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The Economics of Child Trafficking (Part II)

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Abstract:
The trafficking of children is a thriving business. In this paper, we highlight key economic characteristics of this business. We show that the fight against child trafficking is far from trivial and that supply-side policies have very limited effect unless preceded by attacks on the demand side. Successful policies involve international cooperation on both fronts. We work within a model of a source country to highlight the necessary ingredients of a successful international cooperation towards the elimination of child trafficking.

Keywords: Child trafficking, worst forms of child labor, international coordination

JEL Classification: J82, O15, O19

1 Introduction

The trafficking of children is a thriving business.[1] According to the International Labor Organization (ILO), in 2002, more than 1.2 million children were trafficked in the world (ILO-IPEC, 2002). One would think that a business of such scale should be easy to regulate. The fight against child trafficking, however, is far from trivial. To succeed in this fight, it is crucial to understand some important aspects of the business at hand.

Children are trafficked away for several purposes. Some end up working as modern slaves in plantations or factories, some wind up on the sex market, some others find themselves as child soldiers on the frontline of a conflict foreign to them. There may be several market segments, depending on the purpose, but they all share key economic characteristics. First, and foremost, each market is an international market with an international price. Well-meaning individual efforts by some governments may thus not be very meaningful in the end. Worse, as we show in this paper, such individual efforts may be counter-productive for the global fight against child trafficking. Second, the trafficking of children obeys the laws of supply and demand. A rise in the price of children attracts new traffickers on the market, while a drop in the price makes children affordable to a wider audience. Third, traffickers prey on children who are most vulnerable, either because parental supervision is lacking or because parents are excessively credulous, to the point of confiding their children to the care of well-speaking strangers. There are two ways of protecting children. On the one hand, parents may invest time and energy in the supervision of their children. On the other hand, governments may invest in the education of parents or in public protection mechanisms to supplement parental supervision. Both types of protections entail a cost. Fourth, this cost of protecting children is an increasing function of the number of traffickers. Fifth, the success of traffickers is a decreasing function of the private and public investments in the protection of children. Last but not least, child traffickers operate in well organized rings and follow

[1] The *United Nations' 2000 Protocol to Prevent, Suppress and Punish Trafficking in Persons* defines child trafficking as "the recruitment, transportation, transfer, harboring or receipt of persons, by means of threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation."

a basic standard in organized crime: competition is bad for business. While there is not much evidence on the actual degree of competition between traffickers, tacit collusion is the only way such rings could have had the time to establish themselves and reach their level of proficiency. Their trade is well functioning, so well indeed that traffickers, for example, rarely smuggle children across borders: they are often equipped with false passports and the tools to bribe officials when needed. The rings need not be large but they involve at least a few people in different countries (see Dottridge, 2004 for an excellent description of the trade).

An understanding of those six simple principles leads to the following important remarks. Ceteris paribus, if a country invests in the protection of its children and succeeds in the fight of traffickers at home, this tends to drive the international price of children upward, which is likely to make it more costly for other countries to provide similar protection for their children. One's efforts to fight trafficking in one's own backyard *de facto* exert a negative externality on the rest of the world. Clearly, rich countries have taken the lead in the protection of their children, which has strong implications on the structure of the market: It implies that most of the supply originates from poor countries, but also that most of the demand originates from individuals of richer countries. Indeed, by making it more costly for poor countries to protect their children, it makes poor children even more vulnerable to traffickers. By establishing the market price at a relatively high level, it also makes children a commodity affordable primarily to the wealthy. This polarization of the market can be explained at least partly by the leading role rich countries have assumed in the ILO-IPEC crusade against trafficking.

Child trafficking therefore appears to be very hard to combat. A winning strategy would imply a move from mere myopic supply-side policies to a more complex policy intervention. The first step would involve a simultaneous, coordinated attack by all destination countries on the demand side of the market. The second step would require a similar coordination on the supply-side. The first step, however, is not easy to achieve. Because the demand originates from richer countries who have secured the protection of their children by supply-side policies, a significant part of the responsibility for the elimination of child trafficking lies in the hands of the latter, while victims originate from poorer countries. The sense of

altruism of rich countries will thus be put to the test.

Our purpose, in this paper, is to emphasize the fundamental economics of child trafficking in a way that may help guide policy makers in this highly important matter.

1.1 The facts

International consensus — In most countries, human trafficking is acknowledged as a serious crime, punishable by law. Yet, owing to dramatic improvements in transportation and communication technologies, child trafficking has developed into a transnational crime, and appears to be on the rise worldwide. The ILO-IPEC (2001), the UNICEF (2002) and the U.S. State Department (2003) have all pulled the alarm warning about its growing scope and its transnational complexity. The international community's response to the transnational nature of the phenomenon resulted in a series of international conventions: the United Nations' *Convention on the Rights of the Child* and its *Optional Protocol on the Sale of Children, Child Prostitution and Child Pornography*, and *Convention C182* by the ILO (1999). All efforts made so far to fight child trafficking are laudable. They typically stress the need for international cooperation. Our paper may help guide policy makers on the desirable form of such cooperation and sequence of policy action.

