The Role of Poverty and Community Norms in Child Labor and Schooling Decisions

Holger Strulik*

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Abstract. Household poverty is a powerful motive for child labor and working frequently comes at the expense of schooling for children. Accounting for these natural links we investigate whether and when there is an additional role for community norms and how the social evaluation of schooling evolves over time. The proposed model provides an explanation for why equally poor villages or regions display different attitudes towards schooling and why children who are not working are not sent to school either but remain idle instead. The conditions for a successful implementation of a half-day school vs. a full-day school are investigated. An extension of the model explores how an education contingent subsidy paid to the poorest families of a community manages to initiate a bandwagon effect towards an equilibrium where all children are sent to school.

Keywords: School Attendance, Child Labor, Social Norms, Targeted Transfers

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*University of Hannover, Department of Economics, Koenigsworther Platz 1, 30167 Hannover, Germany, strulik@vwl.uni-hannover.de. I would like to thank Arnab Basu, Karl Dietrich, and participants at the ESPE conference, London, and at the VfS Conference on Development Economics and Policy, Zurich for their useful comments.

1. Introduction

According to UNICEF an estimated 218 million children aged 5-17 are currently engaged in child labor, excluding child domestic labor. The common and mostly undisputed explanation provided in the economics literature is that poverty in interaction with credit constraints and subsistence needs forces families to let their children work (Basu, 1998, 1999, Edmonds, 2007). While cross-country comparisons strongly confirm this conjecture, within-country studies provide sometimes surprisingly little support (Psacharopolous, 1997, Ray, 2000, Bhalotra, 2006). One possibility that can explain different levels of child labor in countries, regions, or villages of about the same poverty level is the prevalence of different social norms that shape parents' attitude towards child labor (Rodgers and Standing, 1981, Basu, 1999, Lopez-Calva, 2002).

Education and child labor are naturally interrelated because the time spent on working cannot be spent on attendance at school or for homeworks and vice versa. This does, of course, not necessarily imply that working precludes schooling (Edmunds, 2007). Obviously, the length of a school day will be an important determinant for the incidence and intensity of child labor. A half-day school reduces the child time budget by less than a full-day school and will possibly be more attractive if children contribute a lot to family income. A full-day school, on the other hand, if accepted, will be more successful in eliminating child labor.

The interrelation of child labor and schooling and their alleged joint determination by poverty implies that both have to be considered simultaneously in a child time allocation problem. A successful ban of child labor, for example, reduces family income and may thus discourage education activities (Strulik, 2004). Subsidizing school attendance seems to be a more promising way to utilize the trade-off between schooling and working time. Targeted transfer programs such as Progresa in Mexico, Bolsa Escola in Brazil, and Food for Education in Bangladesh have thus been not only aspiring to increase education but also to reduce child labor in the targeted communities.

With respect to the schooling objective these programs have been shown to be very successful. Interestingly, it has also been found that transfer programs – despite their success on school attendance – have much smaller and sometimes insignificant effects on child labor (Ravallion and Wodon, 2000, Skoufias and Parker, 2001, Cardoso and Souza, 2004). These findings suggest the importance of a third state of child time allocation, idleness. Obviously, the results are compatible if subsidies made schooling attractive for families whose children were previously not engaged in child labor or school attending children continued to work after school at times that they previously spent mostly on leisure and play.

Recently, two studies have evaluated the Progresa program with a different twist, which is particularly interesting for the present paper. Both Lalive and Cattaneo (2006) and Bobonis and Finan (2007) find that the subsidies did not only increase school attendance of targeted children but also that of ineligible children when the program was introduce in their local community. While the importance of social interaction in schooling decisions has already been investigated by others before (e.g. Zelizer, 1985, Case and Katz, 1991) the quasi-experimental design of Progresa was ideal to overcome identification problems and to clearly work out the neighborhood effect. Besides demonstrating the existence of such a “social multiplier” (Glaeser et al., 2003) for the schooling decision the studies provide a couple of other results that are interesting against the background of the present paper. It was found that poorer families are more strongly affected by the behavior of peers, that the social interaction runs through the parents (rather than the children) and that the strength of the response of ineligible families is increasing in the share of eligible families.

If a social multiplier is operative, some parents are (not) sending their children to school because others are (not) sending their children to school. A pro- or anti-schooling norm may then be sustainable as a locally stable equilibrium. Local norms can explain some of the puzzles of the empirical child labor-schooling literature, for example, why a Peruvian child is ceteris paribus (i.e. in particular controlling for poverty) more likely to experience schooling than a Pakistani child (Ray, 2000), or why in India of the rural 12 to 14 year old girls 32 percent attend school in Uttar Pradesh but 98 percent in Kerala, a state of similar poverty (Kabeer, 2001, as cited in Satz, 2003).

In this paper we investigate how parents solve the problem of child time allocation subject to their poverty and the prevailing schooling norm in their community. The schooling norm in turn depends on the share of parents who have sent their children to school in the past. In a simplifying manner we assume that community norms affect child labor only through the schooling decision. Neglecting a separate norm for child labor could be seen as a first order approximation of the expectation that a norm on schooling is stronger than a norm on child labor. A schooling norm can be more easily developed and sustained because schooling is a binary decision (sent the girl to school or not) whereas child labor is a continuous variable to which it is harder to attach a specific normative value. Furthermore, the schooling decision is very visible within the community. Children show up at school, wear uniforms and satchels, wait with fellow pupils at the bus stop etc. Whether and how long children work cannot so easily be monitored by others, in particular if they work at home. Finally, child labor can already be very plausibly be motivated by economic needs. That schooling is traded off against child idleness is much harder to explain by poverty in particular when schooling is for free.[1]

The paper is related to a small literature that investigate the evolution of norms within economic models. Problems addressed so far include the growing welfare state (Lindbeck, et al., 1999), out-of-wedlock childbearing (Nechyba, 2001), family size (Palivos, 2001), occupational choice (Mani and Mullin, 2004), and contraceptive use (Munshi and Myaux, 2006). While the present paper shares most with Nechyba's article with respect to its formal approach, it is mostly related with respect to content to the already mentioned model by Lopez-Calva (2002). Lopez-Calva considers an anti-child labor norm and assumes that its strength depends on the aggregate labor supply of child labor. Given a static model with homogenous households he derives conditions for which there exist two equilibria, one without child labor, a strong anti-child-labor norm, and a high equilibrium wage and another one where all households supply the same effort units of child labor and both anti-child-labor norm and wages are low. Both equilibria are equally likely attained and thus the child labor decision is reduced to a coordination problem.

The conditions for multiple equilibria are also the major objective of investigation in the present paper. In a model where households are heterogeneous with respect to poverty and susceptibility to social approval of their behavior it is shown how the existence of multiple equilibria depends on preferences, children's contributions to family income, and average productivity. Which equilibrium is eventually attained – given that there are multiple ones – depends on the communal history, i.e. the initially prevailing norm possibly modified by exogenous shocks. This is so because the schooling norm is assumed to be determined by the number of families who sent their children to school in the past. The backward looking behavior makes the social equilibria locally stable and provides a strong argument for policy intervention. In particular it can be the case that parameters of preferences and family income are such that all children in a

[1] Chamarbagwala (2007) investigates children's time allocation in neighboring Indian districts. She finds spatially correlated errors that can possibly be attributed to local attitudes and norms. At least for boys she finds stronger spatial correlations for schooling and idleness than for child labor, which supports our intuitive argument for the relatively higher importance of schooling norms.

community were sent to school if there were no prevailing anti-schooling norm. With a prevailing anti-schooling norm ("girls don't belong to school", "children of peasants don't belong to secondary school" etc.) only some children are sent to school, in particular those of the richer families of the community.

The model can thus generate results were on the surface it looks as if poverty has caused inferior schooling while at a deeper level the causes are found in the communities' history and evolution of norms. Through its path dependence the model is also compatible with the observation that communities (villages or regions) of similar poverty (and equal distribution of preferences and income) display very different schooling behavior.

