c \) to the child’s parent on top of the in-kind nutritional efficiency wage \( r_c \). In other words, the cost of hiring a child incurred by the employer is \( \theta r_c \), where \( \theta \geq 1 \) can be thought of as a measure of child-labor “exploitation” in the sense that the higher the value of \( \theta \), the higher the proportion of the effective wage that is collected by the selfish parent. Gupta (2000) determines the values of \( \theta \) and \( r_c \) endogenously through a Nash cooperative bargaining game between a child’s parent and the employer. Here we deviate from this approach by assuming that the child’s nutritional wage \( r_c \) is determined endogenously through profit maximization, and we will treat \( \theta \) as an exogenous parameter. The main results of our analysis hold also in the absence of a monetary premium that corresponds to the case of \( \theta = 1 \).

C. Agrarian Producer Behavior

Output in the agrarian sector is denoted by \( X \) and is produced under perfect competition and constant returns to scale. There are three factors of production: unskilled adult labor \( L \) and child labor \( C \), which are perfect substitutes, and skilled adult labor \( H_x \), which is an imperfect substitute for the other two. We assume that one unit of skilled adult labor generates one unit of effective skilled adult labor independently of the level of effort. Therefore, \( H_x \) denotes the amount of agrarian skilled adult labor and the number of agrarian skilled adult workers. Finally, we assume that, despite
the existence of efficiency wages in the modern sector, the skilled adult wage rate in the agrarian sector $w_a$ is flexible and assures full employment of skilled adult workers. This assumption implicitly postulates that the level of effort does not enter the utility of an adult worker.\footnote{Unemployment among adult workers can be readily introduced into the model by relaxing this assumption as in the works of Shapiro and Stiglitz (1984) and Matusz (1996).} Also, the assumption that child labor is a perfect substitute for unskilled adult labor follows the standard practice of the literature (see, e.g., Basu and Van 1998; Doepke and Zilibotti 2005; Genicot 2005) and allows the analysis of child-labor bans without driving the agrarian output down to zero.

Based on the above considerations, we postulate the following Cobb-Douglas production function for the agrarian sector:

$$X = (L + \beta h(r_c)C_a)^\alpha (H_x)^{1-\gamma},$$

(11)

where $X$ is the agrarian-sector output; $C_a$ is the number of children employed with $C_a \leq C$, where $C$ denotes the economy-wide endowment of child labor; $hC_a$ is the total amount of child labor employed, expressed in efficiency units, and $0 < \beta < 1$ is an adult-equivalent scaling constant (i.e., one unit of child labor is equivalent to $\beta$ units of unskilled adult labor); and $H_x$ is the number of skilled adult workers employed in this sector.

The value of profits in the agrarian sector is given by

$$\pi_c = p_x(L + \beta h(r_c)C_a)^\alpha (H_x)^{1-\gamma} - \theta_{r_c}C_a - r_c L - w_cH_x.$$  

(12)

In the above profit expression, $p_x$ is the fixed international relative price of good $X$ due to our choice of $Y$ as the numeraire. The first term of the right-hand side is the firm’s revenue $p_xX$, where $X$ is given by equation (11). The last three terms correspond to three components of labor costs: $\theta_{r_c}$ is the per-unit (child labor) cost, and $\theta_{r_c}C_a$ is total child-labor cost to a firm employing $C_a$ children; expressions $r_c L$ and $w_c H_x$ correspond to the labor costs of employing unskilled and skilled adult workers, respectively. Each firm takes $p_x$, $r_c$, and $w_c$ as given and chooses the number of child workers $C_a$, unskilled adult workers $L$, skilled adult workers $H_x$, and the nutritional efficiency wage $r_c$ to maximize profits $\pi_c$. The first-order conditions for this maximization problem are given by

$$\frac{\partial \pi_c}{\partial C_a} = \alpha p_x(L + \beta h(r_c)C_a)^{\alpha - 1}(H_x)^{1-\gamma} \beta h(r_c) - \theta_{r_c} = 0,$$  

