

Buying Out Child Labor

Stéphane Pallage & Christian Zimmermann

(CREFFE, UQAM)

Facts

1) Child labor is a significant practice of developing countries and a seemingly self-perpetuating institution (poverty trap).

	Ghana (92)	Côte d'Ivoire (88)	Peru (91)	Pakistan (91)	World (95)
Children particip. rate	28% ^a	19.3% ^b	14.7-18.1% ^c	27.8% ^d	13.02% ^e
Av. years of schooling*	3.86	4.11	7.91	2.5	

2) Many rich countries advocate bans on child labor.

Definition

Child labor is defined as the participation of school-aged children on a regular basis in the labor force in order to earn a living for themselves (street children) or to supplement household income.
[Canaggarajah-Coulombe-97]

Debates in the child labor literature

- Are bans on child labor beneficial to poor countries?
 - Dessy (1999) versus Basu-Van (1998)
- Where does child labor come from?
 - ◇ Externalities (social returns to education higher than private returns): Grootaert-Kanbur (1995)
 - ◇ Parents are selfish: Gupta (1998)
 - ◇ Parents are altruistic, but wretched: Basu-Van (1998)
 - ◇ Coordination failures: Dessy-Pallage (2000)
 - ◇ Lack of commitment: Baland-Robinson (2000)

Our problem

We do not know whether bans are desirable. We don't get into these questions.

- 1) We would like to understand the growth implications of child labor.
- 2) We analyze the possible use of child labor as a strategic device. We would like to characterize the optimal self-enforcing contract between rich and poor countries that would lead to the disappearance of child labor.
- 3) We would like to quantify a 'moral' issue: how much would the poor require to forego the practice vs how much is the rich willing to pay?

Growth literature on which we build

- Lucas (1988)
- Azariadis-Drazen (1990)
- Galor-Tsiddon (1997)

I. A “simple” growth model with education

One country: closed economy

Two generations: live for two periods, one as children, one as adults

Family: one child for each adult

Preferences: $u_t^2 = u(c_t^1 + c_t^2, e_t) + \beta u_{t+1}^2$

Production: $y_t^1 = A n_t^1 h_t^1$ and $y_t^2 = A n_t^2 h_t^2$

Laws of motion: $h_{t+1}^1 = h_t^1$ and $h_{t+1}^2 = h_t^1 + \gamma_1 h_t^{2\gamma_2} e^{\gamma_3}$

Budget: $w_t^1 n_t^1 + w_t^2 n_t^2 = c_t^1 + c_t^2$

Problem of parents:

$$v^2(h^2) = \max_e u^2(A(1 - e)h^1 + Ah^2, e) + \beta v^2(h^1 + \gamma_1 h^{2\gamma_2} e^{\gamma_3})$$

Poverty traps?