Two aspects of the model address the empirical phenomenon of child idleness. First we investigate also equilibria where the contribution of children to family income is so low compared to their parent's suffering from letting them work that children who are not attending school are left completely idle. Second, we investigate the introduction of a full-day school vs. a half-day school. Comparing the success of the schooling systems is interesting because attendance at full-day school more or less eliminates child labor whereas a half-day school allows school attending children to work in the afternoon and probabably replaces time that was formerly spent on leisure and play through child labor. We also investigate the seemingly convincing looking idea to eliminate child labor through schooling in a two-step way where at the first step a half-day school tries to attract children in order to develop a strong pro-schooling norm and at a second step an implementation of a full-day school utilizes this norm in order to eradicate child labor.

In the last section the model is extended towards schooling contingent income subsides. Because the model takes the heterogeneity of households explicitly into account it is particularly suitable to analyze targeted transfer program such as Progresa. It provides strong theoretical support for the success of these programs and the involved social multipliers. Given a community stuck at an equilibrium where a majority of children remains uneducated we search for the optimal design of a targeted transfer program, i.e. the share of targeted families and the size of the subsidy that manages a transition towards an "education for all" equilibrium at minimum costs. Numerical analysis suggests that it is always sufficient to target a minority in order to change the behavior of a majority and – according with the empirical evidence – that the subsidies needed are quite small compared to children's potential contribution to family income. Minimum subsidies are particularly low if children contribute a lot to family income and a half-day school allows them to work in the afternoon, i.e. to replace former idleness with schooling.

2. The Model

Education can be modelled conveniently as a binary choice. Sent the children to school or not. Child labor, with contrast, is better conceptualized as a continuous variable. Parents decide not only whether at all but also how long their children have to work. In solving this decision problem they consider the trade-off between the empathetically perceived disutiltiy from letting their children work and the children's contribution to family income. Income is spent on consumption goods and consuming goods is an utility enhancing activity. Parents are thus facing a trade off in time allocation for their children.

In the following we consider two variants of the basic decision problem. In the first case child labor and schooling are mutually exclusive (full-day school arrangement). In the second case schoolgoers are allowed to work at most half of their time and thus perhaps less than homestayers (half-day school arrangement). Child time can be spent on labor ℓ, schooling h, or idleness so that the time budget constraint is given by $1 \geq \ell + h/\bar{h}$. The parameter $\bar{h}$ controls for the schooling system, $\bar{h} = 1$ for full-day school and $\bar{h} = 2$ for half-day school. Each family consists of one parent and one child. The parents decides upon $h \in \{0, 1\}$ where $h = 1$ means schooling. Working children contribute a fraction γ of adult income per unit of labor supplied, $0 \leq \gamma \leq 1$.

Although the model is more general and gender is nowhere explicitly stated it may be helpful for the intuition to consider the time allocation problem for girls and to conceptualize the time endowment as one day consisting of a morning and an afternoon. The girls are probably not supplying any wage work but are helping in the household (for example a family farm). They are thus not showing up in the UNICEF statistics mentioned in the introduction. Girls working ℓ time units at home set free $\gamma\ell$ units of extra time of their parents, which is used by their parents to supply additional adult labor and earn wage income.[2]

As motivated in the introduction we assume that a social norm is attached to the schooling decision so that individual utility depends on the social evaluation of one's behavior. Whether

[2] Parents could spend the time saved through helping children on leisure. The solution of the adult's own time allocation problem would then provide a value of adult leisure determined by the opportunity cost of the adult wage so that nothing of the model mechanics would be changed. For convenience we thus neglect the time allocation problem of adults by assuming that any extra time is spent on wage work.

not sending one's child to school is socially approved or disapproved depends on the share of community members (neighbors) whose children are also not attending school.[3] To formalize this notion we assume that if a parent happens to be the one and only in a community who is not sending his child to school, he or she faces a stigma cost ϕ. Social disapproval decreases in accordance with the share of neighbors whose children are also not attending school and is eventually turning into approval. Let S_t denote the degree of approval of an anti-schooling decision in period t. The complete neighborhood evaluation of an anti-schooling decision is then given by $(S_t - \phi)$.

People are to different degrees susceptible to the evaluation of their behavior by others. We capture this fact by assuming that susceptibility to approval is distributed within the unit interval. A parent i has susceptibility to approval $\sigma(i) \in [0, 1]$. The most self-assured parent is assigned with value "0" and the most indeterminate one with value "1". For simplicity we assume a uniform distribution. Summarizing, social utility experienced by parent i for a "no education" decision is given by $\sigma(i) \cdot (S_t - \phi)$.

Like the related literature mentioned in the introduction the model is not complete in the sense that it does not provide a deeper explanation for why the social norm existed in the first place. Utilizing the background story from above once more, we suppose that at model-time t_0 a fraction of girls were not attending school (probably because there was no school, or no school for girls, or no separate toilet for girls at school) which "explains" the initial strength of the social attitude that girls do not belong to school, S_0.

The autonomous, socially independent part of preferences with respect to consumption $c_t(i)$ and child labor is captured by a Cobb-Douglas utility function $c_t(i)^{1-\alpha}[1 - \ell_t(i) + a h_t(i)/\bar{h}]^{\alpha}$. The parameter α measures empathy, i.e. the weight that parents put on child labor relative to own consumption, $0 < \alpha < 1$. For $\alpha = 0$ we have totally insensitive parents caring only about consumption and the evaluation of their behavior by the community. As α rises parents increasingly suffer from letting their children work. The parameter a measures how parents evaluate schooling versus leisure of their children. For $a > 0$ generally empathetic parents get extra utility from schooling compared to leisure.

[3] Alternatively we might assume that the value of a pro-schooling decision (in terms of parental utility) is learned from observing the schooling decision of neighbors.

Putting the autonomous and social elements of utility together, parent i in period t faces the following utility function.

$$u_t(i) = c_t(i)^{1-\alpha}[1 - \ell_t(i) + a h_t(i)/\bar{h}]^{\alpha} + [1 - h_t(i)] \cdot \sigma(i) \cdot (S_t - \phi). \tag{1}$$

To begin with, we neglect schooling subsidies in order to work out the main mechanics of the model easily. They are introduced later in an extension of the basic model. With foregone contributions of child work to family income being the only cost of a pro-schooling decision and $w(i)$ denoting the adult income of family i the budget constraint of family i for period t reads

$$w(i) + \gamma w(i)\ell_t(i) = c_t(i). \tag{2}$$

Parents who are not educating their children set $h_t = 0$. They solve the maximization of (1) w.r.t. (2) and the budget constraint for their children's time, $0 \leq \ell_t \leq 1$. For a parent i this provides the optimal choices

$$\ell_t(i) = 1 - \alpha - \frac{\alpha}{\gamma} \tag{3a}$$

$$c_t(i) = (1-\alpha)(1+\gamma) \cdot w. \tag{3b}$$

Inspection shows that $\ell_t(i) \leq 1$. Only totally insensitive parents ($\alpha = 0$) would let their children work all of the time. Empathetic parents leave their children some spare time. Since $\ell \geq 0$ we see that the following condition has to hold for the incidence of child labor.

Assumption 1 (Child Labor Feasibility).

$$\gamma > \frac{\alpha}{1-\alpha}. \tag{4}$$

Child labor does not exist if children contribute sufficiently little to family income (small γ) and parents are sufficiently empathetic (large α). For most parts of the paper we assume that Assumption 1 holds implying that children who do not go to school work at least some of their time. In a later section we consider the schooling decision when Assumption 1 does not hold, i.e. without the incidence of child labor. This case is interesting in order to investigate whether an enforceable ban of child labor ($\gamma = 0$) necessarily causes schooling or whether parents prefer to leave their children completely idle.

Parents who let their children attain school set $h_t(i) = 1$. Under a full-day school arrangement this immediately solves the time allocation problem. The solution is $\ell_t(i) = 0$ and $c_t(i) = w(i)$. Under a half-day school arrangement maximization of (1) subject to (2) provides the interior solution

$$\ell_t(i) = (1-\alpha)(1+a/2) - \alpha/\gamma \tag{5a}$$

$$c_t(i) = w(i)(1-\alpha)\left[1+\gamma(1+a/2)\right]. \tag{5b}$$

Inspection of (5a) shows that children who attain a half-day school work more than those who are not attending school if $a > 0$. In this case the extra utility from letting the children attain school (vis a vis leaving them idle) is traded off against longer working hours for children after school. If $\ell_t(i) > 1/2$ according to (5a) a corner solution applies that fixes the choice variables to $\ell_t(i) = 1/2$ and $c_t(i) = w(i)\,(1+\gamma/2)$. We discuss the interior solution where parents give up "only" child leisure later in the "Idle Children" section. The corner solution, on which we now focus, is more interesting for a comparison of schooling systems. For education under a full-day schooling arrangement parents have to give up child labor completely whereas at the corner solution for a half-day school arrangement they have to give up some but not all child labor in order to get their children educated.