(13)

$$\frac{\partial \pi_c}{\partial H_x} = (1 - \alpha) p_x(L + \beta h(r_c)C_a)^{\alpha}(H_x)^{-\gamma} - w_c = 0,$$  

(14)
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\[ \frac{\partial \pi_s}{\partial L} = \alpha \rho(L + \beta b(r_c)C_s)^{n-1}(H_s)^{1-u} - r \rho L = 0, \]  

(15)

\[ \frac{\partial \pi_s}{\partial r_c} = \alpha \rho(L + \beta b(r_c)C_s)^{n-1}(H_s)^{1-u} \beta b_1(r_c)C_s - \theta C_s = 0. \]  

(16)

We can illustrate and explore the properties of the general equilibrium solution by proceeding as follows. Combine equations (13) and (16) to generate the following equilibrium condition:

\[ b_1(r_c) = \frac{b(r_c)}{r_c}. \]  

(17)

Equation (17) states that, at the optimum, the firm chooses the nutritional wage that minimizes the wage cost per efficiency unit by setting the marginal efficiency of child labor equal to its average efficiency. It implies that the elasticity of nutritional efficiency with respect to the wage received and consumed by the child is equal to unity. It also determines the equilibrium value of the nutritional efficiency wage (we use superscript * to denote the equilibrium value of the corresponding variable) and arises in most nutritional-wage models (e.g., Stiglitz 1976, 187). It follows that the cost of hiring a child worker is also fixed and equal to \( \theta r_c^* \).

The next step is to determine the equilibrium wage of unskilled adult workers, which is obtained by combining equations (13), (15), and (17):

\[ r_c = \frac{\theta r_c^*}{\beta b(r_c)} = \frac{\theta}{\beta b_1(r_c)}. \]  

(18)

The economic interpretation of equation (18) is straightforward. When a firm hires a child worker, it pays \( \theta r_c \) dollars and receives \( \beta b(r_c) \) unskilled-adult-equivalent units of labor. If, instead, the firm hires one unit of unskilled adult labor, it pays \( r_c \) dollars. Unskilled adult labor and adult-equivalent child labor are identical in production. Consequently, at the interior equilibrium, the cost of hiring an extra unit of child labor (measured in adult-equivalent units \( \beta b(r_c) \)) equals \( \theta r_c^*/\beta b(r_c) \) and must be equal to the wage of an unskilled adult worker, \( r_c \). Basu and Van (1998) obtained a similar condition in the absence of nutritional child wages. Observe, though, that the wage of unskilled adult labor depends only on the nutritional efficiency wage and technological parameters.

Writing equation (17) as \( r_c^* = \theta/\beta b_1(r_c) \) establishes that the unskilled adult labor wage increases in the nutritional wage \( r_c^* \) and parameter \( \theta \) and declines in parameter \( \beta \). Unskilled adult workers benefit from high nutritional wages, \( r_c^* \); from a high degree of child “exploitation” by guardians, \( \theta \); and from low child-labor productivity, \( \beta \).
Next, we calculate the equilibrium wage offered to agrarian skilled adult labor. Combining equations (14) and (15) yields the standard relationship

\[
\frac{(1 - \alpha)(L + \beta \beta(r_C)C_r)}{\alpha H_x} = \frac{w_s}{r_s},
\]

which states that the relative wage of skilled adult workers \(w_s/r_s\) is proportional to the unskilled-labor intensity with the factor of proportionality given by the ratio of factor-cost shares \((1 - \alpha)/\alpha\). As the relative wage of skilled adult workers rises, firms hire more (relatively cheaper) unskilled adult and child workers. Solving equation (19) for \((L + \beta \beta(r_C)C_r)/H_x\) and substituting the resulting expression into equation (15) yields the zero-profit condition

\[
p_s = \alpha^{-n}(1 - \alpha)^{(n-1)}r_s^\alpha w_s^{1-n}.
\]

Solving the zero-profit condition for \(w_s\) generates an expression for the inverse demand for skilled adult workers in the agrarian sector:

\[
w_s = (1 - \alpha)\alpha^{u(1-n)}(p_s)^{(1/(1-n)}(r_s)^{-u(1-n)}.
\]

It is clear from equation (20) that this inverse demand curve is horizontal and declines in the wage of unskilled adult labor. The horizontal demand curve stems from the presence of nutritional efficiency wages and child-labor surplus.