Some statistics — Trafficked children flow from poorer to richer countries. The UNICEF's international flow chart summarized in Table 1 indeed suggests that receiving countries are all wealthier on a per capita basis than source countries. In West and Central Africa, for example, children from Burkina Faso, Ghana, Mali and Togo are trafficked to the relatively richer Cameroon, Côte d'Ivoire, Gabon and Nigeria. In South Asia, Nepal acts as a source-country for India, with a per capita GDP of roughly twice that of Nepal. For this region, the *Committee on the Rights of the Child* reports that in 1995 an estimated 100,000 to 150,000 Nepalese girls and women had been trafficked into India for sexual exploitation. In South-East Asia, Thailand is reported to be the main receiving country, with an estimated 194,180 foreign child laborers reported in 1996, mostly from Cambodia, China (particularly from the Yunnan Province), Lao PDR, Myanmar and Vietnam, all of which are poorer relatively to Thailand. Clearly final users may not necessarily be from the receiving countries. Yet the

flows indicate a relative polarization of the market.

As is also clear from Table 1, the richest countries are important destination countries. Examples include, Australia, Canada, Germany, Greece, Japan, the Netherlands, the United States. None of them is reported as a source country.

1.2 This paper

This paper develops a model in which the supply of trafficked children arises endogenously. In our model, children are kidnapped from a source-country, and illegally shipped into the rest of the world for profit. Children's protection from potential traffickers involves both the family – acting as a private protective unit through parental investment in child protection –, and a government, which allocates public expenditures to improve enforcement of laws against child trafficking. The supply of child trafficking emerges if and only if a positive fraction of the economy's entrepreneurs find it optimal to invest their capital in breaking down protective barriers against child trafficking set up by both families and the local government, given the state of the international demand for children.

We use this model to study the determinants of the ability of a source-country government, acting unilaterally, to curb the supply of trafficked children. We highlight the negative externality exerted by foreign countries' efforts to fight trafficking at home on our model economy, and the key role this externality plays on the polarization of the market observed in the data.

The starting point of our analysis is the observation that since by nature, children are most vulnerable when left unprotected, building a protective environment for these children requires both parental and public investments. Parents are usually called upon to provide for their children's basic needs, including nutrition, adequate clothing, health, and education, which may reduce the risk for these children of being lured by the false promises of better lives outside their home environment. However, for many reasons that include poverty, families often fail to be effective protective units for their children, thus making them the perfect victims for traffickers. To help protect children from traffickers, government officials may launch public awareness campaigns, in addition to the recruiting, training, and equipping of

customs officials, police officers, and other law-enforcers.

Notwithstanding the above, even well-intentioned government officials may fail to prevent children from being trafficked away if, when acting unilaterally, they are unable to affect the international price for trafficked children. The higher this price, the higher the return to creating a supply of trafficked children, which, in turn, may induce well-organized criminal groups to step up the effort to break down barriers against child trafficking. In other words, a high international price acts as a "ladder," helping well-organized criminal groups to climb up the protective walls set up by families and government officials. The critical law-enforcement effort is therefore one that raises the wall higher than the ladder. The higher the ladder, the higher the wall should be, and thus the more public funds will be needed. The rest of the paper is presented as follows. Section 2 offers a brief literature review. Section 3 presents the model and its solution. Section 4 concludes.

2 Literature review

The ILO classifies child trafficking as one of the worst forms of child labor, under Convention C182. Due to the outrageous nature of this phenomenon, an international consensus has developed on its elimination, often prompting policy actions, which, unfortunately, preceded research by many years. Rogers & Swinnerton (2002) and Dessy & Pallage (2005) are the first papers to attempt a theoretical exploration of the economics of this phenomenon.

Using a model of parental investment in child's education, Dessy & Pallage (2005), show that when a country is very poor, in order for a ban on the worst forms of child labor to bring a Pareto-improvement, appropriate mechanisms must be designed to mitigate the decline in child labor wages caused by a ban-induced reduction in employment options for children. Rogers & Swinnerton (2002) offer a counter-argument in a model exploring the welfare effects of banning exploitative forms of child labor. They argue that because the ban pushes both the exploited children and the exploiters towards the non-exploitative side of the market, this has beneficial effects on child labor wages. They do not discuss, however, the determinants of a government's ability to enforce the ban on the worst forms of child labor. Yet this is a very important question: while a ban has the potential to raise child

labor wages in their model, it also has the adverse effect of depressing the return to capital, due to reduced market options. Capitalists therefore may have a vested interest in opposing such a ban (Moehling, 1999), or in bringing down barriers to child exploitation set up by law-enforcement. In Rogers & Swinnerton (2002), parents are passive and do not invest in child protection. Although parents in their model know that their children can fall victims to traffickers, they do not allocate houshold resources to reducing the probability that their child may be trafficked away. Parents in our model may do that.

By focusing on the microeconomics of both children's vulnerability to trafficking and capitalists' decision to supply trafficked children, our research seeks to explain the determinants of the critical level of public expenditures a government must allocate in order to stop child trafficking at the source. It also seeks to explain why poorer countries are more likely to be source-countries for child trafficking: since building a protective environment for children involves household investment, poverty may make households too dependent upon government officials for the protection of their children. In other words, poorer families may substitute public for private barriers against child trafficking. As a result, higher public funds are required in poorer than in richer countries in order to curb the supply of trafficked children. With economic development, in contrast, households become richer; this enables them to become more effective as protective units for their respective children, thus lessening their dependence upon the government to build barriers against child out-trafficking. In that case, the critical level of government effort is lower, which therefore reduces the level of public funds necessary to curb the supply.