Comparing utilities (1) derived from sending the children to full-day school versus enjoying child leisure and contributions to family income according to (3) we find that the child of family i is not attending school in period t if

$$\underbrace{\left[(1+a)^{\alpha} - (1-\alpha)^{1-\alpha}(1+\gamma)\left(\frac{\alpha}{\gamma}\right)^{\alpha}\right]}_{\equiv E_F} \cdot w(i)^{1-\alpha} \leq \sigma(i)\cdot(S_t - \phi). \tag{6}$$

The left hand side of (6) captures the individual, socially-independent, i.e. "ordinary", net utility experienced from a pro-schooling decision. Ceteris paribus, this utility is lower for poorer parents (with low $w(i)$). The constant E_F summarizes the "marginal value of education", i.e. the net utility increase experienced from a pro-schooling decision that an additional unit of $w(i)^{1-\alpha}$ brings about. We see that socially-independent utility is negative if parents do not receive extra utility vis a vis child leisure, i.e. $E_F < 0$ for $a = 0$. The right hand side of (6) reflects socially dependent utility stemming from the evaluation of parent i's pro-schooling decision by the community.

Likewise, given a half-day school and the corner solution for school attending children ($\ell = 1/2$) comparison of utilities shows that the child of family i is not attending school if

$$\underbrace{\left[\left(1+\frac{\gamma}{2}\right)^{1-\alpha}\left(\frac{1+a}{2}\right)^{\alpha} - (1-\alpha)^{1-\alpha}(1+\gamma)\left(\frac{\alpha}{\gamma}\right)^{\alpha}\right]}_{\equiv E_H} \cdot w(i)^{1-\alpha} \leq \sigma(i) \cdot (S_t - \phi). \tag{7}$$

Again, child labor is more prevalent among poor households. Inspection of the marginal education value E_H shows that an extra gain from schooling vis a vis child leisure ($a > 0$) is not necessary for schooling to exist because participants of half-day school are also contributing to family income through work in the afternoon. From this feature one might be tempted to conclude that families with working children always prefer a half-day school. Interestingly, this is not generally the case. Comparison of the marginal education values E_H and E_F proves the following.

LEMMA 1. *Ceteris paribus parents are more inclined to let their children attain school if they face a half-day school (instead of a full-day school) if* $\gamma/2 > 2^{\alpha/(1-\alpha)} - 1$.

Only if children contribute sufficiently much to family income (large γ) and parents feel sufficiently little empathy with their working children (small α) a half-day school is preferred against a full-day school. Note that a has to be sufficiently large for $E_F > 0$, i.e. for a full-day school to be a relevant option in the first place. Lemma 1 thus states that if schooling is sufficiently worthwhile and child labor income is small anyway, empathetic parents prefer to send their children to school for the full day.

In order to proceed we assume that parameters are such that the marginal education values E_F and E_H are positive. If they were zero or negative there would be no schooling in an "ordinary" model without socially dependent preferences (i.e. when $\sigma(i) = 0$ for all i at the right hand sides of (6) and (7)). The positivity assumption thus helps to focus on the role of social preferences for schooling and child labor.

ASSUMPTION 2 (Schooling Feasibility). *The model parameters* a, α, γ, *are such that* $E_F > 0$ *and* $E_H > 0$, *i.e. such that schooling would exist without socially dependent preferences.*

We can prove the following for the value of education.

Lemma 2. *Assume child labor and schooling are feasible. (a) Socially-independent utility from sending one's child to school is increasing in empathy and the valuation of schooling relative to idleness for both schooling systems, i.e.* $\partial E_j/\partial a > 0$ *and* $\partial E_j/\partial \alpha > 0$ *for* $j \in \{F, H\}$.
(b) Higher children's contribution to family income reduces socially-independent utility from education under a full-day school arrangement but raises it under a half-day school arrangement, i.e. $\partial E_F/\partial \gamma < 0$ *and* $\partial E_H/\partial \gamma > 0$.

The proof with respect to a is obvious from inspection of (6) and (7), the proofs for α and γ are in the Appendix. While result (a) is not surprising, result (b) is interesting and probably unexpected. Child labor income has opposing effects on education depending on the school arrangement faced by the family. A half day school becomes more attractive when children contribute more to family income through their work in the afternoon. This implies, for example, that a successful anti-child labor campaign that manages to set γ below $\alpha/(1-\alpha)$ would rises the value of full-day schooling by reducing its opportunity costs but it would be counter-productive to schooling if parents have a half-day school option.

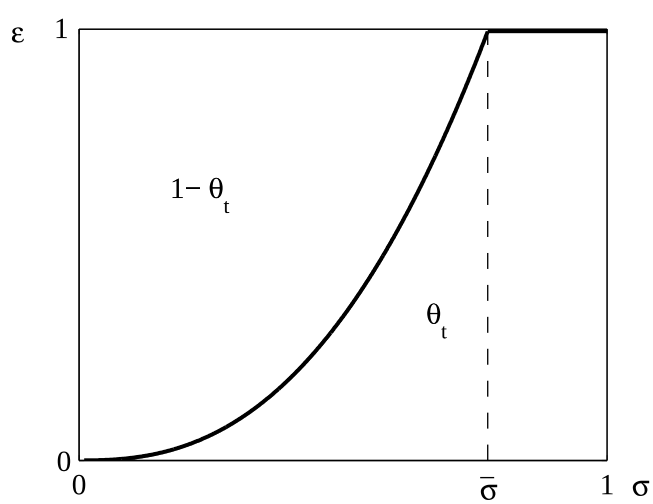
Finally, we introduce a distinction between poverty of a specific family i and poverty of whole community by setting $w(i) = \epsilon(i)A$. Here, A is understood as an index of general productivity of the community and $\epsilon(i)$ is the poverty index of family i. In order to enable an analytical solution we assume that the ideosyncratic parameter ϵ is uniformly and independently distributed within the unit interval. Summarizing the previous results we can state that the child of family i is not attending school if

$$\epsilon(i) \leq \bar{\epsilon} \equiv \frac{1}{A} \left(\frac{\sigma(i) \cdot (S_t - \phi)}{E_j} \right)^{\frac{1}{1-\alpha}}, \qquad j \in \{F, H\}. \tag{8}$$

The right hand side of (8) defines the critical poverty index $\bar{\epsilon}$ below which parents are not sending their children to school. It is the community-specific threshold that separates households with educated children from households with uneducated ones. We see that the general assertion and frequently observed result that poverty affects education and that it are the poorest parents who are most likely not sending their children to school remains, in principle, be true. Yet, here it gets a qualification.

The schooling decision depends also on the general level of community (dis-) approval and the individual susceptibility to community norms. In particular, there can be some relatively rich, highly indeterminate, approval-dependent parents who are not sending their children to school if school participation is against the social norm of their neighborhood. On the other hand, there can be some relatively poor parents who are not giving much on community norms against schooling and send their children to school although non-education would receive community approval. Figure 1 visualizes this result by showing the threshold in a $\sigma - \epsilon$-diagram. The area below the threshold gives the share of children who are not attending school in period t, which we denote by θ_t. For a given value of σ it are always the children of poor parents who are not participating in school. However, since σ is independently distributed among income levels there may be also some rich parents who leave their children at home. In particular, if the community norm S_t is very strong, there exist some parents with very high susceptibility to social evaluation of their behavior who leave their children at home irrespective of their poverty. Formally, in this case there exists a $\bar{\sigma} < 1$ for which $\bar{\epsilon}(\bar{\sigma}) = 1$, i.e. $\bar{\sigma} \equiv A^{1-\alpha} E_j/(S_t - \phi)$. Otherwise $\bar{\sigma} = 1$, see Figure 1.

Figure 1: Threshold between Schooling and Non-Schooling



Parents are distinguished by poverty index $\epsilon \in [0, 1]$, with $\epsilon = 1$ identifying the richest parent, and by susceptibility to community approval $\sigma \in [0, 1]$, with $\sigma = 1$ reflecting the highest susceptibility. The share of children not attending school in period t is t is θ_t.

