Is Temporary Emigration of Unskilled Workers A Solution to the Child Labor Problem?[1]

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Abstract: As the incidence of child labor is highest among unskilled workers' families, there is a received wisdom that temporary emigration of this category of workers can solve the child labor problem in poor countries. In this paper, we suggest that the case for temporary emigration of unskilled workers as a solution to the child labor problem may be weak at best.

JEL: J13; J61; O11; O15; O40. **Keywords**: Remittances, emigration, education, child labor, general equilibrium.

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I. Introduction

In a seminal theoretical work on the child labor effects of migrant remittances, Epstein and Kahana (2008) propose a mechanism whereby remittances sent by migrant parents enable not only their children, but also children living in non-migrant households, to stop working. Emigration, by reducing labor supply, causes wages to rise in the source country, which in turn enables even non-migrant households to dispense with child labor income. While intuitively compelling, Epstein and Kahana's mechanism is perhaps impervious to the well-known fact that even in poor countries, unskilled labor may not be the only input in the economy-wide production process. For example, while low-tech agriculture may be intensive in unskilled labor, transportation, processing, shipping and handling of agricultural output, in contrast, may require skilled labor. At the sectoral level, therefore, the agriculture production function may exhibit complementarities between unskilled labor and skilled labor, as essential inputs. Furthermore, the above notwithstanding, their model's main prediction appears to be driven by their specification of parental utility function.

This paper assesses the robustness of the main prediction of Epstein and Kahana (2008). We propose a mechanism whereby temporary emigration of unskilled workers can actually worsen, rather than solve, the child labor problem in poor countries. Central to this mechanism is the complementarity between skilled and unskilled labor, as well as the perfect substitutability between unskilled adult labor and child labor. On one hand, due to complementarity between skilled and unskilled labor, emigration of unskilled workers reduces the skilled labor wage through a decrease in the skilled labor's productivity level. On the other hand, due to perfect substitutability between unskilled adult labor and child labor, emigration of unskilled workers raises the child labor wage. We show that emigration of unskilled workers thus tends to raise the incidence of child labor in families headed by skilled adults, while it has no effect on the incidence of child labor in families headed by unskilled adults. The latter result is due to logarithmic preferences, which differ from the Stone-Geary specification used in Epstein and Kahana (2008). As a result, instead of decreasing, the economy-wide incidence of child labor rises.

Our research contributes to the development literature on parental investment in child's human capital. Most contributions in this branch highlights the trade-off between the current benefits of child labor to poor households, and its future costs in terms of low levels of human capital for children, when they become adults. Basu and Van (1998), Baland and Robinson (2000), Dessy and Pallage (2001), Doepke and Zilibotti (2005), and Dessy and Knowles (2008) are some of the important theoretical contributions to this child labor literature. We build around this literature by emphasizing transnational migration and remittance flows as a strategy for combatting child labor.

The rest of this paper is organized as follows. Section 3 describes the setup, and characterizes the intertemporal equilibrium. Concluding remarks are presented in Section 4. Finally, proofs of some results are provided in the Appendix section.

II. Setup

Consider two overlapping-generations economies, North (N) and South (S). Both produce a unique tradable good. When it takes place within firms, production of the tradable good requires both skilled and unskilled labor. Only adults can supply skilled labor, while unskilled labor may be supplied by both adults and children.

South is initially populated by a continuum one of two-period lived individuals. Individuals are children in their first period of life, and adults in their second and last period. The second period is the decision-making stage. In the beginning of every period t ($t = 0, 1, ...$), there are η_s skilled adults and $\eta_u = 1 - \eta_s$ unskilled. Adults are endowed with one unit of labor time, which they inelastically supply to firms. Henceforth, we refer to all decision makers as workers.

Unskilled adult workers make three important decisions: (i) whether or not to migrate to North (N); (ii) depending on their location, how much money to transfer to their child dependent, (iii) how much child's time to allocate to skill-imparting education. Skilled adult, by contrast, are only concerned with the last two decisions, as they do not migrate. Each child is endowed with one unit of time. Work and schooling are the only competing claims on child's time, with a fraction e allocated to schooling and the remaining fraction $1 - e$, to work.

