

A SOCIAL STIGMA MODEL OF CHILD LABOR

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Resumen: Se presenta un modelo donde una norma social se internaliza por los agentes. Los infractores de la norma son estigmatizados, lo que se refleja en una reducción de utilidad. El costo del estigma, sin embargo, se reduce conforme crece el número de personas que no cumplen dicha norma. El modelo se aplica al análisis del trabajo infantil. En equilibrio, el costo del estigma esperado y observado es igual y el mercado laboral se vacía, tanto de mano de obra infantil como de adultos. La interacción estratégica da origen a multiplicidad de equilibrios.

Abstract: This paper constructs a model in which a social norm is internalized. The social disapproval of people who violate the norm -stigmatization- is incorporated as a reduction in their utility. That reduction in utility is lower as the proportion of the population that violates the norm increases. In the model, society disapproves of people sending their children to work and parents care about that "embarrassment". An equilibrium is constructed in which the expected and realized stigma costs are the same; and the wages rates of child and adult labor are such as to equate demand and supply for each kind of labor.

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Nature, when she formed man for society, endowed him with an original desire to please, and an original aversion to offend his brethren... She rendered their approbation most flattering and most agreeable to him for its own sake; and their disapprobation most mortifying and most offensive.

Adam Smith

1. Introduction

In every society, a set of rules regarding filial obligations determine different behavioral standards within the household. These rules establish what actions are acceptable by the community and they have an effect on parents' attitudes towards their children and vice versa.¹ There are different ways in which these social norms or conventions may be enforced. A recent paper by Lindbeck, Nyberg and Weibull (1998) has modeled the case of a social norm that is enforced by social stigma and the individual's preference for avoiding stigma or embarrassment. The explicit recognition of such norms in parental decision, making concerning child labor as in the model of Basu and Van (1998) can give us some important practical insights concerning the incidence of child labor and policy measures for combating the problem. That is what this paper is concerned with.

The model proposed here assumes that a parent who sends her child to the labor market is likely to face a social stigma that reduces her own welfare. The second key assumption will be that the social stigma is lower the higher the aggregate incidence of child labor. The latter is a consequence of the reasonable assumption that a society is more tolerant of a practice that is widely prevalent (see Lindbeck, Nyberg and Weibull, 1998). Multiple equilibria will arise, where some equilibria show no child labor in the economy and relatively high wages, whereas others present higher incidence of child labor and lower wages. The model solves simultaneously the formation of the level of stigma and the equation of demand and supply in the adult and child labor markets.

The contribution of this paper to the literature is twofold. First, it incorporates the effect of social norms on child labor decisions, addressing an important issue that has been previously neglected in the

¹ As an example, see the discussion about such rules and its effects on fertility and human capital investment decisions in Dasgupta (1993) and Ray (1998).

literature on the subject.² Second, it provides an alternative explanation of child labor that originates in social interactions, resulting multiplicity of equilibria as in Basu and Van (1998). Additionally, in this case the existence of multiple equilibria is robust to different specifications of the demand for labor in the economy. This is especially significant because it means that multiple equilibria (one where children work and another where they do not) can occur even in a small, open economy. As Dixit (1998) noted, this does not happen in Basu and Van's (1998) model.

This paper consists of five sections. The following section briefly reviews the interactions between social norms and behavior, providing a definition of what is understood as a social norm or convention. Section three develops a simple example to show the multiplicity of equilibria arising through the social convention that imposes a social cost on those that send their children to work. Section four introduces the interaction between the social stigma cost and wages, capturing the idea that parents who can afford not to bear the burden of sending their children to work will avoid that practice. The final section provides some concluding remarks.

2. Norms, *Stigma*, and Economic Decisions: Motivation and Pertinent Literature

Two issues will be discussed in this section. The first is the incorporation of social norms in the analysis and its relevance for a better understanding of the economic behavior. The second concerns the type of norm used in this paper, one that is enforced through a "social stigma", embedded in the preferences. This "social stigma" type of a norm has been previously used in the literature to analyze the welfare system (Besley and Coate, 1992 ; Lindbeck, Nyberg and Weibull, 1998) and crime incidence and its persistence (Rasmusen, 1995).

The study of the effect of social norms on economic behavior has grown in recent years.³ Following Weber (1922), several categories

² Thorough reviews of the literature can be found in Grootaert and Kanbur (1995) and Basu (1999). Lopez-Calva (2001) contains a review of the empirical findings.

³ See, for example, Besley and Coate (1992), Basu (2000); Basu, Jones and Schlicht (1987); Young (1998); Bendor and Mookherjee (1990); Boyd and Richardson (1994); Schlicht (1993, 1998); Binmore and Samuelson (1994); and Elster (1989).

of repeated collective practices can be distinguished as formal and informal guidelines of behavior. These are *usage, custom, convention, and law*.⁴ According to Weber, *usage* refers to an action that is observed to recur regularly but may change and evolve over time, whereas *custom* is when a specific usage prevails for an extended period of time. A *convention* or *social norm* is a part of the custom to which people adhere voluntarily, without internalization, but which does not require formal enforcement. People adhere to norms because they are protected against violation by sanctions of social disapproval. The *law*, on the contrary, is a set of behavioral rules that require a formal “staff” to enforce them, e.g., the court.⁵ The economic literature uses social norms and custom under the term “conventions”, emphasizing the fact that they are enforced informally. In this paper, internalized norms will be called “preference-changing” –closer to Weber’s definition of *custom*, whereas those that require informal social enforcement will be termed “rationality limiting” – as in Weber’s definition of norms or conventions.⁶