The area below the threshold is computed as

$$\theta_t = \int_0^{\bar{\sigma}} \frac{1}{A} \left(\frac{\sigma \cdot (S_t - \phi)}{E_j} \right)^{\frac{1}{1-\alpha}} \mathrm{d}\sigma + (1 - \bar{\sigma}) = 1 - \frac{E_j A_t^{1-\alpha}}{(2-\alpha)(S_t - \phi)} = \theta(S_t), \qquad j \in \{F, H\} \,. \quad (9)$$

Inspection of (9) and using Lemma 2 proves the following comparative statics for the share of uneducated children in a community.

PROPOSITION 1. *Assume child labor is feasible. (a) The share of uneducated children is increasing in community approval of an "anti-education" decision (S_t). It is decreasing in general empathy (α), in the parental evaluation of the importance of schooling compared to idleness (a), in stigma costs (ϕ), and in average productivity (income) of the community (A).*
(b) An increasing contribution of child labor to family income (γ) leads, ceteris paribus, to a higher share of uneducated children under a full-day school and to a lower share of uneducated children under a half-day school.

3. The Evolution of Community Norms

A community's evaluation of behavior is not a given constant but evolves as a lagged endogenous variable depending on the observation of aggregate behavior. The results obtained so far were just providing a snapshot of the socio-economy for given S_t. In order to proceed we assume that community approval of an anti-schooling decision depends positively on the share of parents who were not sending their children to school in the past. Let δ denote the time preference rate or rate of oblivion by which these observations are depreciated in mind so that approval is given by $S_t = (1-\delta)\sum_{i=0}^{\infty} \delta^i \theta_{t-1-i}$. Alternatively, this can be written as the period-by-period evolution of approval,

$$S_t = (1-\delta) \cdot \theta_{t-1} + \delta \cdot S_{t-1}. \tag{10}$$

A social equilibrium is obtained where the social norm, i.e. the level of community approval, stays constant, which requires $S_t = \theta_t$. Inserting the equilibrium condition $S_t = \theta_t$ into (9) we obtain the polynomial

$$\theta_t^2 - \theta_t(1+\phi) + \phi + E_j A^{1-\alpha}/(2-\alpha) = 0, \tag{11}$$

which has at most two real, positive solutions whose evaluation leads to the following result.

PROPOSITION 2. *Assume child labor and education are feasible. If*

$$E_j A^{1-\alpha} < \frac{1}{4}(1-\phi)^2(2-\alpha), \quad j \in \{F, H\} \tag{12}$$

then there exists a long-run social equilibrium where not all children attain school. In this case there exist three social equilibria and the equilibrium shares of uneducated children are

$$\theta_{high} = \frac{1}{2}(1+\phi) + \sqrt{\frac{1}{4}(1-\phi)^2 - \frac{E_j A^{1-\alpha}}{(2-\alpha)}}$$

$$\theta_{mid} = \frac{1}{2}(1+\phi) - \sqrt{\frac{1}{4}(1-\phi)^2 - \frac{E_j A^{1-\alpha}}{(2-\alpha)}}$$

$$\theta_{low} = 0.$$

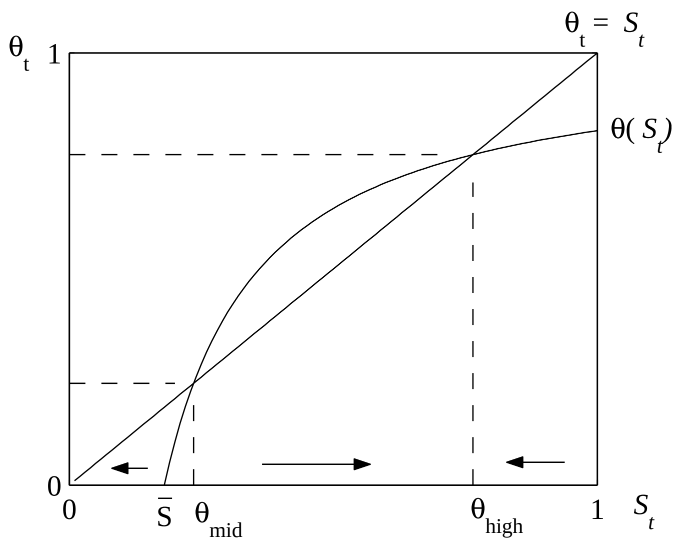
The equilibrium θ_{mid} is unstable. The equilibria θ_{low} and θ_{high} are locally stable.

Proof. The solution of (11) is θ_{high} and θ_{mid}. Since $\theta \in [0,1]$ the radicand has to be non-negative, which requires (12) to hold. For stability consider the $S_t - \theta_t$ diagram in Figure 2. Equilibria are found along the 45-degree line where $\theta_t = S_t$. Note that S_t is rising above the 45-degree line and falling below according to the evolution of community approval described in (10). The share θ_t is given by the concave curve displaying the $\theta(S_t)$ curve according to (9). This curve hits the abscissa at $S_t \equiv \bar{S} = \phi + A^{1-\alpha}E_j/(2-\alpha)\beta > 0$, cuts the 45-degree line from below at θ_{mid} and then again from above at θ_{high}. Thus the equilibrium θ_{high} is locally stable and the equilibrium θ_{mid} is unstable. If θ_t happens to be below θ_{mid} the social dynamics converge towards the origin where all children are educated ($\theta = \theta_{low} = 0$). □

It has been shown in the last section that, given S_t, poor households are more prone to leave their children at home. Here, we see that aggregate poverty (low productivity A) at community level is also detrimental to schooling. Thus, poverty remains an important determinant of non participation in school and child labor. But Figure 2 also shows that two communities sharing the same average poverty level and the same distribution of income (and the same preferences and technology) can end up in diametral opposed equilibria. The community starting with a relatively low initial θ, $\theta < \theta_{mid}$, converges to complete education, whereas the community starting with $\theta > \theta_{mid}$ ends up in an equilibrium with a high share of uneducated children. In other words, socio-economic history explains a community's attitude towards schooling today and thus helps to sustain an anti- or pro-schooling culture.

Some communities are more prone to end up with little education than others. Inspecting the derivatives of (12) and of θ_{high} and using Lemma 2 proves the following comparative statics of the equilibrium share of uneducated children.

Figure 2: Community Dynamics of Schooling and Schooling Norm



$S_t \in [0, 1]$ denotes community approval of schooling in season t evolving according to (10). The share of parents not sending their children to school is given by $\theta(S_t)$ according to (9). Arrows indicate the direction of motion of S_t over time.

Proposition 3. *Given any initial share of children not attending school, θ_0. (a) The possibility that non-participation in school exists at social equilibrium and the share of not participating children at such an equilibrium increase with decreasing average productivity of the community (A), decreasing empathy (α), decreasing parental evaluation of schooling vis a vis idleness (a), and decreasing stigma costs (ϕ).*
(b) The possibility that non-participation in school exists at social equilibrium and the share of not participating children at such an equilibrium increases if child contributions to family income (γ) increase under a full-day school arrangement and if contributions decrease under a half-day school arrangement.

Diagrammatically, the above changes of parameters shift the $\theta(S_t)$–curve to the left.

If a community has arrived successfully at the equilibrium $\theta_{low} = 0$, the resulting pro-schooling norm is very robust as the following result shows.

Proposition 4. *If the social equilibrium of complete schooling (θ_{low}) is attained, the socio-economy remains there irrespective of variation of child labor's potential contribution to family income (γ), general productivity (A), and other parameter changes.*

The proof follows immediately from noting that $\bar{S} > 0$ in Figure 2 as long as Assumption 2 holds. In fact, even unfortunate parameter changes that lead to a violation of Assumption 2 may not cause the community to leave the all-schooling equilibrium if stigma costs ϕ for the first mover out of the equilibrium are sufficiently high so that $\bar{S}$ remains positive. In other words, once the community has developed a pro-schooling norm, education is more robust against negative shocks than it would be if parents had socially independent preferences. A negative shock (i.e. a bad harvest) that would induce socially independent parents to abandon schooling in favor of child labor does not affect schooling in social equilibrium because of the stigma attached to an anti-schooling decision.