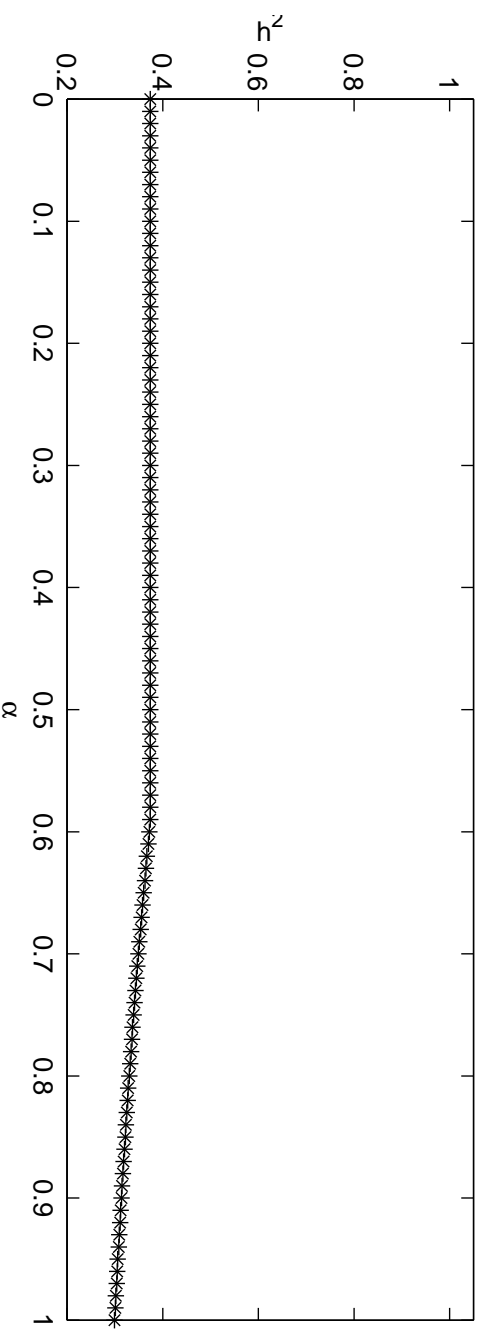
Example: logarithmic preferences

$$u_t^2 = \alpha \ln(c_t^1 + c_t^2) + (1 - \alpha) \ln(e_t) + \beta u_{t+1}^2$$

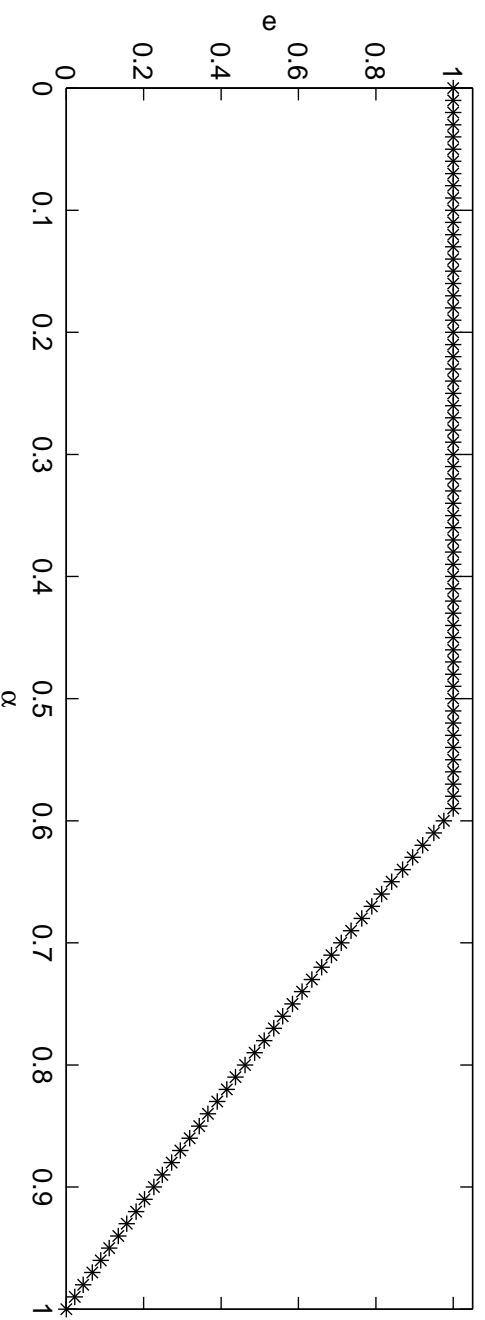
Steady-states:

$$\left\{ \begin{array}{l} e = (1 - \alpha) \frac{h^1 + h^2}{h^1} + \alpha \frac{\beta \gamma_3 \frac{h^2 - h^1}{h^1}}{1 - \beta \gamma_2 + \beta \gamma_2 \frac{h^1}{h^2}} \\ h^2 = h^1 + \gamma^1 h^{2\gamma_2} e^{\gamma_3} \end{array} \right.$$

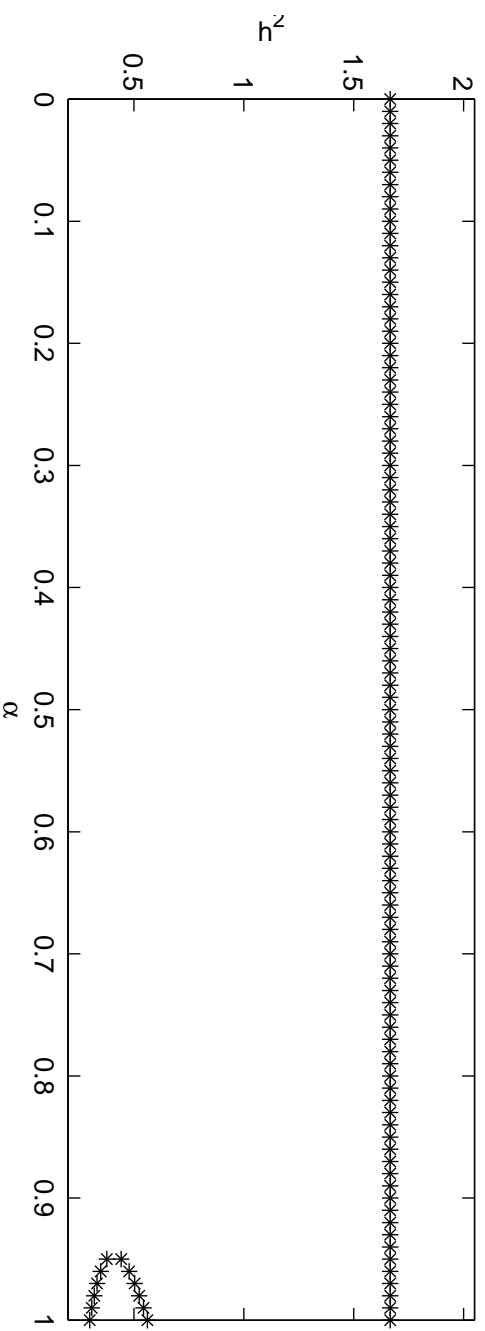
Steady-state human capital, $h^1 = .3$ and $\gamma_1 = .2$