If child exploitation or the worst forms of child labor have not been studied much, there exists, however, a large literature on child labor, both theoretical and empirical. The theoretical literature was initiated by the seminal work of Basu & Van (1998). Among the contributors are Basu (1999, 2000), Swinnerton & Rogers (1999), Baland & Robinson (2000), Ranjan (1999, 2001), Dessy (2000), Dessy & Pallage (2001), Jafarey & Lahiri (2002), Dessy & Vencatachellum (2003), Doepke & Zilibotti (2005). The empirical literature on child labor is very rich, with contributions by Grootaert & Kanbur (1995), Canagarajah & Coulombe (1997), Ravallion & Wodon (2000), Edmonds (2005), Edmonds & Pavcnik (2005).

3 The model

The structure of this Section is as follows. We start by setting up the model environment. We then derive a series of lemmas all of which culminate in the characterization of a general equilibrium for this economy. The final proposition establishes the limits of supply-side policy intervention at the local level.

We consider an economy populated by ex ante identical households, in total size normalized to unity. Following Rogers & Swinnerton (2002), we assume that there are aslo $\bar{k}$ entrepreneurs living in the economy, each endowed with one unit of capital. Therefore $\bar{k}$ is both the total number of entrepreneurs and the quantity of capital existing in this economy. Entrepreneurs have two options for earning a return on their endowment of capital. One is to combine capital and hired labor to produce the unique consumption good; the other is to engage in child trafficking, by illegally transporting abducted children and selling them abroad for profit. We denote by k_L the population of legitimate entrepreneurs, and by k_T that of child traffickers, with $k_L + k_T = \bar{k}$. Both k_L and k_T are determined endogenously.

All households are initially composed of an adult-child pair. Parents are altruistic in the sense that they love their children and would suffer from their disappearance. Children do nothing in this environment, apart from enjoying parental care and supervision, when offered. As long as there are entrepreneurs who find it beneficial to become child traffickers, all parents will be exposed to the risk of losing their offspring. Child trafficking is a criminal activity, which is fought in part through public enforcement of laws that guarantee child safety and protection, and in part through parental investment in child protection. We denote as g the level of public expenditures in anti-child-trafficking law-enforcement, and by x_i, the level of private investment in child protection by parent $i \in [0, 1]$. The total barrier available for the protection of the child of parent i is given by:

$$b_i = B(x_i, g), \tag{1}$$

We impose the following restrictions on the behavior of the function B.

Assumption 1. The function B has the following properties: (1) $B_x > 0$ and $B_g > 0$; (2) $B_{xg} = B_{gx} \geq 0$; (3) $B_{xx} \leq 0$.

Part (1) of Assumption 1 states that both parental investment, x_i, and public investment, g, contribute to raising the level of protection afforded a child in this environment. Part (2) states that the incremental return from increasing parental investment in child protection is non-decreasing in the government's investment and *vice versa*. Part (3) is a diminishing returns assumption: it suggests that a parent by himself cannot infinitely increase the protection afforded his child.

Given the level of protective barrier surrounding children in this environment, an entrepreneur j who decides to engage in the child trafficking business must choose the level of effort, e_j, necessary to break down barriers set up by both parents and the government. The aggregate child trafficking effort, e, in this environment is measured by:

$$e = \int_0^{k_T} e_j dj, \tag{2}$$

Each parent i knows the conditional probability, ρ_i, that his child will be trafficked away if he is protected by a barrier of level b_i, when the aggregate intensity of trafficking within the community is e. This conditional probability is described by the following function P, whose behavior is made precise in Assumption 2:

$$\rho_i = P\left(b_i, e\right). \tag{3}$$

Assumption 2. Function P satisfies the following properties: (1) $P_b < 0$; (2) $P_e > 0$; (3) $P_{bb} \geq 0$; (4) $P_{be} < 0$; (5) $P\left(b_i, 0\right) = 0$.

Part (1) of Assumption 2 states that increasing the level of child protection reduces a child's vulnerability to traffickers. Part (2) reflects the fact that an increase in the intensity of trafficking raises the risk that a child will fall victim to traffickers. Part (3) implies that *ceteris paribus*, the incremental reduction in the probability of victimization decreases as barriers are raised. It also implies that P is bounded below. Part (4) states that the incremental gain from raising the level of protective barriers is decreasing in the level of aggregate trafficking effort. Part (5) implies that there is no risk of child out-trafficking when no trafficking activity takes place.

Each parent is endowed with one unit of labor, which is inelastically supplied to legitimate entrepreneurs, in exchange for a wage, ω. After earning his labor income, each parent then

bears a child, invests x_i for his child safety and protection, and allocates the remainder, $\omega - x_i$, to household consumption, c_i, of the unique consumption good. Trafficking activity then possibly begins. A parent whose child is safe and protected enjoys a utility $u(c_i) + \delta$, where δ denotes the utility derived from raising a well-protected child. In contrast, a parent whose child is trafficked away misses out on the utility the child once provided and his utility reduces to $u(c_i)$, where $c_i \leq \omega - x_i$. The function u satisfies $u' > 0$, $u'' < 0$.[2]

3.1 Production of the consumption good

We take the consumption good as the economy's numeraire. In the production process of this good, entrepreneurs are residual claimants, and exhibit a price-taking behavior in both the labor and the output markets, respectively. An entrepreneur who combines his unit endowment of capital with l units of labor achieves a level of output given by $\theta f(l)$, where $\theta > 0$ denotes a productivity parameter, which we take as a proxy for the economy's level of development. The function f satisfies $f' > 0$, $f'' < 0$, $f(0) = 0$, as well as Inada conditions. Capital totally depreciates after its use in the production process. Given our normalization of the parent-worker population size, total labor supply is equal to 1. Since all legitimate entrepreneurs operate an identical technology, in equilibrium, perfect competition implies that they all hire the same amount of labor, $l = 1/k_L$, and pay a competitive wage given by:

$$\omega = \theta f'(1/k_L). \tag{4}$$

Let r_L denote the residual claimed by a legitimate entrepreneur. Price-taking behavior implies that this residual is given by:

$$r_L = \theta \left[f(1/k_L) - f'(1/k_L)(1/k_L) \right]. \tag{5}$$

It is immediate to establish that $\partial r_L / \partial k_L = 1/k_L^3 f'' < 0$. The return to legitimate entrepreneurship thus decreases with the number of entrepreneurs, k_L, pursuing a legitimate