A frequently addressed question in the literature is whether the introduction of schooling can eradicate child labor. Since a compulsory and enforceable participation at full-day school eliminates child labor instantaneously, schooling has to be voluntary or non-enforceable for this to be an interesting question. In that case families without socially dependent preferences would accept the education supply whenever this is individually preferred, i.e. whenever E_F is positive. With socially dependent preferences the issue is not so straightforward. Since there was no schooling in the status quo ante, community approval for an anti-education decision can be expected to be high initially. Probably we start in a situation where $S_0 = \theta_0 = 1$. For the successful introduction of a school the $\theta(S_t)$-curve has to be situated sufficiently far down so that there are no intersections with the identity line, implying that (12) is not fulfilled. One sees that having a positive education value E_F is a necessary but not sufficient condition for schooling of a community at large. Possibly, extra effort is needed in order to overcome a prevailing anti-schooling norm.

This extra effort, which could be supplements to family income (captured in a stylized way as rising A) must not be of infinite duration. A temporary downward shift of the $\theta(S_t)$ curve is enough. Once the share of non-educated children falls below θ_{mid}, income supplements can be terminated since the community has developed a sufficiently strong pro-schooling norm. The bandwagon effect (Granovetter, 1973) has generated enough momentum. Because of decreasing community approval S_t for an anti-schooling decision, more and also poorer parents send their children to school next period. With further decreasing S_t approval turns into disapproval eventually and at $\bar{S}$ all parents let their children attend school.

In order to abolish child labor through schooling, a two-step policy might appear reasonable. As a first step a half-day school is implemented so that parents accepting the schooling offer can still let their children do some work in the afternoon. If the policy is successful, the intersection at θ_{high} becomes non-existent, parents are increasingly starting to educate their children and the community converges towards θ_{low} where a pro-schooling norm prevails. Now, facing an established pro-schooling norm, it can be that parents may prefer a full-day school vis a vis no education and the change from half-day to full-day school eliminates child labor entirely.

The left panel of Figure 3 shows by example that this scenario is indeed possible. Numerical values of parameters are chosen such that children contribute much to family income ($\gamma = 0.7$), parents are not so empathetic ($\alpha = 0.2$) but at the margin an anti-schooling decision is quite strongly stigmatized ($\phi = 0.4$). Starting without a school, i.e. with no parent educating their children and thus a lot of approval for an anti-schooling decision, the introduction of a full-day school is not successful. Only a minority, i.e. a share of $1 - \theta_{high}$ of rich and socially relatively independent parents (endowed with high ϵ and/or low σ values) let their children attend school. The majority of families in the community leave their children at home.

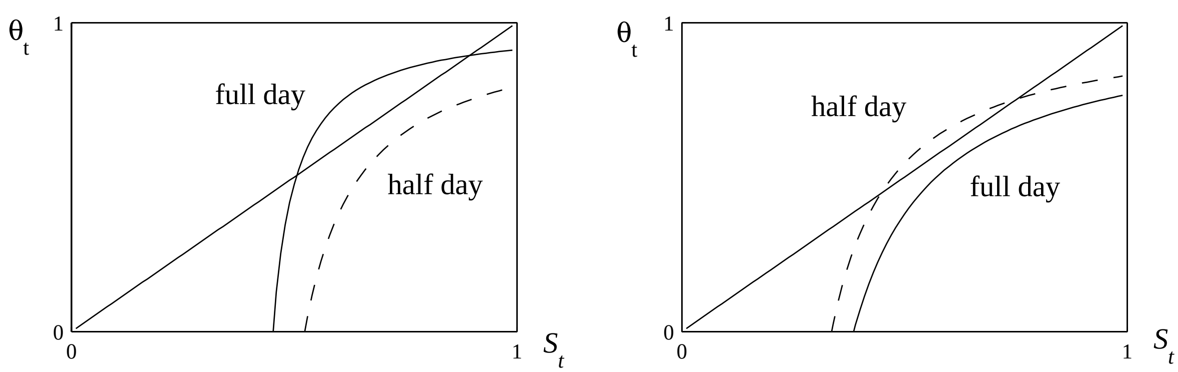
With contrast, a half day school can be successfully implemented. Parents who let their children attend school also let them work in their afternoon so that foregone family income from a pro-education decision is relatively small. There exists no intersection with the identity line and the dashed curve representing the social norm $\theta(S_t)$. After introduction of the half-day school a bandwagon effect sets in and more and more children are going to school. With more children attending school a pro-schooling norm develops. Once the pro-schooling norm is sufficiently strong (i.e. when θ crosses θ_{mid}) the pro-schooling norm has grown sufficiently large that a transition to a full day school is possible. In other words, social disapproval for an anti-schooling decision is now sufficiently strong so that parents prefer schooling even when they have to abandon child labor completely for letting their children attend school.

Unfortunately, in general, the policy conclusions to be drawn are less straightforward than one might infer from the example. In fact, just the opposite result can also be produced, i.e. an example where parents who would sent their children to a full-day school but leave them at home when there is only a half-day school available. In order to construct such a "degenerate" case we assume that children contribute relatively little to family income ($\gamma = 0.45$) parents are somewhat empathetic ($\alpha = 0.3$) and the marginal stigma cost of an anti-schooling decision is relatively small ($\phi = 0.2$). The right panel of Figure 3 shows that the dashed curve, representing the schooling norm given a half-day school, is now intersecting the identity line whereas no such intersection exists for the full-day schooling norm represented by the solid line.

The intuition for these results follows from Lemma 2. If children contribute relatively little to family income, sufficiently empathetic parents prefer a full-day school versus a half-day school. In that case, the share of parents sending their children to school immediately, i.e. irrespective of the initially prevailing anti-schooling norm, is larger under a full-day school option. If it is sufficiently larger, it initiates a bandwagon effect towards a pro-schooling norm that cannot be realized by a half-day school arrangement where initially fewer parents are motivated to take up schooling.

While children's contributions to family income can perhaps be measured sufficiently precisely we can expect more parameter uncertainty about the strength of norms (ϕ) and empathetic feelings (α). Not knowing which schooling system can be expected to be more successful in overcoming an anti-schooling norm, it could be wise to provide both options, at least during an initial period.

Figure 3: Community Norm Dynamics: Full-Day vs. Half-Day School



Model parameters: $A = 1$, $a = 1.5$ and $\alpha = 0.2$, $\gamma = 0.7$, $\phi = 0.4$ for the left panel and $\alpha = 0.3$, $\gamma = 0.45$, $\phi = 0.2$ for the right panel. Solid lines show $\theta(S_t)$ curves for a full-day school. Dashes lines show $\theta(S_t)$ curves for a half-day school.

4. Idle Children

We are now turning towards the case where Assumption 1 does not hold, i.e. we assume that working children would contribute sufficiently little to family income and parents are sufficiently empathetic so that child labor does not exist. Idle children, however, do not necessarily imply that a free schooling offer is "automatically" accepted by the community. Inspection of utilities for $\ell_t(i) = 0$ shows that the child of family i is not attending school if

$$\underbrace{[(1+a)^{\alpha} - 1]}_{\equiv E_L > 0} \cdot w(i)^{1-\alpha} \leq \sigma(i) \cdot (S_t - \phi). \tag{13}$$

Replacing E_j by E_L in (8) – (12) it is straightforward to see that all previous results – apart from the statements about child labor income – remain valid. In particular, if parents do not get enough extra value out of the education of their children compared to child leisure and play (small a) they prefer to leave their children completely idle as long as a sufficiently strong anti-schooling norm $(S_t - \phi)$ prevails. This outcome helps to explain the coexistence of a schooling option and the incidence of idle children without to resort on schooling costs. Furthermore, the result is important in the following context. Imagine that large contributions from child labor in the past have driven the community in a situation where an anti-schooling decision gets a lot of social approval (S_t is large). Then, even when schooling is for free (as currently assumed), an enforceable child labor ban setting γ to zero does not induce schooling if condition (13) holds. Without employing a schooling costs argument, however, the existence of norms is essential in explaining the incidence of idle children. If there were no social preferences (i.e. $\sigma(i) = 0$ for all i) the right hand side of (13) would be zero and – given the positivity of the left hand side – the condition were never fulfilled.