When they emigrate, unskilled workers leave their children behind, and make international monetary transfers to their children. We refer to these transfers as remittances. We are interested in the impact these remittances have on the incidence of child labor in the source country of migrants.

Let m be a binary variable representing the migration decision of an unskilled worker: $m = N$ if he migrates and $m = S$, if otherwise. Non-migrant workers supply their entire labor endowment to domestic firms in exchange for a wage ω_s if skilled, and ω_u if unskilled. Unskilled migrant worker earn an exogenous wage $\bar{\omega}_u$.

All workers have identical preferences over own-consumption c_m, child's consumption c_m^k, and the child's skilled status $j \in \{s, u\}$ when adult. Assume a simple additively separable expected utility specification of these preferences:

$$U_m^i = \ln\left(c_m^i\right) + \mu\left(\ln c_m^{i,k} + \beta E\left[\upsilon\left(j\right)\right]\right), \quad i \in \{s, u\} \tag{II.1}$$

where E is the expectation operator, conditional on current-of-period information, $\mu > 0$ the altruism parameter, $\beta \in (0, 1)$ the time-discounting factor, and $\upsilon(j)$ the level of utility an adult worker derives from raising a child who transits to state $j \in \{s, u\}$ when adult, with

$$\upsilon\left(j\right) = \begin{cases} \delta & \text{if } j = s \\ 0 & \text{if } j = u \end{cases}, \tag{II.2}$$

with $\delta > 0$.

Unskilled workers who make the migration decision m allocate their income to the financing of own consumption, and remittance flows to their offspring. The budget constraint faced by an unskilled worker whose migration decision is $m \in \{N, S\}$ thus is $P_m c_m^u + \theta_m^u \leq \widetilde{y}_m^u$, while the budget constraint faced by a skilled worker is $P_S c_S^s + \theta_S^s \leq \omega_s$, where θ_m^i denotes the amount of money transferred to the child, P_m the price of the tradable good at the place of employment m, and

$$\widetilde{y}_m^i = \begin{cases} \bar{\omega}_u & \text{if } m = N \\ \omega_u & \text{if } m = S \end{cases} \tag{II.3}$$

the labor income at the place of employment. Since children do not migrate, a child's consumption satisfies the following budget constraint: $P_S c_m^{i,k} \leq \theta_m^i + \left(1 - e_m^i\right)\omega_k$,where ω_k, the child labor wage, and $1 - e_m^i$, child's time allocated to work.

Schooling is the only skill-accumulation mechanism. Skill accumulation is a stochastic process. There are two possible future states a child can transit to when adult. Each of these states denotes the skill status of the individual in it. A child whose parent is in state $i \in \{s, u\}$ and works in country $m \in \{N, S\}$ transits to state $j \in \{s, u\}$ when adult with probability $\rho_i^j(m) \in [0, 1]$. Skill accumulation thus leads to the following location-specific transition probability matrix:

$$T(m) = \begin{pmatrix} \rho_u^u(m) & \rho_u^s(m) \\ \rho_s^u(m) & \rho_s^s(m) \end{pmatrix}. \tag{II.4}$$

We specialize these conditional probabilities to

$$\rho_i^i(m) = \begin{cases} 1 - e_m^u \lambda_u & i = u \\ e_m^s \lambda_s & i = s \end{cases} \tag{II.5}$$

and

$$\rho_i^j(m) = 1 - \rho_i^i(m), \qquad j \neq i \tag{II.6}$$

where $e_m^i \in [0, 1]$, and $\lambda_i \in (0, 1)$ is the probability that a child who goes to school full-time becomes skilled when adult if born of a parent in state $i \in \{s, u\}$. An implication of stochastic skill accumulation is that skilled and unskilled workers will always coexist in the workforce, as is the case in the real world.

In keeping up with the standard literature on skill acquisition (e.g., Kremer and Chen 1999), we make the following assumption:

Assumption 1. $\lambda_s > \lambda_u$.

Assumption 1 states that the likelihood of becoming skilled is always higher for children born of skilled parents than for those born of unskilled parents.