[2]It can be argued that the disutility of losing a child is potentially much larger than δ and possibly infinite. Since we do observe children sent to the labor market in spite of the risk of trafficking, it must be, however, that this cost is bounded above. In absence of better information, we assume without loss of generality that losing one's child implies the loss of the utility the presence of the child provided the parents.

productive activity. This result has important implications for the supply of trafficked children.

3.2 Child trafficking technology

Child traffickers are self-employed agents who abduct children from their home and ship them abroad in exchange for profit. They combine their unit endowment of capital and their own effort, e_j, to break down barriers to child trafficking set up by the government and by the parents, where $j \in [0, k_T]$. Given the level of private and public barriers against child trafficking, it is clear that the number, n_T, of children trafficked out of the community will be proportional to the total number of children living in the economy: $n_T = \alpha$, where $\alpha \in [0, 1]$. The share α is endogenously determined.

Child tarffickers compete for a share of the victims. The number, n_{Tj}, of children successfully trafficked away by trafficker j is thus given by:

$$n_{Tj} = \alpha\beta_j, \quad j \in [0, k_T], \tag{6}$$

where

$$\beta_j = \frac{(e_j)^\lambda}{\int_0^{k_T} (e_\iota)^\lambda \, d\iota}, \qquad j \in [0, k_T], \tag{7}$$

and λ denotes the degree of competition between child traffickers. The shares $\beta_j \in [0, k_T]$ are then determined endogenously by individual traffickers' efforts. With respect to the value taken by λ, we make the following assumption:

Assumption 3. We assume that there is a certain level of tacit collusion among traffickers, so that λ is relatively close to 0.

This assumption reflects the fact that traffickers operate in extremely well organized rings, which could hardly be obtained in an environment of fierce competition.

We also assume for simplicity that the total cost of exerting a child trafficking effort is linear in this effort and equal to γe_j, with $\gamma > 0$.[3] Denoting by q the exogenously given

[3]This cost may include, for example, transportation costs, and/or other costs necessary to break down protective barriers set up by both the parent and the government.

world price of each child victim sold abroad, we can write agent j's return to child trafficking as:

$$r_{Tj} = \alpha q \beta_j - \gamma e_j. \tag{8}$$

3.3 The problem of a typical household

Parents maximize expected utility. A typical parent i solves:

$$\max_{x_i} \{u(\omega - x_i) + (1 - \rho_i)\delta\}$$
$$\text{s.t. (1) and (3)}$$

After substituting in the constraints, the objective function can be rewritten as:

$$V(x_i, e, g, \omega) \equiv u(\omega - x_i) + (1 - P[B(x_i, g); e])\delta. \tag{9}$$

The following lemma characterizes the optimal level of parent i's investment in child protection:

Lemma 1 *Let Assumptions 1 and 2 hold. Then the optimal parental investment in child protection is a function X defined by*

$$X(e, g, \omega) = \arg\max_{x_i} V(x_i, e, g, \omega)$$

such that (i) $X_e > 0$; (ii) $X_g > 0$; and (iii) $X_\omega > 0$.

Proof. The first order condition for a maximum of (9) is:

$$-u' - P_b B_x \delta = 0$$

Taking the total derivative of this first order condition and applying the Implicit Function Theorem yields the results. ■

Part (i) of Lemma 1 states that parental investment in child protection rises with the intensity of child trafficking in the economy. Part (ii) states that an exogenous increase in the level of public expenditures financing law-enforcement against child trafficking tends to cause parents to increase their own investment in child protection. This result is a direct

implication of the complementarity between private and public investment. Part (iii) implies that richer parents invest more in child protection than poorer ones.

As an implication of Lemma 1, the conditional probability that a child will be trafficked out of the community can be rewritten as follows using (3):

$$\hat{P}(e, g, \omega) \equiv P(B[X(e, g, \omega), g], e). \tag{10}$$

Lemma 2 *Under Assumptions 1 and 2, and as long as the cost of losing a child is not prohibitive, the function $\hat{P}$ exhibits the following properties: (i) $\hat{P}_e > 0$; (ii) $\hat{P}_g < 0$; (iii) $\hat{P}_\omega < 0$.*

Proof. The partial derivative of $\hat{P}$ with respect to e is given by:

$$\hat{P}_e = X_e B_x P_b + P_e. \tag{11}$$

Using Lemma 1, it is easy to verify that:

$$X_e = \frac{\delta P_{be} B_x}{u'' - \delta B_{xx} P_b - B_x^2 P_{bb}}$$

Substituting this expression in (11), we find that as long as δ is not too large $\hat{P}_e > 0$. To prove claim (*ii*), note that $\hat{P}_g = [X_g B_x + B_g] P_b < 0$ since $P_b < 0$, $X_e > 0$, and $B_x, B_g > 0$. The proof of claim (*iii*) follows in the same manner. ■

Part (i) of Lemma 2 states that the conditional probability that a child will be trafficked in this environment rises with an increase in the aggregate intensity of trafficking. The direct effect on $\hat{P}$ of an increase in e outweighs the subsequent decrease in that probability caused by the response of parents in terms of improved child protection. Part (ii) states that an increase in the level of public investment in child protection reduces this probability. Finally part (iii) states that this probability is lower the wealthier the household in which the child lives.