Interestingly, for given susceptibility σ poorer families are again more prone to leave their children at home although there are no longer opportunity cost in form of foregone child labor income. This result is now simply reflecting the fact that poorer families can spend less income on consumption and thus experience less utility from consumption $(w(i)^{1-\alpha})$ so that the social evaluation of their behavior becomes – for given $\sigma(i)$ – relatively more important for their decisions and they are more influenced by a prevailing anti-schooling norm in their community than richer families.

5. Targeted Transfers

Next, let us consider whether and how exogenously provided development aid in form of income subsidies can move a community out of an anti-schooling equilibrium. The case of extensive, unconditional transfers is trivial and has already been addressed briefly in Section 3. A sufficiently high increase of average income A eliminates the anti-schooling equilibrium.

Sufficient here means that income transfers increase the value of education for a critical mass of families so that their pro-schooling decision together with the initiated bandwagon effect towards a pro-schooling norm eliminates the equilibrium θ_{high} and puts the community on a path towards the "education for all" equilibrium. But then, of course, the rise of A might not be sufficient. In that case too few families take up schooling for the anti-schooling norm to vanish. The norm curve shifts downward but the equilibrium θ_{high} continues to exist. Such a scenario may explain why unconditional transfers have often been observed as unsuccessful with respect to the intended change of schooling behavior.

More successful have been targeted transfers (see the Introduction), a policy design which is also theoretically more interesting. Targeted transfers like the programs of Progresa, Bolsa Escola, or Food for Education are characterized by two salient features. They are paid contingent on behavior, e.g. children showing up at school, and they are addressed to only a subset of a community, usually the poor families. These features render the current model particularly suitable for a theoretical investigation because heterogeneity of the population w.r.t. poverty and schooling attitude is explicitly taken into account. Particularly interesting here is the question of whether and how targeted transfers received by only the poorest families manage to affect the schooling behavior of a community at large through the spillover of behavior from targeted families to others. Formally, this leads to a problem of optimal design of the transfer program, i.e. the question how many families should receive subsidies and how generous the payment should be in order to initiate a successful transition towards the "education for all" equilibrium and simultaneously minimize costs of the program.

Suppose that the poorest families of a community are selected to receive an income subsidy of size s contingent on their children going to school. Let p denote the number, i.e. community share, of eligible families. For convenience we normalize average productivity, $A = 1$. Keeping everything else from the basic model, assuming that child labor is feasible (Assumption 1 holds), and comparing utilities given a full-day school option we find that the child of family i will not attend school in period t if the following condition holds.

$$(w(i) + s_p)^{1-\alpha} \cdot (1 + a)^{\alpha} - \lambda w(i)^{1-\alpha} \leq \sigma(i) \cdot (S_t - \phi), \quad \lambda \equiv (1 - \alpha)^{1-\alpha}(1 + \gamma) \left(\frac{\alpha}{\gamma}\right)^{\alpha}. \quad (14)$$

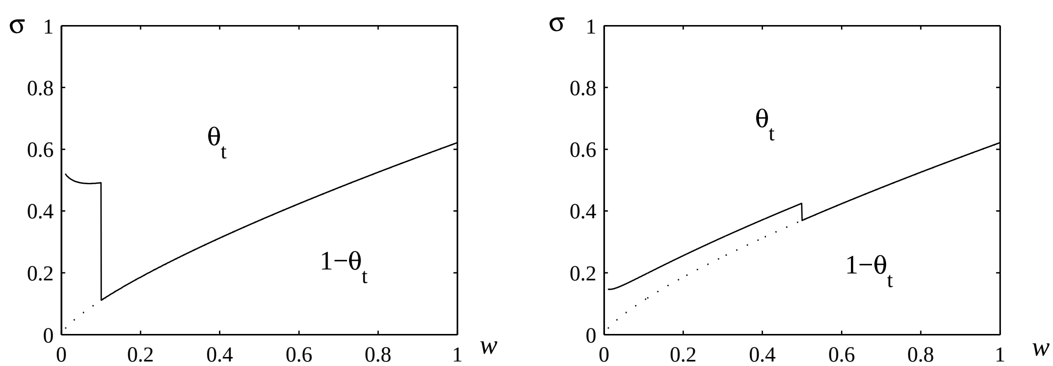
Here, s_p is a binary variable. $s_p = s > 0$ if $w(i) < p$ and $h_t(i) = 1$ and $s_p = 0$ otherwise. If s_p were zero for all w, condition (14) would collapse to (6). Condition (14) evaluated with equality provides the threshold between educated and uneducated children, which is now conveniently analyzed in a w–σ diagram.

$$\bar{\sigma}_F = \frac{1}{S_t - \phi}\left[(w + s_p)^{1-\alpha} \cdot (1+a)^{\alpha} - \lambda \cdot w^{1-\alpha}\right] \tag{15}$$

for $S_t > \phi$ and $\bar{\sigma} = 1$ otherwise.

As before, parents are more likely to keep their children uneducated if they are poor (low $w(i)$ for given $\sigma(i)$) and if they are susceptible to social approval (high $\sigma(i)$ for given $w(i)$). There are, however, two important differences between the basic and the current version of the model. First, schooling subsidies have shifted the threshold upwards so that a positive share $\tilde{\sigma}$ of the poorest families let their children attend school, $\tilde{\sigma} \equiv s^{1-\alpha}(1+a)^{\alpha}/(S_t - \phi)$. Second, the threshold is discontinuous. A structural break occurs at the point where families with income above p lose eligibility for transfers.

Figure 4: Education Threshold for Two Targeted Transfer Programs



Model parameters are $A = 1$, $a = 1.5$ and $\alpha = 0.25$, $\gamma = 0.45$, $\phi = 0.2$, and $S_t = 0.6$. Left panel: $s = 0.1$ and $p = 0.1$. Right panel: $s = 0.02$ and $p = 0.5$. The dotted line shows the threshold without targeted transfers.

Figure 4 visualizes how the design of transfers shapes the threshold and determines the share of uneducated children in a community at time t. If transfers are generous but paid only to a small share of families (s is large relative to p), the share of the poorest families who are persuaded to educate their children is large but so is the behavioral jump at the point of discontinuity. Such an example is shown in the left panel. Here, a subsidy of $s = 0.1$ is received by the poorest 10 percent of families of the community contingent on a pro-education decision, i.e. $p = 0.1$. One sees that under the currently prevailing norm ($S_t = 0.6$) about 45 percent of the poorest families are persuaded to send their children to school. On the other hand, if transfers are small but many families are eligible, the impact on behavior is relatively small at every targeted level of poverty but so is the behavioral change when already relatively rich families lose eligibility. The right hand panel shows such a case. There, 50 percent of the community are eligible for a schooling contingent transfer of $s = 0.02$. In short, a high–s–low–p policy changes the behavior of many people within a small income bracket whereas a low–s–high–p policy changes the behavior of few at any given level of income but this over a larger domain of poverty levels.

The parameters of transfer policy, s and p, interact in the determination of the share of uneducated children θ_t and the overall costs of the project. If the project works in the sense that targeted families send their children to school, total costs are given by $\int_0^p s\mathrm{d}w = p \cdot s$. The two policies shown in Figure 4, for example, imply the same project costs if all eligible families take up schooling. A different split up of the same project costs ps usually leads to different success measured by the additional share of children actually brought to school, visible as the area between solid and dotted lines in Figure 4. For an overall assessment of the success of a project, however, an inspection of thresholds as shown in Figure 4 is inappropriate. These are just a snapshot pictures of society at one arbitrary value of social approval. For a definite judgement of success we have to consider the long-run social equilibrium where $S_t = \theta_t$. There, it is particular interesting whether a transfer project creates enough behavioral change to initiate a transition towards the "education for all" equilibrium.

In order to prepare an investigation of equilibrium effects we step-wise integrate the area below the threshold.

$$1 - \theta_t = \frac{1}{S_t - \phi} \left\{ \int_0^p (w+s)^{1-\alpha} \cdot (1+a)^\alpha - \lambda w^{1-\alpha} \mathrm{d}w + \int_p^{\bar{w}} w^{1-\alpha} \cdot (1+a)^\alpha - \lambda w^{1-\alpha} \mathrm{d}w \right\} + (1 - \bar{w}),$$

where $\bar{w} = \min(1, [(S_t - \phi)/((1+a)^\alpha - \lambda]^{1/(1-\alpha)})$. Solving for θ we obtain the share of uneducated children at time t.

$$\theta_t = 1 - \frac{E_{FS}}{(2-\alpha)(S_t - \phi)} \tag{16}$$

$$E_{FS} \equiv (1+a)^\alpha \left\{1 + (p+s)^{2-\alpha} - s^{2-\alpha} - p^{2-\alpha}\right\} - \lambda + \mu_F,$$

where the constant $\mu_F \equiv (2-\alpha)(\bar{w} - 1) + (\bar{w}^{2-\alpha} - 1)[(1+a)^\alpha - \lambda]$ is independent of the design of the transfer program with $\mu_F = 0$ for $\bar{w} = 1$. Here, E_{FS} denotes the average value of education at full-day school when there are targeted schooling subsidies. It is the counterpart to the marginal value of education E_F in the benchmark model, which can easily be verified by comparing (16) with (9).