Let η_s' (respectively η_u') denote the next generation's proportion of skilled (respectively, unskilled) individuals in South. Let M_u denote the number of unskilled emigrants. Thus $\eta_u - M_u$ denotes the total number of non-migrant unskilled workers of type in the source country. Combining the transpose of the transition probability matrix in (II.4) with (II.5) and (II.6), we arrive at the following laws of motion for the economy-wide proportions of skilled individuals (η_s) and unskilled individuals (η_u):

$$\begin{pmatrix} \eta'_u \\ \eta'_s \end{pmatrix} = \begin{pmatrix} 1-e_N^u\lambda_u & 1-e_N^s\lambda_s \\ e_N^u\lambda_u & e_N^s\lambda_s \end{pmatrix} \begin{pmatrix} M_u \\ 0 \end{pmatrix} + \begin{pmatrix} 1-e_S^u\lambda_u & 1-e_S^s\lambda_s \\ e_S^u\lambda_u & e_S^s\lambda_s \end{pmatrix} \begin{pmatrix} \eta_u - M_u \\ \eta_s \end{pmatrix} \tag{II.7}$$

In South, firms are perfectly competitive in both the output and the input markets. The production technology for the unique tradable good is a Cobb-Douglas function of skilled labor (L_s), unskilled labor (L_u) and child labor (L_k):

$$Y = A\left(L_s\right)^{\alpha}\left(L_u + \rho L_k\right)^{1-\alpha},$$

where A denotes a time-invariant exogenous measure of total factor productivity, which we take as a proxy of the level of development in the source country of emigrants, and α, the skilled-labor share in output. Resource constraints are,

$$L_s \leq \eta_s \tag{II.8}$$

$$L_u \leq \eta_u - M_u, \tag{II.9}$$

$$L_k \leq \bar{L}_k \tag{II.10}$$

where

$$\bar{L}_k = \left(1-e_S^s\right)\eta_s + \left(1-e_S^u\right)\left(\eta_u - M_u\right) + \left(1-e_N^u\right)M_u \tag{II.11}$$

denotes a measure of the economy-wide incidence of child labor.

Using (II.8) and (II.9), it can be shown that perfectly competitive hiring of labor leads to the following market-clearing wages in South

$$\omega_u = (1-\alpha)A\left[\frac{\eta_u - M_u + \rho L_k}{\eta_s}\right]^{-\alpha} \tag{II.12}$$

$$\omega_s = \alpha A\left[\frac{\eta_u - M_u + \rho L_k}{\eta_s}\right]^{1-\alpha} \tag{II.13}$$

$$\omega_k = \rho\omega_u. \tag{II.14}$$

The wage effects of emigration of unskilled workers can thus be seen through (II.12), (II.13), and (II.14). In particular, emigration of unskilled workers (i.e., a rise in M_u) raises the unskilled labor wage and the child labor wage, while it decreases the skilled labor wage.

A. Workers' Decision Problem

Workers in South are forward-looking. Their decision problems can thus be solved by applying a backward induction process. This process is structured as follows. First, as workers' utility is strictly increasing in all its arguments, in the optimum all budget constraints will be saturated. Therefore, using (II.1), (II.2), as well as budget constraints, we arrive at the following expected value function for an unskilled worker who makes decisions $\left(m, \theta_m^i, e_m^i\right)$:

$$V\left(m, \theta_m^i, e_m^i\right) = \ln\left(\widetilde{y}_m^i - \theta_m^i\right) + \mu \ln\left[\theta_m^i + \left(1 - e_m^i\right)\omega_k\right] + \mu\beta\delta e_S^s \lambda_s. \tag{II.15}$$

His decision problem takes the following form:

$$\max_{\langle m, \theta_m, e_m \rangle} V\left(m, \theta_m^i, e_m^i\right). \tag{II.16}$$

Unskilled workers choose their employment location m by anticipating the consequences this choice will have on their children's skill-status when adult. Therefore, each unskilled worker first determines his child's education level e_m^i, and the intra-family remittance flow θ_m^i given his migration decision m. Then, given $\left(e_m^i, \theta_m^i\right)$, he optimally selects the employment location that yields the highest possible value. More formally, an unskilled worker's two stages problem is described as follows:

$$\max\left\{\max_{\theta_N, e_N} V\left(N, \theta_N^u, e_N^u\right); \max_{\theta_S, e_S} V\left(S, \theta_S^u, e_S^u\right)\right\} \tag{II.17}$$