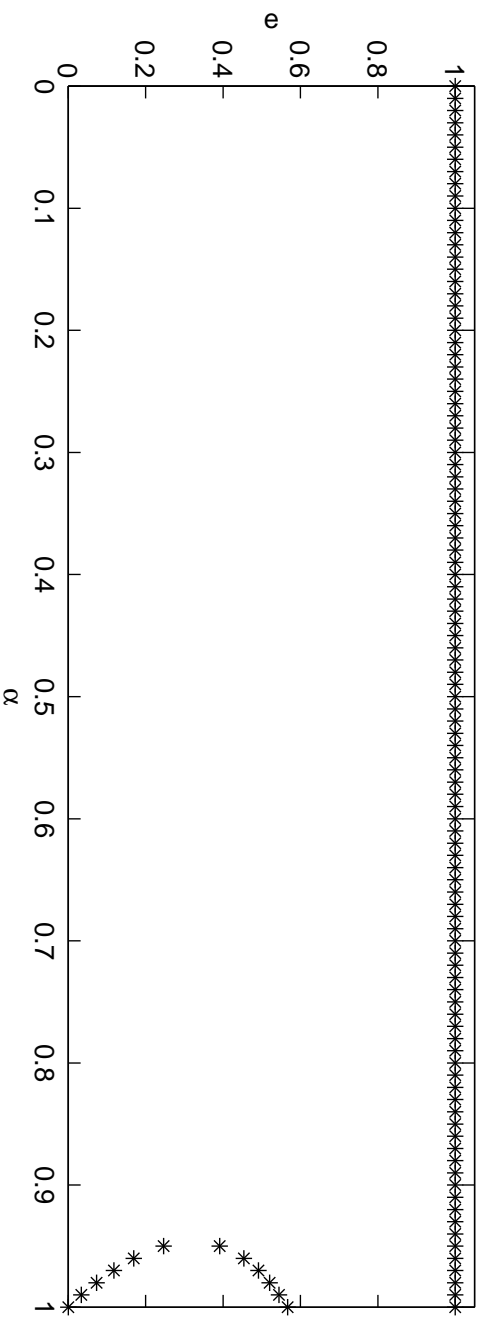
Steady-state schooling effort, $h^1 = .3$ and $\gamma_1 = .2$

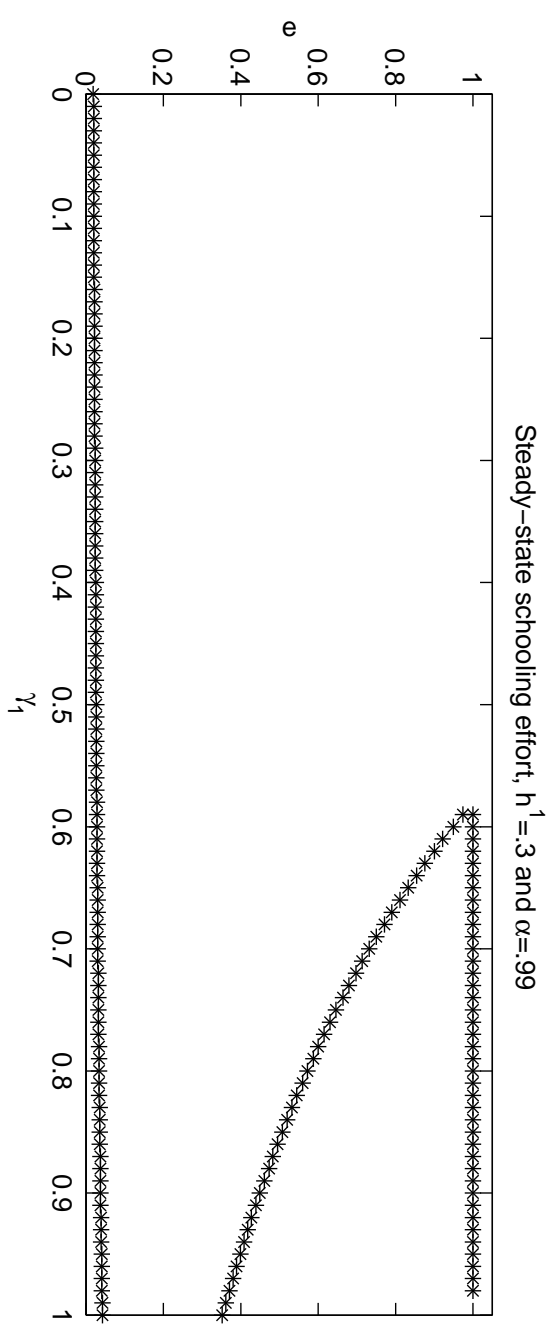
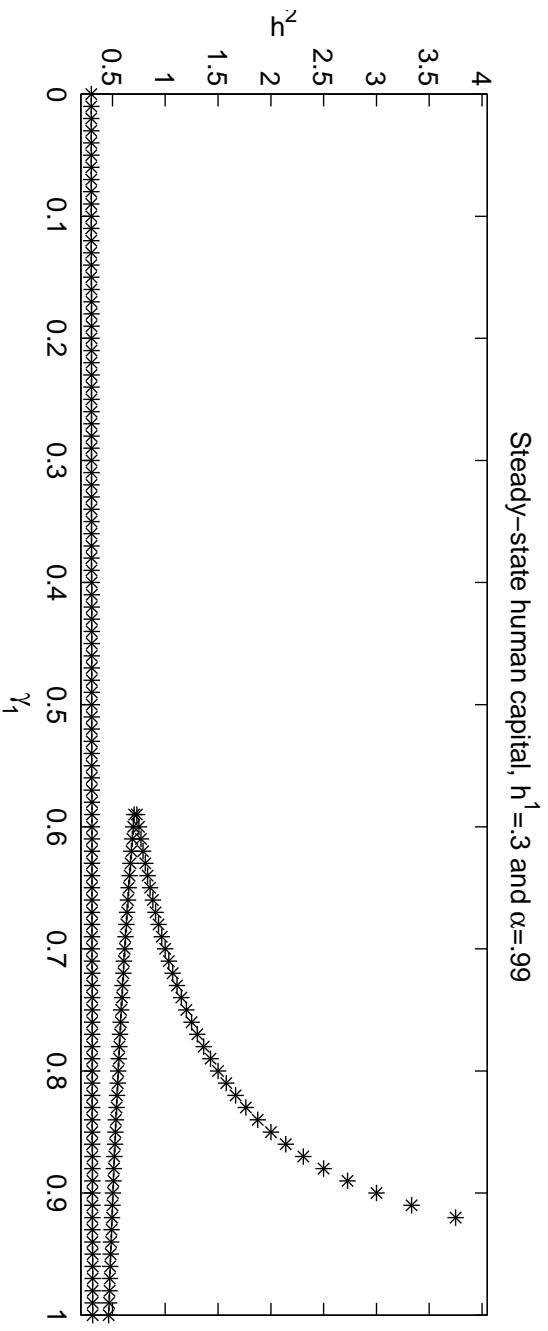