Equations (17), (18), and (20) determine the equilibrium values of the nutritional efficiency wage \(r_s^\alpha\), the wage of unskilled adult labor \(r_s^\alpha\), and the wage of agrarian skilled adult labor \(w_s^\circ\). The assumption that all adult workers are fully employed means that the demand for unskilled adult labor equals its supply \(L\). Solving equation (19) for the number of child workers and using equation (18) to substitute \(r_s^\alpha\) generates the demand for child labor:

\[
C_s = \frac{\alpha}{(1 - \alpha) \theta H_x} H_x - \frac{L}{\beta \beta(r_C)}.
\]

Equation (21) states that the demand for child labor is an increasing function of the number of agrarian skilled adult workers \(H_x\) and a decreasing function of the supply of unskilled adult labor measured in child-labor-equivalent units, \(L/\beta \beta(r_C)\). Because the nutritional efficiency wage pins down all three wages in the agrarian sector, the equilibrium levels of child labor and agrarian skilled adult labor become complements.

Finally, notice that if the right-hand side of equation (21) is nonpositive,
there is no demand for child labor. Consequently, equation (21) defines the following market-participation condition for child workers: \\(^{13}\)

\[
\omega_x \geq (1 - \alpha)p_x \frac{L_x}{H_x}. 
\] (22)

In the absence of child labor (say, due to compulsory education or a child-labor ban), condition (22) holds as equality and corresponds to the inverse demand for agrarian skilled adult labor. This condition can also be derived by setting \(C_v = 0\) in equation (14). We will revisit this point later in conjunction with the analysis of a child-labor ban.

D. Sectoral Allocation of Skilled Adult Labor

We assume that skilled adult workers can move freely between the agrarian and modern sectors. As a result, the following full-employment condition equalizes the economy-wide demand for skilled adult labor to its supply:

\[
H = H_x + H_y, 
\] (23)

where \(H\) denotes the economy’s fixed endowment of skilled adult labor. Lemma 1 then allows us to express the demand for skilled adult labor in the modern sector as

\[
\omega_x = M(H_x; A, K), 
\] (24)

where \(M_1 < 0\), \(M_2 > 0\), and \(M_3 > 0\).

Similarly, equations (18) and (20) define a horizontal inverse demand function for agrarian skilled adult labor:

\[
\omega_x = N(p_x; \theta; \alpha), 
\] (25)

where \(N_1 > 0\), \(N_2 < 0\), and \(N_3 > 0\). An increase in the relative price \(p_x\) shifts higher the inverse demand for agrarian skilled adult labor, whereas an increase in the “child exploitation” parameter \(\theta\) increases the cost of child labor to employers and has the opposite effect. An increase in the intensity of child labor captured by parameter \(\alpha\) increases the productivity of skilled adult workers and shifts upward the inverse demand for agrarian skilled adult labor. The first two properties are obvious from inspection of equations (18) and (20), whereas the last one can be derived by differentiating equation (20).

Equations (23)–(25) constitute a system of three equations in three unknowns \(\omega_x\), \(H_x\), and \(H_y\). These equations determine the allocation of skilled adult labor between the two sectors and the skilled adult labor