By contrast, since skilled workers do not emigrate to North, a skilled worker's decision problem is simply

$$\max_{\theta_S, e_S} V^s\left(\theta_S^s, e_S^s\right)$$

where

$$V^s\left(\theta_m^i, e_m^i\right) = \ln\left(\omega_s - \theta_S^s\right) + \mu \ln\left[\theta_S^s + \left(1 - e_S^s\right)\omega_k\right] + \mu\beta\delta\rho_s^s\left(m\right). \tag{II.18}$$

Using (II.15), (II.5), (II.6), (II.12), (II.13) and (II.14) it can be checked that under Assumption 1, the first order necessary and sufficient condition for an interior solution to the above decision problems lead to the following decision rules for unskilled workers:

$$\begin{aligned} \theta_N^u &= \bar{\omega}_u - \frac{\rho\left(1-\alpha\right)A}{\mu\beta\delta\lambda_u}\left[\frac{\eta_u - M_u + \rho L_k}{\eta_s}\right]^{-\alpha}; && \text{(II.19)} \\ 1 - e_N^u &= \frac{1+\mu}{\mu\beta\delta\lambda_u} - \frac{\bar{\omega}_u}{\rho\left(1-\alpha\right)A}\left[\frac{\eta_u - M_u + \rho L_k}{\eta_s}\right]^{\alpha} && \text{(II.20)} \end{aligned}$$

if $m = N$; and

$$\begin{aligned} \theta_S^u &= \left(1-\alpha\right)A\left[\frac{\eta_u - M_u + \rho L_k}{\eta_s}\right]^{-\alpha}\left(1 - \frac{\rho}{\mu\beta\delta\lambda_u}\right); && \text{(II.21)} \\ 1 - e_S^u &= \frac{1+\mu}{\mu\beta\delta\lambda_u} - \frac{1}{\rho}. && \text{(II.22)} \end{aligned}$$

if $m = S$. For skilled workers, the first order conditions can be shown to lead to

$$\begin{aligned} \theta_S^s &= A\left[\frac{\eta_u - M_u + \rho L_k}{\eta_s}\right]^{-\alpha}\left[\frac{\alpha\left(\eta_u - M_u + \rho L_k\right)}{\eta_s} - \frac{\left(1-\alpha\right)\rho}{\mu\beta\delta\lambda_s}\right] && \text{(II.23)} \\ 1 - e_S^s &= \frac{1+\mu}{\mu\beta\delta\lambda_s} - \frac{\alpha\left[\eta_u - M_u + \rho L_k\right]}{\rho\left(1-\alpha\right)\left(\eta_s - M_s\right)}. && \text{(II.24)} \end{aligned}$$

With the above results, we next define the net gain from emigration for unskilled labor. Let $\vartheta\left(\bar{\omega}_u\right) = V\left(N, \theta_N^u, e_N^u\right) - V\left(S, \theta_S^u, e_S^u\right)$ denote the net value gain from migrating to North for an unskilled worker. From (II.15), substituting in (II.19), (II.20), and (II.22)), using (II.3), and re-arranging terms yields this net value gain as follows

$$\vartheta\left(\bar{\omega}_u\right) = \left(\bar{\omega}_u - \omega_u\right)\mu\beta\delta\left(\lambda_u - \gamma_u\right)/\phi. \tag{II.25}$$

B. Equilibrium

In this sub-section, we characterize and analyze child labor implied by migration and workers' remittances in the source country, which we call South. We define an equilibrium as a situation where unskilled workers are indifferent between migrating and not migrating to North.