Results are similarly obtained when parents face a half-day school. Comparing utilities and focussing on the corner solution for afternoon work ($\ell = 1/2$) provides the threshold

$$\bar{\sigma}_H = \frac{1}{S_t - \phi}\left[\left(w \cdot \left(1 + \frac{\gamma}{2}\right) + s_p\right)^{1-\alpha} \cdot \left(\frac{1+a}{2}\right)^{\alpha} - \lambda \cdot w^{1-\alpha}\right] \tag{17}$$

for $S_t > \phi$ and $\bar{\sigma} = 1$ otherwise. Step-wise integration of the area below the threshold and solving for θ_t provides the share of uneducated children at time t when there is a half-day school option.

$$\theta_t = 1 - \frac{E_{HS}}{(2-\alpha)(S_t - \phi)} \tag{18}$$

$$E_{HS} \equiv \left(\frac{1+a}{2}\right)^{\alpha}\left\{\frac{\left[s + p(1+\gamma/2)^{1-\alpha}\right]^{2-\alpha} - s^{2-\alpha}}{(1+\gamma/2)^{1-\alpha}} + (1+\gamma/2)^{1-\alpha}(1-p^{2-\alpha})\right\} - \lambda + \mu_H,$$

with policy independent constant $\mu_H \equiv (2-\alpha)(\bar{w}-1)+(\bar{w}^{2-\alpha}-1)\{[(1+a)/2]^{\alpha}(1+\gamma/2)^{1-\alpha}-\lambda\}$. Inspection of derivatives verifies the intuition about how generosity of and eligibility for transfers affects the value of education.

Lemma 3. *The average value of education is increasing in the generosity of transfers and in the share of targeted recipients for both full-day and half-day school.* $\partial E_{jS}/\partial s > 0$, $\partial E_{jS}/\partial p > 0$, $j \in \{F, H\}$.

From here, equilibrium analysis commences as for the basic version of the model. Following the proof of Proposition 2 it is straightforward to show that an equilibrium with prevailing anti-schooling norm, θ_{high}, exists if

$$E_{jS} < \frac{1}{4}(1-\phi)^2(2-\alpha), \quad j \in \{F, H\}\,.$$

Applying Lemma 3 we see that a larger p or s reduces the set of parameters for preferences and child contributions to family income (a, α, and γ) for which an anti-schooling equilibrium exists, which proves the following intuitive result.

Proposition 5. *If transfers s are sufficiently high and the share of targeted recipients p is sufficiently large, the anti-schooling equilibrium ceases to exist.*

More interesting and not so straightforward is the question which targeted transfer policy is best, i.e. which combination of p and s minimizes costs and "just" moves a socio-economy out of θ_{high} so that it converges towards the "education for all" equilibrium. Formally, we are interested in the solution of the following problem

$$\min_{p,s} p \cdot s$$
$$s.t. \quad E_{jS} = \frac{1}{4}(1-\phi)^2(2-\alpha), \quad j \in \{F, H\}\,. \tag{19}$$

From the first order conditions we arrive at a result with a familiar structure (from Gossen's second law).

Proposition 6. *If a targeted transfer program is optimally designed, the ratio of eligible recipients relative to generosity, p/s, is equal to the ratio of marginal changes of the value of education that these policies bring about, i.e.*

$$\frac{p}{s} = \frac{\partial E_{jS}/\partial p}{\partial E_{jS}/\partial s}, \quad j \in \{F, H\}\,. \tag{20}$$

Inserting the derivatives for full-day school the optimality condition becomes

$$\frac{p}{s} = \frac{(p+s)^{1-\alpha} - p^{1-\alpha}}{(p+s)^{1-\alpha} - s^{1-\alpha}} \quad \Rightarrow p = s. \tag{21}$$

Generosity and eligibility affect the average value of education symmetrically so that the optimal design requires equality of p and s. In other words, the model suggests that a schooling project that targets a large share of the population with small transfers (or vice versa) is ill-designed. Either it does not move the economy out of the bad equilibrium or, if it is successful, there exists a cheaper transfer design with the same effect.

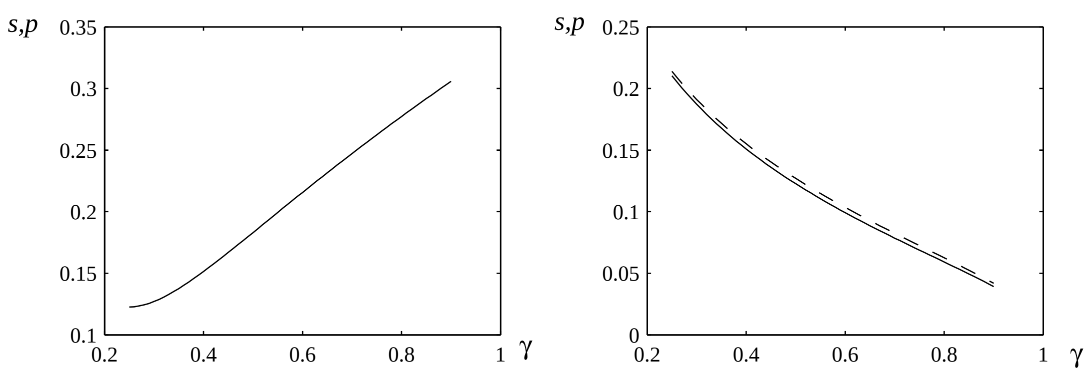
In case of a half-day school the optimal transfer design fulfils

$$\frac{p}{s} = \frac{\left[(s+xp)^{1-\alpha} - xp^{1-\alpha}\right]x}{(s+xp)^{1-\alpha} - s^{1-\alpha}} \tag{22}$$

with $x \equiv (1+\gamma/2)^{1-\alpha}$ and thus, as shown in the Appendix, $s > p$. Subsidies to poor families should be larger than the range of eligibility under a half-day school because school attending children continue to work in the afternoon and contribute $1/2 \cdot \gamma w(i)$ to family income. Thus, richer households are relatively easily induced to send their children to school by a changing schooling norm. Because their schooling decision depends relatively less on monetary subsidies compared to social evaluation, transfers should be more strictly targeted to the poor.

In order to assess how much should be spend and how many families should be targeted we solve the two equations (19) and (21) for s and p [equations (19) and (22) in case of a half-day school]. Given the non-linear shape, this can be done, unfortunately, only numerically. The most interesting parameter with respect to which the project design can be investigated is γ, the children's contribution to family income. Using a characteristic example, Figure 5 illustrates the optimal project design, i.e. the cost minimizing choice of p and s that produces a transition towards "education for all". For alternative values of child contribution to income, the left panel shows the solution for full-day school and the right panel for half day school. Solid lines reflect the optimal share of targeted families and dashed lines the optimal size of the transfer. As shown above, both coincide in case of a full-day school.[4] The numerical solution reveals that they lie also quite close together in case of a half-day school.

Figure 5: Optimal Targeted Transfers for Alternative Child Labor Contribution to Family Income



Model parameters are $a = 2$, $\alpha = 0.2$, $\phi = 0.2$. Solid lines: population share of eligible families, dashed lines: size of the subsidy. Left panel: full day school, right panel: half-day school.