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\(^{13}\) Setting \(C_v \geq 0\) and using eq. (20) yields \([\alpha/(1 - \alpha)](b(b(\tau_c)/\theta_{\tau_c})\omega_x H_x \geq L_x\). Substituting in eq. (17) generates \([\alpha/(1 - \alpha)](\omega_x H_x/\tau_c) \geq 1\). Solving for \(\tau_c\) in eq. (19) and substituting into the above expression yields condition (22).
Fig. 1.—Sectoral allocation of skilled adult labor

wage in the agrarian sector. Figure 1 illustrates the geometric solution to the above system of equations and will be used to analyze the model’s comparative-static properties. The length of the horizontal segment 0,0, in figure 1 measures the economy’s endowment of skilled adult labor, H. The two vertical axes measure the skilled labor wage in units of good Y. Points 0, and 0, correspond to the origins of the agrarian and the modern sectors, respectively. The horizontal curve w, w1, is the graph of equation (25) and illustrates the inverse demand for agrarian skilled adult labor.

The curve labeled BM is the graph of equation (24) and expresses the demand for skilled adult labor in the modern sector as a function of w,. Equation (7) and lemma 1 imply that the efficiency-wage gap w, w, > 0 is an increasing function of w,. These properties are reflected in the upward-sloped curve EC, which is located above and is steeper than curve BM. In other words, as the labor employed in the modern sector H, declines, the wage gap (the vertical distance between curves EC and BM) increases. Finally, the downward-sloped curve LL is the graph of the market-participation condition for children, which corresponds to the lower boundary of (22). In the absence of child labor, the equilibrium allocation of resources is given by the intersection of curves LL and BM at point N.

If (22) holds as a strict inequality (e.g., for sufficiently low values of L), then the unique intersection of curves BM and w, w, at point D de-
Child Labor and Globalization

III. Comparative Statics

The model generates a rich pattern of wages and employment and can be used to analyze the effects of several policies. We start with the effects of globalization, followed by the impact of domestic policies and regulations, on the incidence of child labor and the wage structure.

A. Globalization

1. International Trade

This global link operates through changes in the country’s terms of trade, captured by the relative price of the agrarian good $p_x$. Without loss of generality, consider first a decline in $p_x$. This decline can be triggered by a number of mechanisms. For instance, if the economy exports good $Y$, then an improvement in the country’s terms of trade caused by global trade liberalization is equivalent to a decline in $p_x$. Another mechanism that can cause a decline in $p_x$ can be described as follows: assume that a small country exports the agrarian good $X$ and that trade sanctions or an effective global campaign to label child-labor-intensive goods causes a global drop in their demand. The reduction of global demand for good $X$ would cause a decline in $p_x$. In either case, a drop in $p_x$ shifts the inverse demand for agrarian skilled adult labor downward in figure 1, causing a decline in $w_x$ and a corresponding reduction in the number of agrarian skilled adult workers $H_x$. Equation (21) implies that the number of children employed $C_x$ declines as well. One can readily see from figure 1 that a decline in $w_x$ increases the number of skilled adult workers employed in the modern sector $H_x$, raises output $Y$, and causes a decline in the efficiency wage $w_x$, the wage gap $w_e - w_x$, and the value of effort $w_e/e$ (see lemma 1). The nutritional efficiency wage and the wage of unskilled adult workers are not affected by a decline in $p_x$.

Consequently, this dimension of globalization reduces the dispersion of wages between unskilled and skilled workers. If trade liberalization reduces the demand for child-labor-intensive goods, it reduces the incidence of child labor without affecting the wage offered to working children. It is also obvious from figure 1 that a sufficient decline in $p_x$ can...
shift the horizontal demand for skilled adult labor below point $N$, eliminating completely the demand for child labor. Of course, the reverse effects can occur if trade liberalization causes an increase in the relative price of the agrarian good $p_x$. In other words, the nature of trade liberalization and the structure of comparative advantage are important features of the international economics of child labor.

2. International Labor Migration

The model is well suited to analyze the effects of international labor migration. We focus on the impact of emigration in order to be consistent with the empirical literature that documents the prevalence of child labor in poor countries such as India and China. Emigration of children can be modeled as a reduction in the economy’s endowment of child labor $C$. A small reduction in $C$ does not affect the initial allocation of resources, nor does it have an impact on prices and wages. As more children leave the country, the number of children employed remains the same, but the measured incidence of child labor increases because the share (not the absolute number) of working children increases.