It is important to note that by the law of large numbers, the conditional probability, $\hat{P}(e, g, \omega)$, can be interpreted as the proportion α of children actually victims of child traffickers, when the intensity of the child trafficking activity is e, and the state of nature is given by (g, ω):

$$\alpha = \hat{P}(e, g, \omega). \tag{12}$$

3.4 Inter-sectoral allocation of entrepreneurs

A typical trafficker j's problem is to choose the level of individual effort, e_j, that solves the following program:

$$\begin{aligned} &\max_{e_j} r_{Tj} \\ &\text{s.t.(7) and (8)} \end{aligned} \tag{13}$$

Assuming that each trafficker does not internalize the impact of his action on the others, the first order condition for problem (13) is:

$$e_j = \alpha q \bar{\lambda} \beta_j, \qquad j \in [0, k_T] \tag{14}$$

where β_j is defined in (7) and $\bar{\lambda} = \lambda \gamma^{-1}$. Since traffickers are homogeneous and non-strategic, they all choose to exert exactly the same level of effort so that $e_j = e^*$, for all j. Consequently, each trafficker's market share is $\beta_j = \beta^* = 1/k_T$.

Therefore, using (12) and (14), the equilibrium effort e^* is characterized by the following equation:

$$\Upsilon\left(e^*, g, q, \theta, k_T\right) = 0, \tag{15}$$

where k_T denotes the total population of child traffickers, and

$$\Upsilon\left(e^*, g, q, \theta, k_T\right) \equiv k_T e^* - \hat{P}\left(e^* k_T, g, \theta f'\left[\left(\bar{k} - k_T\right)^{-1}\right]\right) q\bar{\lambda}. \tag{16}$$

Lemma 3 *Under Assumptions 1, 2 and 3, the trafficking effort e^* chosen by each child trafficker exists and is a function E defined by:*

$$\Upsilon\left[E\left(g, q, \theta, k_T\right), g, q, \theta, k_T\right] \equiv 0,$$

such that: (i) $E_g < 0$; (ii) $E_q > 0$; (iii) $E_\theta < 0$; (iv) $E_k < 0$.

Proof. Using (16), we take in turn the derivatives of Υ with respect to each argument:

$$\begin{aligned} \Upsilon_e &= \left[1 - q\bar{\lambda}\hat{P}_e\right] k_T \\ \Upsilon_g &= -q\bar{\lambda}\hat{P}_g \\ \Upsilon_q &= -\bar{\lambda}\hat{P}\left(e^* k_T, g, \theta f'\left[\left(\bar{k} - k_T\right)^{-1}\right]\right) \\ \Upsilon_\theta &= -q\bar{\lambda} f'\left[\left(\bar{k} - k_T\right)^{-1}\right]\hat{P}_\omega \\ \Upsilon_k &= \left[1 - q\bar{\lambda}\hat{P}_e\right] e^* - q\bar{\lambda}\left(\bar{k} - k_T\right)^{-2}\theta f''\hat{P}_\omega. \end{aligned}$$

Using Assumption 3, as $\lambda \to 0$, so does $\bar{\lambda} \to 0$, and we have $\Upsilon_e > 0$ and $\Upsilon_k > 0$, since $\hat{P}_e > 0$ and $\hat{P}_\omega < 0$. Furthermore, $\Upsilon_g > 0$, since $\hat{P}_g < 0$. Finally, $\Upsilon_q < 0$ and $\Upsilon_\theta > 0$ by inspection. The results then follow from the application of the Implicit function's theorem. ■

Lemma 3 characterizes the response of local traffickers to changes in their environment. It shows that an exogenous increase in the level of public expenditures allocated to anti-child-trafficking law-enforcement tends to induce traffickers to reduce their trafficking effort [Part (i)]. So does economic development [Part (iii)]. Exogenous increases in the international price for trafficked children tend to stimulate traffickers' effort [Part (ii)]. An increase in the number of traffickers has a negative effect on the effort level chosen by each trafficker [Part (iv)]. All these effects are quite intuitive. However, these are only partial equilibrium effects, as the number of child traffickers will adjust in equilibrium. We next characterize the equilibrium inter-sectoral allocation of entrepreneurs.

A general equilibrium for this economy exists if and only if there exists, k_T^*, such that $r_L = r_T$, and $k_L^* = \bar{k} - k_T^*$. In other words, entrepreneurs in equilibrium must be indifferent between either market. If this were not the case, there would be movements of entrepreneurs across markets until returns are equalized. We now proceed to show that such an equilibrium exists and is unique.