Définition *An equilibrium for this overlapping-generations' economy is the number of unskilled emigrants M_u^*, the economy-wide incidence of child labor $\bar{L}_k^*$, and a law of motion for the economy-wide proportion of skilled individuals η_s, such that*

(i) M_u^* solves

$$\vartheta\left(\bar{\omega}_u\right) = 0; \tag{II.26}$$

(ii) the economy-wide incidence of child labor $\bar{L}_k^*$ satisfies (II.11);

(iii) the next generation's proportion of skilled workers η_s' satisfies (II.7), while the next generation's proportion of unskilled workers is given by $\eta_u' = 1 - \eta_s'$.

The equilibrium condition (II.26) implies that $\bar{\omega}_u = \omega_u$. Solving this equation yields the proposition below:

Proposition 1. *If*

$$\frac{\mu\beta\delta\eta_s\Phi\left(\bar{\omega}_u\right)}{(1-\alpha)(1+\mu)\upsilon} < \rho < \frac{\mu\beta\delta}{(1+\mu)\upsilon}\left[1 + \frac{\eta_s\Phi\left(\bar{\omega}_u\right)}{(1-\alpha)}\right] \tag{II.27}$$

and

$$\lambda_s < \rho(1+\mu)\left[\frac{\left[\mu\beta\delta\lambda_u - \rho(1+\mu)\right]\eta_u}{\lambda_u\eta_s} + \frac{\alpha\mu\beta\delta\Phi\left(\bar{\omega}_u\right)}{(1-\alpha)}\right]^{-1} \tag{II.28}$$

then

$$M_u^* = \frac{(1+\mu)\rho\upsilon}{\mu\beta\delta} - \frac{\eta_s\Phi\left(\bar{\omega}_u\right)}{(1-\alpha)}, \tag{II.29}$$

and

$$\bar{L}_k^* = \frac{(1+\mu)\upsilon}{\mu\beta\delta} - \frac{\eta_u}{\rho} - \frac{\alpha\eta_s\Phi\left(\bar{\omega}_u\right)}{\rho(1-\alpha)} \tag{II.30}$$

where

$$\Phi\left(\bar{\omega}_u\right) = \left[\frac{(1-\kappa_u)\bar{\omega}_u}{A(1-\alpha)}\right]^{-1/\alpha}$$

Observe that $1 - e_m^u$ is the supply of child labor in a family headed by an unskilled adult employed in location m. Using the equilibrium condition $\bar{\omega}_u = \omega_u$. The reader can check from (II.20) and (II.22) that in equilibrium, the incidence of child labor in families headed by an unskilled adult is unaffected by emigration:

$$1 - e_m^u = \frac{1+\mu}{\mu\beta\delta\lambda_u} - \frac{1}{\rho}$$

all m.

Note that in absence of emigration (i.e., $M_u^* = 0$), it can be shown using (II.11), (II.22), and (II.24) that the equilibrium incidence of child labor in South would be:

$$\bar{L}_k^0 = \frac{(1+\mu)(1-\alpha)\upsilon}{\mu\beta\delta} - \frac{\eta_u}{\rho}. \tag{II.31}$$

Therefore our main proposition is the following:

Proposition 2. *Under conditions (II.27) and (II.28), emigration raises the economy-wide incidence of child labor:*

$$\bar{L}_k^* > \bar{L}_k^0.$$

Proof Consider the difference $\bar{L}_k^* - \bar{L}_k^0$. Using (II.30) and (II.31), it can be shown that this difference reduces to

$$\bar{L}_k^* - \bar{L}_k^0 = \frac{\alpha}{\rho} M_u^*,$$

which is positive, since $M_u^* > 0$ under conditions (II.27) and (II.28)■

Therefore, rather than solving the child labor problem, emigration of unskilled workers may worsen it, despite remittances.[4]

III. Conclusion

This paper assessed the robustness of the main prediction of Epstein and Kahana (2008). They suggest that child labor can be mitigated by encouraging temporary emigration of un-

[4]The reader can also check that this result implies that emigration of unskilled workers will slow down the development of a skilled labor force.

skilled workers. We show that alternative specifications of parental preferences and aggregate production function overturn this conclusion. We highlighted a mechanism whereby temporary emigration of unskilled workers worsens, rather than solves, the child labor problem in poor countries. Our analysis suggests that the case for temporary emigration of unskilled workers as a solution to the child labor problem may be weak at best.

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