The above-mentioned property allows us to consider the impact of a more realistic migration pattern, namely, emigration of families consisting of, say, unskilled adult workers and children. This pattern of emigration can be analyzed by considering a simultaneous reduction in the endowment of unskilled adult workers $L$ and the aggregate supply of children $C$. As long as the final equilibrium is characterized by underemployment of children ($C < C^*$), a decline in $C$ does not affect any endogenous variable in the model. However, a decline in $L$ increases the equilibrium number of working children without affecting the rest of the endogenous variables. To see this property, observe that the demand for agrarian skilled adult labor, which is given by equation (25), does not depend on the supply of unskilled labor. Therefore, all curves in figure 1 remain invariant to a reduction in $L$, and equation (21) yields $\frac{\partial C_v}{\partial L} = \frac{-1}{\beta h(r^*)} < 0$. As a result, emigration of unskilled adults and children causes a rise in the number and the proportion of working children. Emigration of unskilled labor can indeed exacerbate the problem of child labor by increasing the demand for working children.

Finally, consider the effects of emigrating skilled adult workers by examining the impact of a reduction in the economy’s endowment of skilled adult labor $H$. This means that the horizontal distance $0,0$, in figure 1 is reduced by the number of skilled adult emigrants. A decline in $H$ does not affect the structure of wages in this small open economy. Therefore, the skilled adult wage in the agrarian sector $w$, remains the same and so do employment and wages in the modern sector. All the adjustment occurs in the agrarian sector, whose employment $H$, and output $X$ decline. Equa-
tions (21) and (23) imply that \( \partial C_{x}/\partial H = \alpha \omega^{b}/(1 - \alpha) \theta \tau^{c} < 0 \), that is, the number of children employed in the agrarian sector \( C_{x} \) contracts as skilled adult workers leave the country. This result is robust to whether skilled workers emigrate with their children or without them since a marginal reduction in \( C \) does not affect the number of children employed. Consequently, the effects of skilled adult emigration are qualitatively similar to the effects of population contraction in a Lewis-type small open economy with an unlimited supply of (child) labor.

As in the case of international trade, the effects of emigration on child labor depend on the pattern of migration: relaxing migration restrictions on skilled adult workers, especially in advanced countries, would result in skilled workers moving from poor countries, where child labor is more prevalent, to rich countries, where child labor is not such a common practice. This dimension of globalization is therefore beneficial to the global reduction of child-labor employment. However, the model predicts that relaxation of unskilled labor migration restrictions will result in a higher incidence of child labor.

3. Foreign Direct Investment

The effects of FDI can be analyzed by considering an increase in the endowment of capital \( K \) employed in the modern sector. In this case, both the \( EC \) and the \( MB \) curves in figure 1 shift upward, with the former shifting more than the latter due to efficiency-wage considerations, causing an expansion in modern-sector employment \( H_{x} \), without affecting the skilled adult labor wage in the agrarian sector \( w_{x} \). As a result, the equilibrium wage gap \( w_{x} - w_{x} \) remains the same (see eq. [7]), but there is a movement of skilled workers from the agrarian to the modern sector. The output of the latter expands at the expense of agrarian output and employment of both unskilled adult workers and working children. The arrival of multinationals does not affect the structure of wages or the value of effort but reduces the incidence of child labor.

B. Domestic Policies and Regulations

The literature on child labor has analyzed a number of domestic policies aimed at reducing directly the demand or supply of child workers, such as banning child labor, increasing the returns to education, providing free meals to children, and offering direct income subsidies to families with children. The static nature of the present model does not permit the analysis of educational policies that work through dynamic channels and of differences between social and private returns to education. However, the model can be used to analyze wage subsidies offered to families with children and a ban made on child labor.
1. Child-Wage Subsidies

Recall that each child worker receives the nutritional wage $\tau_C$, which takes the form of food or clothing, and that the employer pays a cash premium $(\theta - 1)\tau_C$ to the child’s guardian. Suppose now that the government (or an international organization) offers a specific subsidy to every child in the amount $s$ that takes the form of a daily meal (say lunch), which covers part of each child’s nutritional needs. Consequently, a firm pays $\theta s / \tau_C$ per child worker in exchange for efficiency units of child labor. In order to avoid corner solutions, we assume that, even in the presence of a subsidy, the firm has an incentive to offer a strictly positive child wage, that is, $\tau_C + s < \tau_C$.