First, note that after substituting $e^* = E(g, q, \theta, k_T)$ in (10), the incidence of child trafficking is:

$$\alpha = \widetilde{P}(k_T, g, q, \theta) \tag{17}$$

where

$$\widetilde{P}(k_T, g, q, \theta) \equiv \hat{P}\left(k_T E(g, q, \theta, k_T), g, \theta f'\left[\left(\bar{k} - k_T\right)^{-1}\right]\right). \tag{18}$$

Lemma 4 *Under Assumptions 1, 2 and 3, the function $\widetilde{P}$ has the following properties: (i) $\widetilde{P}_k > 0$; (ii) $\widetilde{P}_g < 0$; (iii) $\widetilde{P}_q > 0$; (iv) $\widetilde{P}_\theta < 0$.*

Proof. Using (18) we can derive the above partial equilibrium effects as follows:

$$\begin{aligned}
\widetilde{P}_k &= [e^* + k_T E_k]\hat{P}_e + \theta\left(\bar{k} - k_T\right)^{-2} f''\hat{P}_\omega \\
\widetilde{P}_g &= k_T \hat{P}_e E_g + \hat{P}_g < 0
\end{aligned}$$

$$\begin{aligned}\widetilde{P}_q &= k_T \hat{P}_e E_q > 0 \\ \widetilde{P}_\theta &= f' \hat{P}_\omega < 0.\end{aligned}$$

First, observe from the proof of Lemma 3 that as $\bar{\lambda} \to 0$, $k_T E_k \to -e^*$, so that $\widetilde{P}_k \to \theta \left(\bar{k} - k_T\right)^{-2} f'' \hat{P}_\omega$, which is positive, since $\hat{P}_\omega < 0$ and $f'' < 0$. Hence $\widetilde{P}_k > 0$. The sign of the other partial effects all follow from Lemma 3. Hence the results ■

Next, we characterize the optimal return to capital in the child trafficking activity, $r_T = R^T(k_T, g, q, \theta)$, as follows:

$$R^T(k_T, g, q, \theta) = \frac{q}{k_T} \widetilde{P}(k_T, g, q, \theta) - \gamma E(g, q, \theta, k_T). \tag{19}$$

The partial equilibrium effects on the return to capital in the child-trafficking sector are summarized in the following Lemma:

Lemma 5 *Under Assumptions 1, 2 and 3, the function R^T has the following properties: (i) $R^T_k < 0$; (ii) $R^T_g < 0$; (iii) $R^T_q > 0$; (iv) $R^T_\theta < 0$.*

Proof. The partial derivatives of R^T with respect to each of its arguments are given by:

$$R^T_k = -\frac{q\widetilde{P}(k_T, g, q, \theta)}{(k_T)^2} + \frac{1}{k_T}\left[q\widetilde{P}_k - \gamma k_T E_k\right] \tag{20}$$

$$R^T_g = \frac{1}{k_T}\left[q\widetilde{P}_g - \gamma E_g k_T\right] \tag{21}$$

$$R^T_q = \frac{1}{k_T}\left[\widetilde{P}(k_T, g, q, \theta) + q\widetilde{P}_q - \gamma E_q k_T\right] \tag{22}$$

$$R^T_\theta = \frac{1}{k_T}\left[q\widetilde{P}_\theta - \gamma E_\theta k_T\right] \tag{23}$$

Claim 1. $R^T_k < 0$. Again, from the proof of Lemma 3 as $\bar{\lambda} \to 0$, $k_T E_k \to -e^*$, which, when substituted back into (20), implies:

$$R^T_k = -\frac{1}{k_T}\left[R^T(k_T, g, q, \theta) - q\widetilde{P}_k\right].$$

We know from the proof of Lemma 4 that for $\bar{\lambda} \to 0$, $\widetilde{P}_k \to \theta \left(\bar{k} - k_T\right)^{-2} f'' \hat{P}_\omega$. Finally, using Lemma 2, we end up with:

$$\widetilde{P}_k \approx -\frac{\theta \left(\bar{k} - k_T\right)^{-2}}{-u'' + \delta P_{bb}} P_b u'' f''.$$

Now observe that we can always choose the functions P, u and f such that $-P_b u'' f'' \to 0$. Hence the result.

Claim 2. $R_g^T < 0$. From (21), consider the difference $\triangle_g = q\widetilde{P}_g - \gamma E_g k_T$. We need to show that this difference is negative. From Lemma 4, it can be shown by way of substitution that:

$$\triangle_g = qk_T\hat{P}_e E_g + q\hat{P}_g - \gamma E_g k_T.$$

Lemma 3 implies:

$$\gamma E_g k_T = \frac{\lambda q \hat{P}_g}{\left[1 - q\bar{\lambda}\hat{P}_e\right]}$$

since $\bar{\lambda} = \lambda/\gamma$. Substituting back into $\triangle_g$ and re-arranging terms yields:

$$\triangle_g = qk_T\hat{P}_e E_g + q\hat{P}_g\left[1 - \frac{\lambda}{1 - q\bar{\lambda}\hat{P}_e}\right] < 0$$

for $\lambda \to 0$. Hence the result.

Claim 3. $R_q^T > 0$. From (22), consider the difference $\triangle_q = q\widetilde{P}_q - \gamma E_q k_T$. It suffices to show that this difference is non-negative. From Lemma 3 and Lemma 4, we have:

$$\triangle_q = \left[q\hat{P}_e - \gamma\right] k_T E_q.$$

We can always choose γ and the function P such that $q\hat{P}_e - \gamma \geq 0$.

Claim 4. $R_\theta^T < 0$. Again, from (23), consider the difference $\triangle_\theta = q\widetilde{P}_\theta - \gamma E_\theta k_T$. From Lemma 3 and Lemma 4, we have:

$$\triangle_\theta = f'\hat{P}_\omega\left[1 - \frac{\lambda q}{1 - q\bar{\lambda}\hat{P}_e}\right] < 0$$

for $\lambda \to 0$. Hence the result. ■

Property (i) of Lemma 5 states that the return to capital in the child trafficking activity is decreasing in the number of entrepreneurs who choose to invest in child trafficking. Property (ii) states that this return also decreases with an increase in the level of public expenditures allocated to better enforcement of anti-child trafficking laws. Property (iii) states that an exogenous increase in the worldwide price for trafficked children from the rest of the world causes this return to rise. Property (iv) implies that this return is higher, the poorer the economy.