Steady-state human capital, $h^1=.3$ and $\gamma_1=.82$

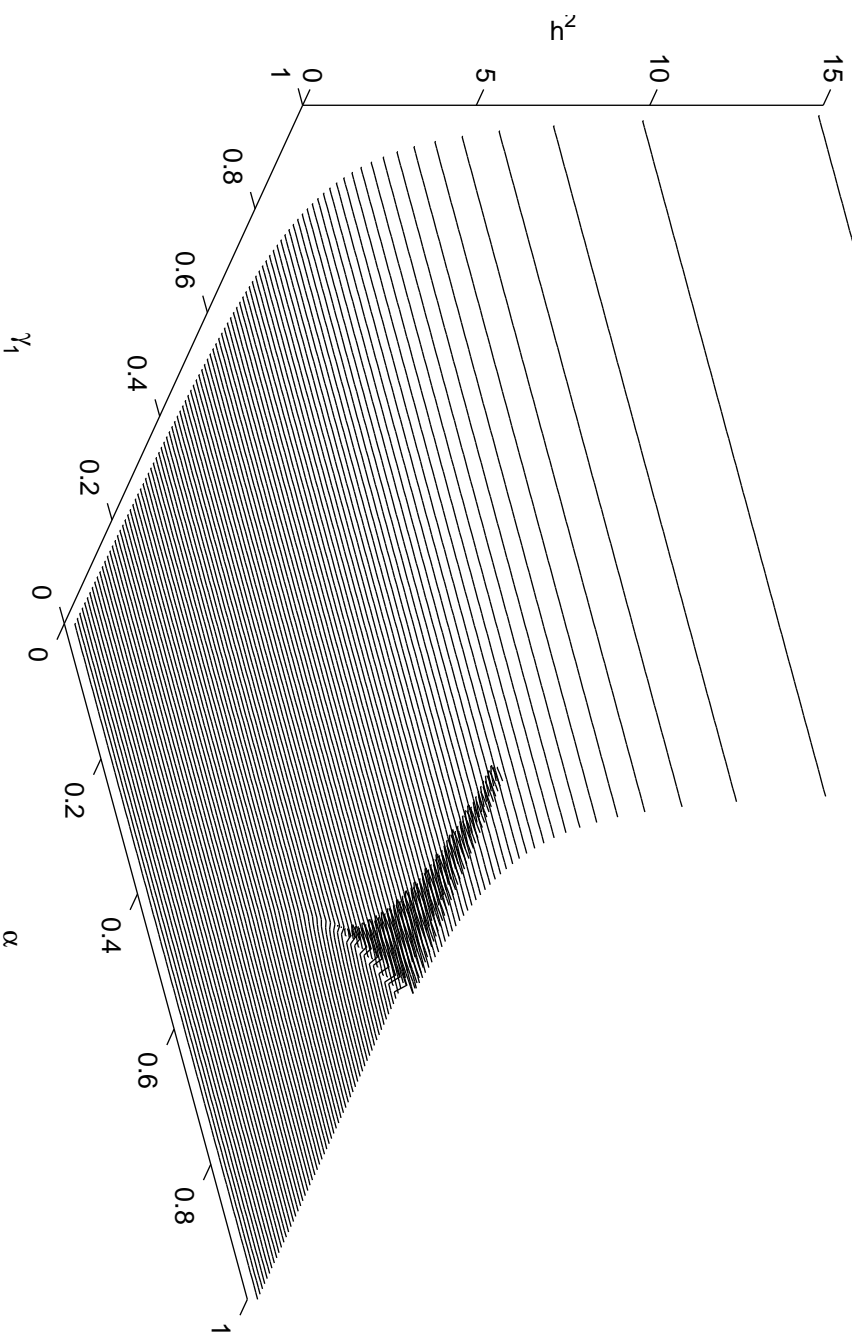


Steady-state schooling effort, $h^1=.3$ and $\gamma_1=.82$





Steady-state human capital, $h^1 = .3$, $\beta = .5$



II. The open economy model with externality

Two countries: one “rich”, one “poor”

Preferences of the rich: $u_t^2 = u(c_t^1 + c_t^2, e_t + e_t^*) + \beta u_{t+1}^2$

Preferences of the poor: $u_t^{2*} = u(c_t^{1*} + c_t^{2*}, e_t^*) + \beta u_{t+1}^{2*}$

Markov equilibrium without transfers: pair of decision rules

$[e(\cdot), e^*(\cdot)]$ that solve:

$$[P] \begin{cases} v^{2*}(h^{2*}) = \max_{e^*} u^*(A(1 - e^*)h^{1*} + Ah^{2*}, e^*) + \beta v^{2*}(h^{2*'}) \\ v^2(h^2; h^{2*}, e^*) = \max_e u(A(1 - e)h^1 + Ah^2, 2 - e - e^*) + \beta v^2(h^{2'}; h^{2*'}, e^*) \end{cases}$$

Sustainable transfers:

$$[P'] \max_{e_t, \tau_t} \sum_{t=0}^{\infty} \beta^t u(Ah_t^2 - \tau_t, e_t + 1)$$

subject to:

$$\left\{ \begin{array}{l} h_{t+1}^2 = h^1 + \gamma_1 h_t^{2\gamma_2} e^{\gamma_3} \\ h_{t+1}^{2*} = h^{1*} + \gamma_1 h_t^{2*\gamma_2} e^{*\gamma_3} \\ h_0^2 = \bar{h}_0, \quad h^1 = \underline{h}_0, \quad h_0^{2*} = \bar{h}_0^*, \quad h^{1*} = \underline{h}_0^* \\ \sum_{s=t}^{\infty} \beta^s u^*(Ah_s^{2*} + \tau_s, 0) \geq v^{2*}(h_t^{2*}) \quad \forall t \end{array} \right.$$

An attempt at calibration

Two countries: Ghana and the United States

Functional forms:

Asymmetry in preferences:

$$u_t^2 = \alpha \ln(c_t^1 + c_t^2) + (1 - \alpha) \ln(e_t + e_t^*) + \beta u_{t+1}^2$$

$$u_t^{2*} = \alpha \ln(c_t^{1*} + c_t^{2*}) + (1 - \alpha) \ln(e_t^*) + \beta u_{t+1}^{2*}$$

Symmetry in other functional forms:

$$h_{t+1}^1 = h_t^1$$

$$h_{t+1}^2 = h_t^1 + \gamma_1 h_t^{2\gamma_2} e^{\gamma_3}$$

$$y_t^1 = A n_t^1 h_t^1$$

$$y_t^2 = A h_t^2$$

Facts we want to replicate:

- 1) a ratio of human capital between the US and Ghana of about 3
- 2) Children in Ghana spending on average 12.3 hours a week at work \rightarrow 31% of time available for education spent at work

Table 1: Calibration

α	γ_1	γ_2	γ_3	β	$h^1 = h^{1*}$	h_{ss}^2	h_{ss}^{2*}
.985	.835	1.07	.17	.50	.30	3.15	1.24

Solution algorithm

Markov eq. without transfers:

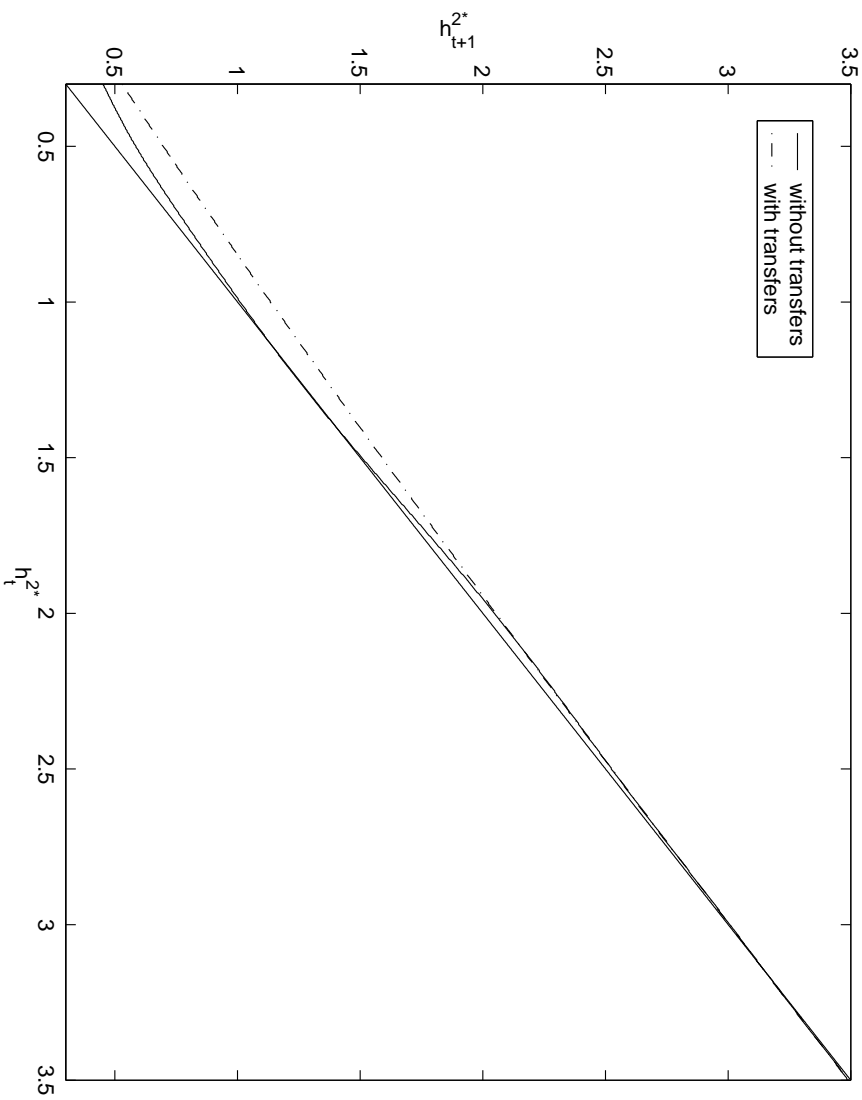
- 1:** Solve autarkic problem of poor \rightarrow obtain $v^{2*}(\cdot)$ and $e^*(\cdot)$
- 2:** Use it to solve problem of the rich \rightarrow obtain $v^2(\cdot|e^*)$ and $e(\cdot|e^*)$

Sustainable transfers:

- 1:** Find transfer rule $\tau(\cdot)$ that makes the poor indifferent between autarky and giving up child labor
- 2:** Compute utility of the rich given $\tau(\cdot)$
- 3:** Transfers are sustainable at a given state if they make the rich better off than autarky. Transfers are sustainable along a development path if they are sustainable at any state along the path.