The employer maximizes the following subsidy-ridden profit function:

$$\pi_s = p_s(L + \beta_b(r_C + s)C_s)^{(H_s)} - \theta r_C C_s - \tau_C L - w_s H_s, \quad (26)$$

taking the specific subsidy as given. Observe that the only difference between equations (12) and (26) is that in the latter the argument in the efficiency-wage function is augmented by the specific subsidy $s$. Consequently, the efficiency-wage function appears as $b(r_C + s)$ in the solution to the subsidy-ridden maximization problem. Equation (17) is transformed into $b_1(r_C + s) = b(r_C + s) / \tau_C$ and can be used to determine the subsidy effects on the child wage and the efficiency level. Observe that the introduction of a specific subsidy raises the equilibrium efficiency units per dollar spent on child labor. This requires an increase in the marginal efficiency and a reduction in the effective nutritional wage $\tau_C$ due to the concavity of function $b()$. In other words, the child wage $\tau_C$ declines more than the specific subsidy $s$. The subsidy-ridden equation (18) can be written as $\tau_C = \theta / \beta b_1(r_C + s)$ and implies that the unskilled adult labor wage is reduced as well. In the present model unskilled adult workers and working children are perfect substitutes, and therefore a reduction in the child wage must reduce the equilibrium wage of unskilled adult workers.

The subsidy does not affect the zero-profit condition $p_s = \alpha - (1 - \alpha)^{(\alpha - 1)} \tau_C w^{1 - \alpha}$, which implies that the subsidy-induced reduction in $\tau_C$ must increase the wage of skilled workers $w_s$. In figure 1, curve $w_s w$ moves higher and generates a shift of employment from the modern to the agrarian sector, resulting in a higher value of $H_s$. It is obvious then from equation (21) that the specific subsidy increases the incidence of child labor by increasing the relative wage of skilled adult workers $w_s / \tau_C$ and

14 Differentiating totally equation $b_1(r_C + s) = h(r_C + s) / r_C$ yields $dr_C / ds = [b_1(r_C + s)/r_C b_1(r_C + s) - 1 < -1$. In addition, total differentiation of $\tau_C = \theta / \beta b_1(r_C + s)$ combined with the previous expression for $dr_C / ds$ yields $dr_L / ds = -r_L / r_C < 0$. 

the agrarian employment of skilled adult labor \( H_e \) and by decreasing the efficiency of child labor \( h(r_c + s) \).

Furthermore, the subsidy-ridden increase in \( w_e \) raises the efficiency-wage gap \( w_e - w_s \) and reduces the value of effort \( w_e/e \). Consequently, within the present framework, a policy aiming at helping children ends up increasing the demand for child labor, wage inequality among skilled adult workers, and effort per dollar. In contrast, it is straightforward to establish that an increase in the cash premium received by the child’s guardian, captured by an increase in parameter \( \theta \), generates the opposite general equilibrium effects: a decline in the skilled adult wage \( w_s \), in the efficiency-wage gap \( w_e - w_s \), and in the effort per dollar \( e/w_e \).