Next, let us re-write the return to capital in the legitimate sector, using (5):

$$R^L\left(k_T,\theta\right)=\theta\left(f\left[L\left(k_T\right)\right]-f'\left[L\left(k_T\right)\right]\left(L\left(k_T\right)\right)\right), \tag{24}$$

where

$$L\left(k_T\right)=\frac{1}{\bar{k}-k_T} \tag{25}$$

Clearly, the richer the economy, the higher the return to legitimate entrepreneurship: $R^L_\theta>0$.

Furthermore, since $L'>0$, the smaller the number of legitimate entrepreneurs (i.e., the higher k_T), the higher the return to legitimate entrepreneurship:

$$R^L_k=-\frac{1}{\left(\bar{k}-k_T\right)^3}f''>0.$$

Finally, we define

$$\sigma\left(k_T,g,q,\theta\right)\equiv R^T\left(k_T,g,q,\theta\right)-R^L\left(k_T,\theta\right) \tag{26}$$

to be the net gain from choosing illegitimate entrepreneurship (i.e., child trafficking). The following Lemma obtains as an implication of Lemma 5:

Lemma 6 *Under Assumptions 1, 2 and 3, the function σ has the following properties: (i) $\sigma_k<0$; (ii) $\sigma_g<0$; (iii) $\sigma_q>0$; (iv) $\sigma_\theta<0$.*

Property (i) of Lemma 6 states that the net gain from engaging in child out-trafficking decreases with the number of agents who opt for this strategy as a means to earn a return on their capital. Property (ii) states that this net gain decreases the more active the government is in enforcing the law against child out-trafficking. Property (iii), in contrast states that an exogenous increase in the international price for trafficked children causes this net gain to rise. Property (iv) states that this net gain is higher in poorer countries than in their richer counterparts.

We define a general equilibrium for this economy as a situation where entrepreneurs are indifferent as to the sector in which they invest their capital. In other words, in equilibrium, returns to capital are equalized across both sectors:

$$\sigma\left(k_T,g,q,\theta\right)=0. \tag{27}$$

A *general equilibrium* is therefore an inter-sectoral allocation of capital (k_L^*, k_T^*), and an incidence of child out-trafficking α^*, such that (i) k_T^* solves (27), (ii) $k_L^* = \bar{k} - k_T^*$, and (iii)

$$\alpha^* = \widetilde{P}\left(k_T^*, g, q, \theta\right). \tag{28}$$

The following Lemma obtains as an implication of Lemma 6 and the Implicit Function Theorem:

Lemma 7 *Under Assumptions 1, 2 and 3, there exists a function* κ *defined by* $\sigma\left[\kappa\left(g,q,\theta\right), g, q, \theta\right] \equiv 0$ *such that: (i)* $\kappa_g < 0$*; (ii)* $\kappa_q > 0$*; (iii)* $\kappa_\theta < 0$*, where* $k_T^* = \kappa\left(g,q,\theta\right)$*, denotes the value of* k_T *that solves (27).*

Lemma 7 shows that, *ceteris paribus* the number of child traffickers within a given source country decreases with better law-enforcement. Traffickers react to the international price for children: a higher price, *ceteris paribus* attracts more traffickers in the business. This can happen either if the world supply is curbed or if the world demand expands. Moreover, Lemma 7 states that the proportion of child traffickers is higher in poorer than in richer countries. There are two underlying causes for this result. On one hand, where poverty is pervasive, parents do not invest adequately in child protection; this weakens the household as an effective protective unit against child trafficking. On the other, poverty may push entrepreneurs to seek the higher returns to capital provided in the illegitimate trafficking business.

By characterizing the solution to equation (27), Lemma 7 also implicitly establishes the following proposition:

Proposition 1 *Under Assumptions 1, 2 and 3, an equilibrium exists and is unique.*

We now turn to the discussion of policy action.

3.5 Policy responses to child trafficking in a source-country

Using (28) and substituting in the equilibrium k_T^*, the equilibrium incidence of child trafficking boils down to the following function:

$$\alpha^* = P^*\left(g,q,\theta\right),$$

where $P^*(g,q,\theta) \equiv \widetilde{P}[\kappa(g,q,\theta),g,q,\theta]$.

The following Lemma obtains as an implication of Lemma 7.

Lemma 8 *Under Assumptions 1, 2 and 3, the function P^* has the following properties: (i) $P^*_g < 0$; (ii) $P^*_q > 0$; (iii) $P^*_\theta < 0$.*

Proof. Taking the partial derivatives of P^* with respect to its arguments and using the previous Lemmas, we find:

$$\begin{aligned} P^*_g &= \widetilde{P}_k\kappa_g + \widetilde{P}_g < 0 \\ P^*_q &= \widetilde{P}_k\kappa_q + \widetilde{P}_q > 0 \\ P^*_\theta &= \widetilde{P}_k\kappa_\theta + \widetilde{P}_\theta < 0. \end{aligned}$$

■

Property (i) of Lemma 8 states that *ceteris paribus* better law-enforcement financed by an increase in public investment reduces the incidence of child trafficking. However, this effect can be undermined by any mechanism that puts an upward pressure on the international price for children [property (ii)]. Similar supply-side policies abroad typically have this effect. Property (iii) states that economic development causes the incidence of child out-trafficking to decline. As the wealth of households increases, with economic development, these households become more effective protective units for their children. Property (iii) therefore explains why poorer countries are more likely to be source countries for child trafficking, while richer countries are more likely to be destination countries.