Early results

Fig. 3-a: Optimal dynamics with and without transfers



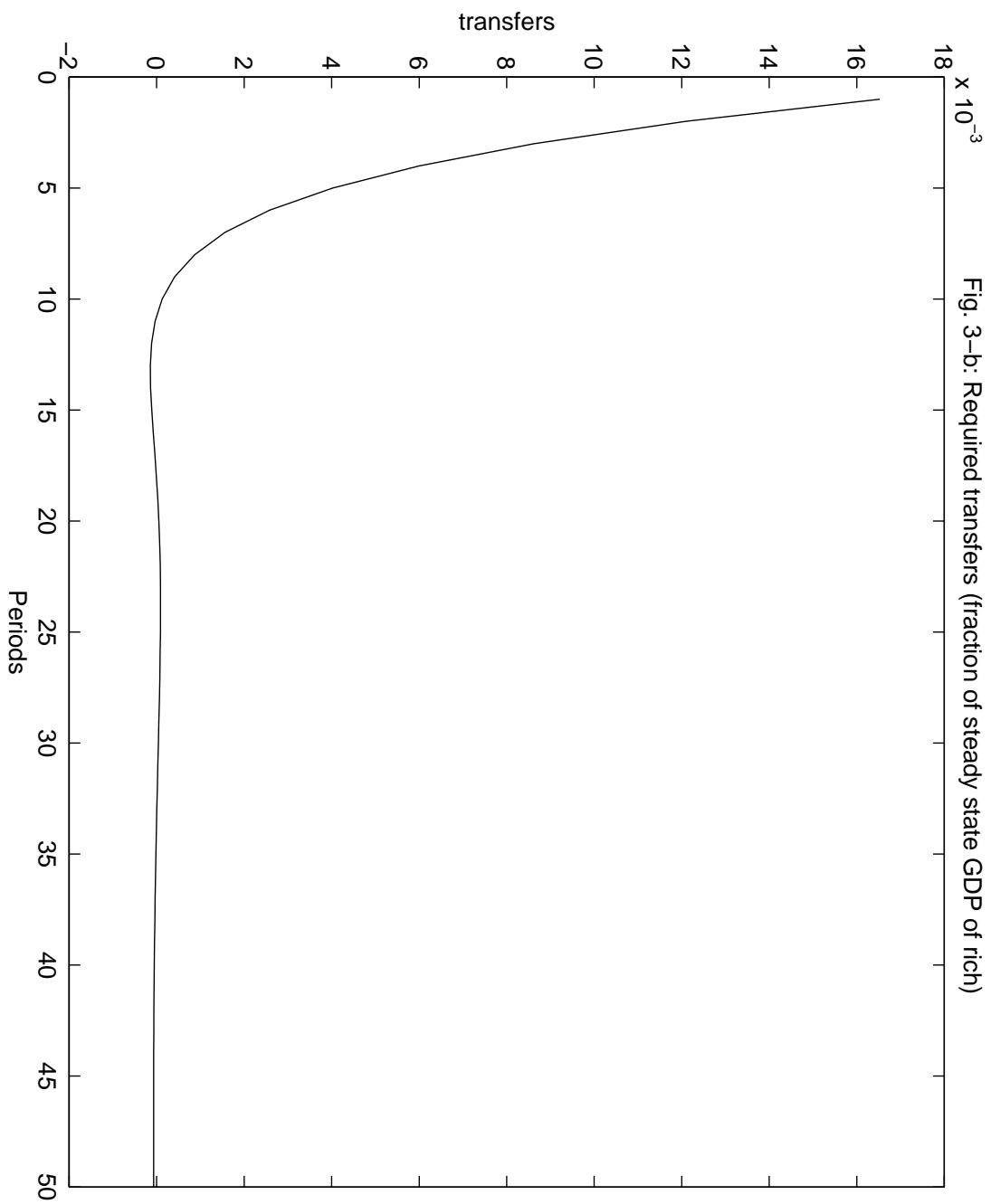
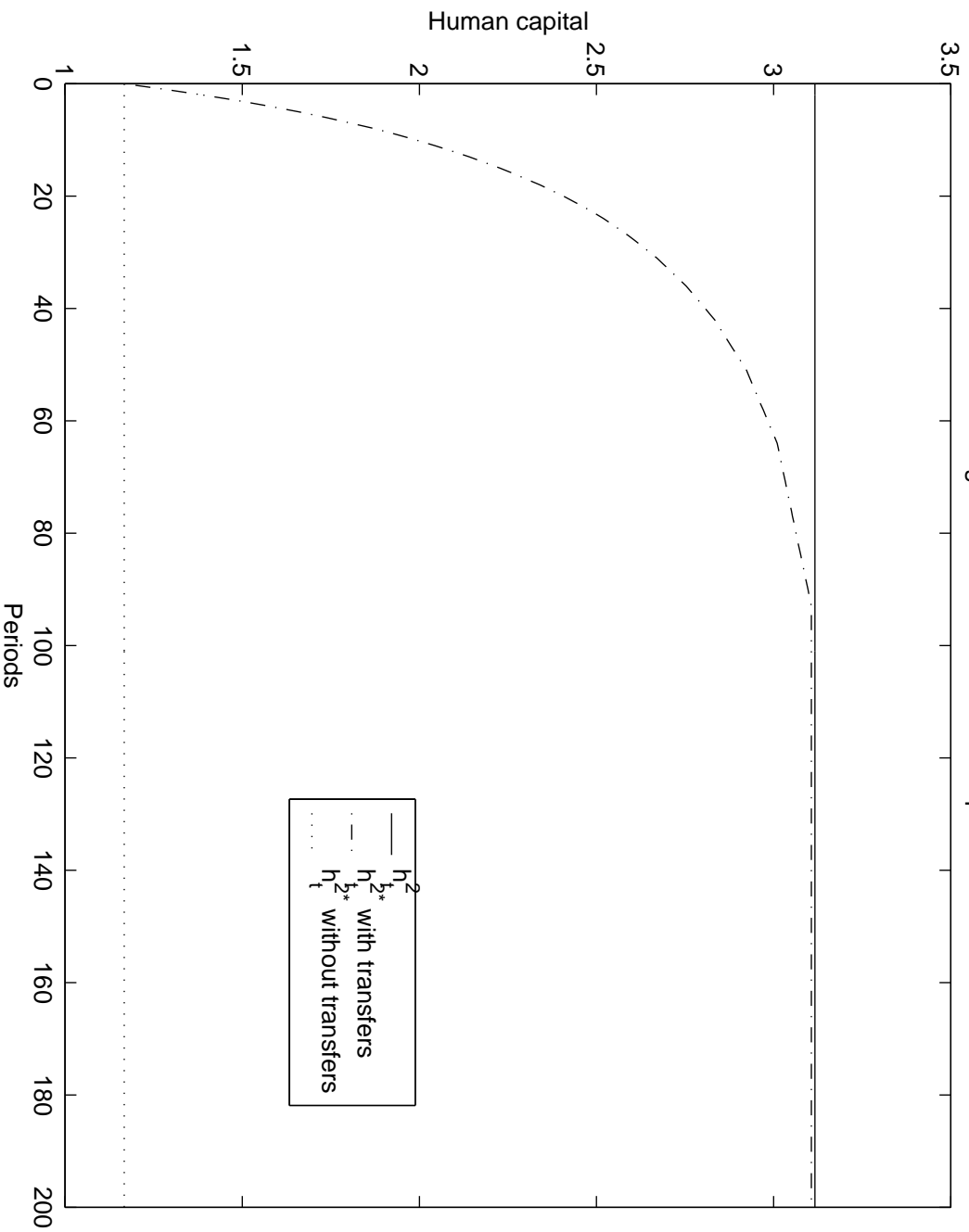


Fig. 3-b: Required transfers (fraction of steady state GDP of rich)

Fig. 3-c: Evolution of human capital



Are transfers sustainable?