2. Child-Labor Regulations

The economics of child labor has devoted considerable effort to the positive and normative analysis of child-labor regulations that erect legal barriers (e.g., reducing the time that children are allowed to work, instituting compulsory education, and declaring certain occupations hazardous for children) or ban child employment altogether. The present model is suited to analyze the general equilibrium effects of an effective ban on child labor. Starting at an equilibrium with working children depicted by point \( D \) in figure 1, a complete ban on child labor changes the shape of the inverse demand curve for agrarian skilled adult labor from the horizontal line \( w_a w_s \) to the downward-sloped curve \( LL \). Wages become fully flexible, and the model is transformed into one of a small open economy with an interindustry wage gap generated by an effort-based efficiency wage. This regime change is depicted in figure 1 by moving from point \( D \) to point \( N \) and implies a reduction in the reservation wage \( w_e \) and the wage gap \( w_e - w_s \). The zero-profit condition \( \rho = \alpha - (1 - \alpha)/w_e \) holds, even in the absence of child labor, and implies that a child-labor ban raises the wage of unskilled adult workers and reduces the wage of skilled adult workers.

IV. Discussion

Are the model’s key predictions empirically relevant? We take this opportunity to briefly comment on whether the model’s properties are consistent with the available evidence and with the analysis of several empirical studies on the determinants and effects of child labor. Consider first the evidence on the dramatic reduction in the incidence of child labor during 2000–2004 documented in the ILO (2006) report. In the present model, several policy-related parameter changes affect the equilibrium value of child labor. For instance, the incidence of child labor declines as the price of child-labor-intensive products falls, as more skilled adult workers emigrate from poor countries, as the flow of unskilled workers
leaving poor countries declines, as more multinationals shift their production to modern (child-labor-free) sectors in developing countries, as governments impose child-labor bans, and as governments reduce the amounts of subsidized meals to working children that make child labor even cheaper for employers. Many of these changes have been occurring simultaneously in the past and are documented in the latest ILO report.

Consider next the findings of Edmonds and Pavcnik (2002) who used household survey data to analyze the effects of globalization on child labor in Vietnam. Their main conclusion is that between 1993 and 1998 two trade-liberalization attempts (increases in rice export quotas) increased the average price of rice by about 30%. This increase was associated with a 10% reduction in the probability of a child entering the labor force. At first sight, this finding seems to contradict our model’s prediction that an increase in the price of the agrarian good raises the incidence of child labor. This paradoxical outcome can be resolved by observing that the negative correlation between the price of rice and the probability of work for children holds for children engaged in work activities within their household (i.e., agricultural activities or household chores such as cleaning, cooking, etc.). In the case of urban children who are employed outside their household (which fits more with the approach of the present model in which the demand for child labor is generated by profit-maximizing firms), a 30% increase in the price of rice is associated with a 5% increase in the incidence of child labor. This finding is consistent with the model’s prediction. In addition, when these authors control for child and adult wages the correlation between the price of rice and the child-labor incidence becomes insignificant. This result is also consistent with the model’s focus on wages as the main channel through which globalization affects the incidence of child labor. Edmonds and Pavcnik (2002, table 1) also report that between 1993 and 1998 the child wage increased by about 11%, whereas the wage of adult workers increased by 30%, confirming the child-wage stickiness relative to adult wages. Finally, the authors find that the supply elasticity of child labor is much higher than the supply elasticity of adult workers.

We also want to comment on three recent empirical studies that have analyzed the relationship between the incidence of child labor and FDI (Kucera 2002; Busse and Braun 2004; Braun 2006). These studies have used cross-sectional and panel data sets to test the hypothesis that a high incidence of child labor suppresses the wage of unskilled labor and therefore reduces the costs of production for multinational firms. In other words, these authors are interested in testing the hypothesis that economies with a high incidence of child labor provide cost advantages to multinationals. These studies found a statistically insignificant correlation between wages and child labor and a significant negative correlation between inward FDI and the incidence of child labor. In addition, Braun
(2006) finds weak evidence for the hypothesis that child labor can discourage FDI by reducing the formation of human capital (caused by lower school attendance of children). According to Braun, the negative correlation between skilled labor and child labor only applies to high skill levels, and it is reversed for low skill levels. These findings seem to contradict the predictions of models that assume flexible wages and focus on long-run supply-side determinants of child labor. In the present model, variations in the incidence of child labor do not affect the unskilled adult wage, which is fixed by the nutritional efficiency wage offered to children. In addition, our model predicts that an increase in the sector-specific capital stock, caused by an inflow of FDI, reduces the agrarian output and the demand for child labor without having an impact on the economy’s wage structure. These predictions are in line with the empirical studies on FDI and child labor.