In Section 3 we had derived that the value of education is decreasing in children's contributions to family income when families face a full-day school but increasing under a half-day school option (and child work in the afternoon). This feature of opportunity costs implies that optimal schooling subsidies and share of targeted families are increasing in γ for the full-day school option but are decreasing for the half-day school option. While this is generally true, the curves

[4]Not shown is the optimal policy when $\gamma < \alpha/(1-\alpha)$ so that child labor does not exist. In this case the best choices are independent from γ. Given the preferences underlying Figure 5 the threshold between work and idleness is at $\gamma = 0.25$ and the best transfer policy to bring idle children to school at minimum cost is $p = s = 0.12$.

are shifted downwards, i.e. an "education for all" equilibrium is realized at lower costs, when schooling becomes intrinsically more important for parents (a rises), or social stigma of an anti-schooling decision rises (ϕ rises), or parents are more empathetic (higher α).

The most important finding, however, is how small the optimally targeted population share is that eliminates the anti-schooling equilibrium. For an assessment recall from Proposition 2 that at an anti-schooling equilibrium a majority of families is not sending their children to school. Otherwise, an anti-schooling norm could not be sustained. For the examples shown in Figure 5 between 65 and 95 percent of children do not attend school at the initial equilibrium θ_{high}. To induce schooling for all, however, it is sufficient to target only between 5 and 30 percent of the families. The initial change of behavior of a few families is sufficiently large to initiate a bandwagon effect, i.e. a perpetual change of the degree of social approval of an anti-schooling decision and the share of school attending children. At the end a pro-schooling attitude is held by everybody and all children are sent to school.

It is also worth noting that the minimum size of the subsidy that produces a successful transition is always smaller than γ and almost always smaller than $\gamma/2$, the average contribution of child work to family income. Thus, with respect to both size of the subsidy and number of targeted recipients surprisingly little effort is needed in order to create strong behavioral changes of a community at large. Nevertheless, in case of a half-day school, the schooling project has relatively little impact on child labor since children who are attracted to school are replacing leisure and play in the afternoon by work. These results are well in tune with recent empirical research on targeted transfer programs but probably hard to produce within a standard model lacking the mechanism of a social multiplier.

6. Final Remarks

In this paper we have investigated the interaction of individual poverty and community norms in the determination of child labor, schooling, and idleness. While maintaining to deliver the well-known association between schooling and individual and aggregate poverty the theory is additionally able to resolve some puzzles from the empirical literature, e.g. while regions of same poverty display very different schooling behavior and why and how idleness can explain that taking up schooling has frequently little effect on child labor. It is explained how policy can initiate a bandwagon effect toward an "education for all" equilibrium utilizing the endogenous evolution of norms. The theory strongly supports targeted transfer programs by showing that relatively small behavior-contingent transfers to a minority can change the schooling behavior of a community at large.

The theory is not claiming to replace poverty-based and other available approaches towards child labor and schooling. Instead, credit constraints (Baland and Robinson, 2000), bonded child labor (Basu and Chau, 2004), political economy elements (Doepke and Zilibotti, 2005), fertility (Hazan and Berdugo, 2002), and child mortality (Strulik, 2004) constitute conceivable future extensions of the community-norms based model of schooling and child labor.

Appendix

Proof of Lemma 2.

$$\frac{\partial E_F}{\partial \gamma} = -(1-\alpha)^{1-\alpha}\alpha^{\alpha}\left[\gamma^{-\alpha} - \alpha\gamma^{-\alpha-1}(1+\gamma)\right]$$

The term in square brackets is positive for

$$\gamma^{-\alpha-1}\left[\gamma - \alpha(1+\gamma)\right] > 0 \quad \Rightarrow \quad \gamma > \frac{\alpha}{1-\alpha},$$

i.e. $\partial E_F/\partial\gamma < 0$ under Assumption 1.

$$\frac{\partial E_F}{\partial \alpha} = (1+a)^{\alpha}\log(1+a) + (1-\alpha)^{1-\alpha}(1+\gamma)\left(\frac{\alpha}{\gamma}\right)^{\alpha}\left[1+\log(1-\alpha) - 1 - \log(\alpha/\gamma)\right].$$

The term in square brackets simplifies to $\log\left[(1-\alpha)\gamma/\alpha\right]$, which is positive because of Assumption 1.

$$\begin{aligned}\frac{\partial E_H}{\partial \alpha} = &\left(\frac{1+a}{2}\right)^{\alpha}(1+\gamma)^{\alpha}\left\{\log\left(\frac{1+a}{2}\right) + \log\left(1+\gamma\right)\right\} \\ &+ (1-\alpha)^{1-\alpha}(1+\gamma)\left(\frac{\alpha}{\gamma}\right)^{\alpha}\left[1+\log(1-\alpha) - 1 - \log(\alpha/\gamma)\right].\end{aligned}$$

From (5a) we conclude that the corner solution E_H fulfils $(1-\alpha) - (\alpha/\gamma) + (1-\alpha)a/2 \geq 1/2$. And since $\gamma > \alpha/(1-\alpha)$ for child labor to exist (Assumption 1), the corner condition necessarily fulfills $(1-\alpha)a/2 > 1/2$ and thus $\log\left[(1+a)/2\right] > 0$. The term in curly braces is thus positive. The remainder of the proof for $\partial E_H/\partial\alpha > 0$ proceeds as for E_F.

$$\frac{\partial E_H}{\partial \gamma} = \frac{1}{2}\left(1+\frac{\gamma}{2}\right)^{-\alpha}(1-\alpha)\left(\frac{1+a}{2}\right)^{\alpha} - (1-\alpha)^{1-\alpha}\left[\left(\frac{\alpha}{\gamma}\right)^{\alpha} - (1+\gamma)\left(\frac{\alpha}{\gamma}\right)^{1+\alpha}\right].$$

Thus $\partial E^H/\partial\gamma$ is positive if

$$\left(1+\frac{\gamma}{2}\right)^{-\alpha}\left(\frac{1+a}{2}\right)^{\alpha} > 2(1-\alpha)^{-\alpha}\left(\frac{\alpha}{\gamma}\right)\left[1-(1+\gamma)\left(\frac{\alpha}{\gamma}\right)\right] \tag{A.1}$$

Since E_H is positive under Assumption 2 we have

$$\left(1+\frac{\gamma}{2}\right)^{-\alpha}\left(\frac{1+a}{2}\right)^{\alpha} > 2(1+\alpha)^{1-\alpha}\left(1+\frac{\gamma}{2}\right)^{-1}(1+\gamma)\left(\frac{\alpha}{\gamma}\right)^{\alpha}.$$

Substituting the right hand side for the left hand side in (A.1) we get a sufficient condition for a positive $\partial E_H/\partial\gamma$

$$(1-\alpha)\left(1+\frac{\gamma}{2}\right)^{-1}(1+\gamma) > 2\left[1-(1-\gamma)\frac{\alpha}{\gamma}\right].$$

This simplifies to

$$\alpha(1+\gamma) > 1-(2+\gamma)(1+\gamma)\frac{\alpha}{\gamma}. \tag{A.2}$$

Under Assumption 1 we have $\gamma > \alpha/(1-\alpha)$ and thus $1+\gamma > 1/(1-\alpha)$. The left hand side of (A.2) is thus larger than $\alpha/(1-\alpha)$, which is larger than one. Since the left hand side of (A.2) is larger than one while the right side is smaller than one, it is true that $\partial E_H/\partial\gamma > 0$.

Proof that $s > p$ for half-day school option. Substitute $b \equiv p/s$ in (22) so that

$$b = \frac{\left[(s+xbs)^{1-\alpha} - x(bs)^{1-\alpha}\right]x}{(s+xbs)^{1-\alpha} - s^{1-\alpha}} = \frac{\left[(s+xb)^{1-\alpha} - xb^{1-\alpha}\right]x}{(s+xs)^{1-\alpha} - 1}.$$

Thus, after multiplying with the denominator of the left hand side

$$0 = (x-b)(1-xb)^{1-\alpha} - x^2b^{1-\alpha} + b = F(x,b).$$

One solution is $(x,b) = (1,1)$. Applying the implicit function theorem there exists a continuous function around $(1,1)$, $b = g(x)$, such that

$$\frac{\partial b}{\partial x} = \frac{\partial F/\partial x}{\partial F/\partial b} = \frac{2^{1-\alpha} - 2}{2^{1-\alpha} - \alpha} < 0,$$

since $0 < \alpha < 1$. This implies, since $x \equiv (1+\gamma/2)^{1-\alpha}$, that b is smaller than one for $x > 1$, i.e. $\gamma > 0$, implying that s is larger than p, at least in the neighborhood of $(1,1)$.

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