However, since the source country acting in autarky cannot influence the international demand for trafficked children, policy discussions of the eradication of child trafficking that emphasize supply-side interventions in source countries are likely to fail if they ignore the negative spillover caused by similar policies elsewhere. Increased police inspections, border patrols, and raising public awareness, while necessary, are not by themselves sufficient for the complete elimination of child trafficking in source countries. In our model, complete elimination of child out-trafficking by government officials acting in autarky would imply that the level of public expenditures on law-enforcement, g, be chosen such that $P^*(g,q,\theta) = 0$. The following proposition characterizes the determinants of that level. It is a straightforward application of Lemma 8.

Proposition 2 *There exists a function G defined by $P^*[G(q,\theta),q,\theta] \equiv 0$, such that (i) $G_q > 0$, and (ii) $G_\theta < 0$, where $G_j = \partial G/\partial j$, $j = q, \theta$.*

Proposition 2 implies that any action that causes the international price for trafficked children to rise generates a negative externality on the fight against child trafficking in a source country: it causes the level of public expenditures necessary for a complete elimination of child trafficking to increase (i.e., $G_q > 0$). Proposition 2 also suggests that, in poorer countries, the burden of fighting child trafficking almost lies entirely with the government. The poorer the country, the higher the level of public expenditures necessary to completely eliminate child trafficking (i.e., $G_\theta < 0$). In poorer countries, parents are less capable of providing adequate protection for their children. Hence governments may need to make a disproportionate contribution to child protection as compared to richer countries.

There is an element of tragedy in Proposition 2. On the one hand, it implies that only international coordination can fight child trafficking. On the other hand, it suggests that policies aimed at fighting the supply alone are misguided. The problem with Proposition 2 is that it mimicks the myopic reasoning of an individual country assuming that its actions do not affect the world price for trafficked children. Clearly, this is a mistake. As all countries can apply the same reasoning, policies to combat traffickers will curb the supply, make the price skyrocket and attract more traffickers into the business. The fight of child trafficking from the supply side only is therefore utterly vain. The prerequisited policies are those that put a negative pressure on the world price of children. Such policies invariably lead us to a fight on the demand. Indeed, if destination countries first target the demand, they make it easier for source countries to fight the supply, as Proposition 2 suggests.

Bluntly put, this paper suggests that simply sending traffickers to jail, while it may serve justice well, will hardly reduce the trafficking of children. Removing a trafficker from the field makes the business more profitable to other traffickers and attracts more entrepreneurs into the trade, unless action is also taken to make the price drop. Making it too costly for pedophiles to risk having sexual relations with children at home or in other destination countries is an element of such policy.[4] Prosecuting those who use child soldiers is another.

[4]Adopting and enforcing child sex tourism legislation is an important step.

Deterring penalties should be designed for each pilar of the demand. For this attack on the demand side, coordinated action at the global level is important. Adopting a strong and unified penal code on the use of trafficked children is a first step. Enforcing such code is the second. As rich countries tend to suggest that poor countries, by being too lenient on traffickers, are responsible for the trafficking business, it may come as a cold shower to realize that a successful policy intervention also implies a fight in their own backyard.

4 Concluding remarks

This paper develops a model to advocate the need for an internationally coordinated action against child trafficking between source and destination countries. The model emphasizes the microeconomics of both children's vulnerability to trans-boundary trafficking and individual entrepreneurs' decision to engage in the business of child trafficking.

Our results shed light on the externality the actions of richer countries may exert on poorer countries in the fight against child trafficking. In particular, it does not seem appropriate for rich countries to pressurize poor countries to immediately adopt similar protection mechanisms as the ones they have already put in place. On the one hand, putting such pressure on poor countries would imply disregarding the fact that it is more costly for poor countries to achieve the same protection of their children. Rich countries' actions have indeed pushed up the price for children. Second, the fight against child trafficking cannot neglect the demand side. As long as the price is high enough, there will be traffickers. Prior to further supply-side policies, governments need to find a way to make the price of trafficked children drop. Coordinated action on the demand side by destination countries is thus a prerequisite to supply-side policies in source countries. Clearly international cooperation is at the core of any successful intervention.

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Table 1: An Overview of International Child Trafficking Flows

Regions	Source Countries (GDP per capita)	Receiving Countries (GDP per capita)
Africa	Benin (1,070)	Nigeria (875) Cote d'Ivoire (1,500) Cameroon (1,700) Gabon (5,700)
	Mali (860)	Cote d'Ivoire (1,500)
	Togo (1,500)	Cameroon (1,700) Gabon (5,700) Nigeria (875)
South and South-East Asia	Malaysia (9,300)	Taiwan (18,000) Australia (27,000) Japan (28,000) Hong Kong (26,000)
	Nepal (1400)	India (2,540)
	Bangladesh (1,700)	Pakistan (2,100) India (2,540)
Latin and Central America	Honduras (2,600)	Canada (29,400)
	Costa Rica (8,500)	United States (37,600) Canada (29,400)
Eastern Europe	Albania (4,500)	Italy (25,000) Greece (19,000)
	Lithuania (8,400)	Germany (26,600) Denmark (29,000) Netherlands (26,900) Israel (19,000)

(Sources: Unicef and World Bank. GDP per capita in PPP from *The World Factbook 2003*)