Finally, we would like to mention that our analysis of a child-labor ban has interesting implications for the political economy of child-labor regulations: according to the model, unskilled workers (who are usually unionized and compete against child workers) would support legislation that bans child labor, whereas skilled workers would oppose such legislation. This result is consistent with the analysis of Doepke and Zilibotti (2005), who use a dynamic model with endogenous educational and fertility-based decisions to analyze the political economy of child-labor laws. It also highlights a potential conflict between high-income families consisting of skilled workers and nonworking children and those with unskilled parents and working children. A ban on child labor reduces the income of a skilled-labor family but has an ambiguous effect on the family income of the latter: it increases the wage of unskilled parents but eliminates the wage of working children, including the wage portion that goes to the guardian’s pocket. Therefore, families headed by unskilled parents with stay-at-home children would support a ban on child labor because it increases their family income, whereas families headed by unskilled parents with working children might oppose or support restrictions on child labor, depending on the model’s parameters. Since the proportion of working children is less than 50%, one could predict that the majority of families headed by unskilled parents would support a ban on child labor. This prediction is supported by an ILO report (2006), which states that the trade union movement was influential in supporting legislation to reduce the incidence of child labor in the 1990s since the basic values of the trade union movement stand in complete opposition to child labor.

V. Concluding Remarks

This article developed a tractable general equilibrium model of a small open economy that incorporates efficiency wages and child labor. The
model was based on the following premises. First, we abstracted from altruistic motives in a poor family’s decision to send its children to work. This deviation from what has become a standard assumption in the economics of child labor (e.g., Basu and Van 1998; Doepke and Zilibotti 2005) was motivated by our desire to examine its robustness, explore the implications of a simple bargaining model of the household, and endogenize the incidence of child labor. Second, we assumed that children work only in the agrarian sector. This assumption is consistent with the empirical literature on child labor, which reports that the vast majority of children engage in agricultural activities. Third, the model introduced child-labor considerations into a standard dual economy characterized by an endogenous wage differential between the agrarian and modern sectors. These three premises differentiated our approach from the rest of the literature and helped us to highlight several demand-side factors that condition the impact of international and domestic policies on child labor.

The modeling of child labor as a perfect substitute for unskilled adult labor coupled with nutritional efficiency wages generates wage rigidity in the agrarian sector and transforms the economy into a “dual” one with an unlimited supply of child labor. Our analysis identifies conditions under which globalization can reduce the incidence of child labor: trade policies that benefit the modern sector, relaxation of restrictions on international migration of skilled adult workers, and more FDI in the modern sector reduce the demand for child labor without worsening the wage-income distribution. Trade policies that encourage more production of child-labor-intensive products, emigration of unskilled adult workers, and taxes that discourage foreign investment in the modern sector increase the incidence of child labor without improving the wage-income distribution. The model was also used to shed light on the effects of two controversial domestic policies. Direct subsidies to working children increase the incidence of child labor by lowering the cost of hiring children, and a ban on child labor benefits unskilled adult labor and hurts skilled adult workers.

Several of the above findings depend on specific assumptions about functional forms. For instance, the assumption of a Cobb-Douglas production function for the agrarian good can be readily relaxed without affecting the main results. One could also relax the assumption of an exogenous premium above and over the nutritional wage that is paid to the child’s guardian by introducing Nash-bargaining considerations and endogenous reservation incomes in the game between the employer and the child’s guardian. One could readily introduce formally a multimember family structure that would permit the analysis of intrafamily exploitation and the effects of globalization on family income and welfare. Finally, one could combine the demand structure of the present model with supply-side elements and credit constraints to develop more realistic open-
economy models that can be used to study the nexus of globalization and child labor.

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