No.

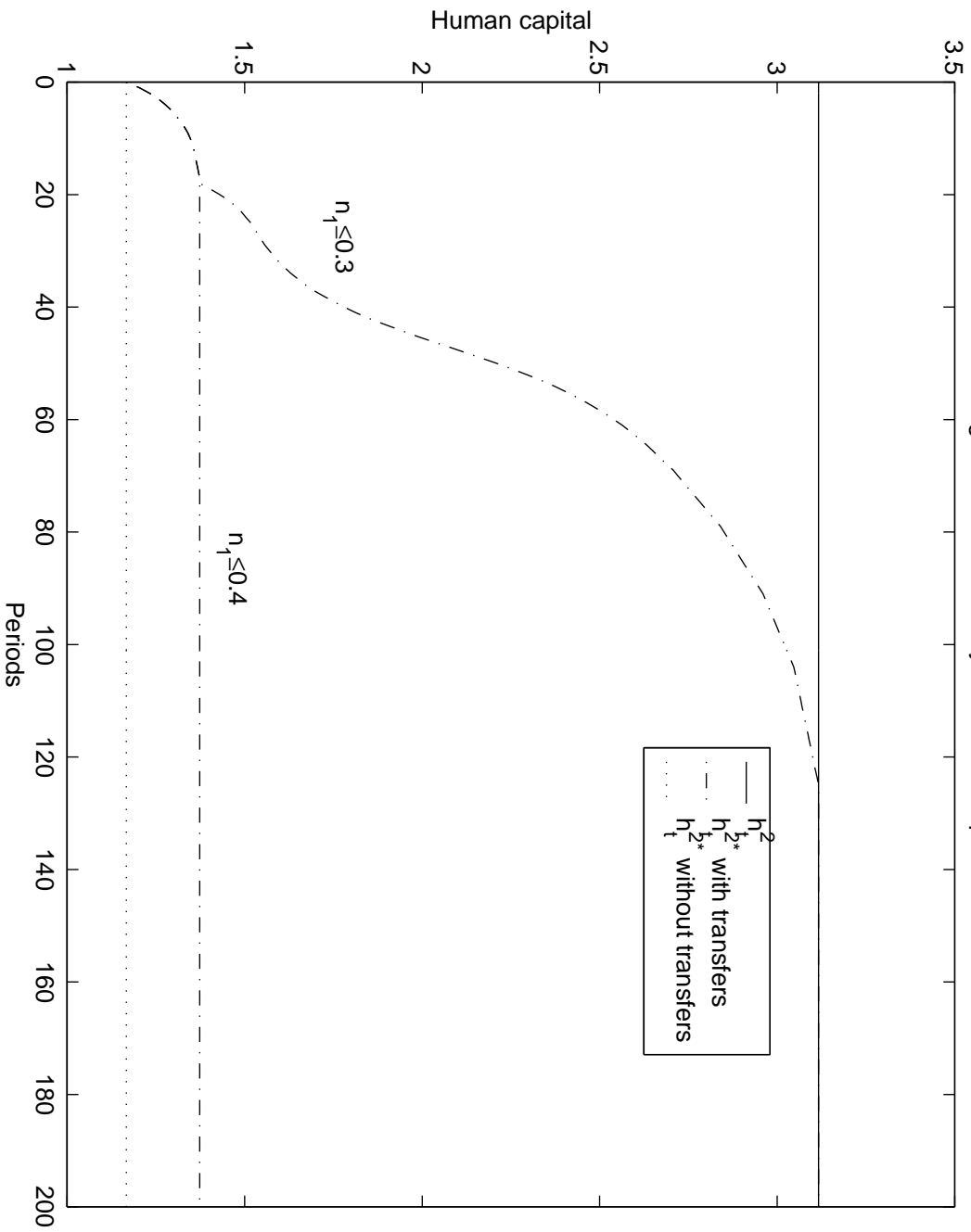
Transfers required by poor	acceptable by rich
2.58%	$\leq .90\%$

Sustainable transfers

Ceiling on Transfer Sustainable?
child labor Present-val.

\bar{n}^1	(% GDP of rich)	
0	2.58%	no
0.1	1.81%	no
0.2	1.14%	no
0.3	0.60%	no
0.35	0.39%	no
0.375	0.30%	no
0.4	0.22%	yes

The long but sustainable way – successive partial bans



Conclusion

- In our calibrated economy, no reasonable transfers can be used to induce a poor country like Ghana to give up child labor immediately.
- A carefully chosen sequence of partial bans is sustainable and leads to the disappearance of child labor in the long run.