Internalization of the norm into the preferences is itself a self-enforcement mechanism. People may incorporate certain rules into their preferences, and norms prevail through the feelings of embarrassment, anxiety, guilt, and shame that occur when they violate them (Elster, 1989; Akerlof and Kranton, 2000). Disapproval by members of the group a person belongs to may reduce that person’s welfare by affecting her sense of belongingness, her identity. This is the type of effect that can be modeled as a “stigma”. A second enforcement mechanism is when the convention requires a punishment or “social sanction” by the community in order for the norm to be sustainable, in a folk theorem type of argument. This idea has been used, for example, to explain informal reciprocal cooperation arrangements in poor communities (Coate and Ravallion, 1993). Yet one alternative role that norms may play in economic interactions is that of focal points in interactions with multiple equilibria. Those are called “equilibrium-selection” norms (Basu, 2000). The same equilibrium selection perspective has been analyzed from an evolutionary perspective in Young (1998). The main result tells us under what conditions efficient norms in a welfare sense would survive over time and which ones would disappear through evolutionary pressure.

⁴ In this paper, social norm and convention will be used interchangeably.

⁵ See the discussion in Swedberg (1993).

⁶ The terminology, though not the analogy to Weber’s taxonomy, is introduced in Basu (2000).

2.1. Social Stigma

The type of social norms modeled in this paper is one in which parents are stigmatized when they send their children to work. Sending a child to work is not well accepted in the community. Thus parents bear a social reputation cost when they decide to do so. The literature tells us that the existence of values like this differ according to the stage of development and cultural traditions. Lindbeck (1997) mentions that norms in favor of work to support oneself evolved over time, before and after the existence of the modern welfare state in advanced countries. Prior to the existence of a developed society, "...it must also have been in the interest of relatives and friends, particularly parents, to promote good working habits in the younger generation so as to prevent free-riding on the altruism of others in the future" (Lindbeck, 1997, p. 2). In the same way, however, those norms may have changed over time as the economies grew richer and were able to establish mechanisms so that people could save, educate their children, and use the benefits of the welfare system. Nowadays, different kinds of filial obligations are observed as natural across countries and for different levels of development. In poor countries, for example, it is possible to find children working in rural areas with few members of the community questioning the practice, understood as standard behavior. As the economies develop and urbanization takes place, those values could be expected to change.

As the idea of child labor becomes less acceptable in the community, parents that incur that practice bear a reputation cost, a stigma. In a classic sociological study, Goffman (1963, p. 3) defines stigma as a concept that is strongly linked to the idea of identity and sense of belongingness,

...(when a person) is presented before us, evidence can arise of his possessing an attribute that makes him different from others in the category of persons available for him to be, and of a less desirable kind -in the extreme, a person who is quite thoroughly bad, or dangerous, or weak.

Such an attribute is a stigma, Goffman says, and "...he is thus reduced in our minds from a whole and usual person to a tainted, discounted one". That is the type of perception that is assumed in the model below, one which reduces the utility level of the individual to whom the stigma is attached.

There are two reasons why people may want to impose a social stigma on parents that send their children to work. First, people

may attach a moral content to such a decision and see child labor as morally unacceptable. Second, on a more practical level, adults may see child labor as a practice that depresses the level of wages in the economy and harms labor market conditions. Hence, a norm may emerge, establishing that sending a child to the labor market is unacceptable to the community. The latter reason is related to the interaction between the adult and the child labor markets, analyzed, for example, in Basu and Van (1998). These two perspectives, the moral principle and the practical rationale, do not necessarily oppose each other. A paper analyzing the results of the US Census of 1900 states that

...child labor, of necessity, will affect the conditions under which adults have to work, and to some degree also will affect their chances for wages. It is but fair to assume that in the same measure as females replaced men as factory workers, so child labor, if not restricted, will crowd a proportionate number of adults out of employment. Child labor, therefore, is not desirable and should be restricted. (Moersch, 1902, pp. 101-102).

On the other hand, the same article provides data about the state that showed the lowest level of child labor, Minnesota, saying that

...this denotes a condition which its citizens should strive to preserve, for it bears with it a great blessing for the young generation. They are much more fortunate than the many other children in other states who have to enter upon factory life at a time when they should build up their bodies and brains for the great struggle of life. (Moersch, 1902, p. 102).

Both arguments against child labor, the moral and the practical reasons, are thus coexisting.

The issue of whether a norm like the one analyzed here indeed exists is an empirical question. In what follows, the norm will be assumed to exist and its effects will be discussed. One piece of evidence that can be used to support the existence of such a stigma in reality, in addition to the discussion in policy circles, full of normative statements and condemnatory judgments of this practice, is the well-known issue of underreporting of child labor in household surveys.⁷ The empirical literature on child labor has typically discussed the fact that parents who do not face any legal threat if they reveal that they send their children to work below the legal age, still tend to declare

⁷ See the discussion in Basu (1999) and Grootaert and Patrinos (1998).

that their children do not work or work less than they actually do. This is typically justified by a certain degree of “shame” the parents may feel by declaring truthfully.⁸ Social embarrassment is indeed a plausible explanation.

3. A Simple Model with Multiple Equilibria

Mal comune, mezzo gaudio, a popular Italian saying tells us.⁹ It is believed that whenever people go through bad times, feeling that others share those bad conditions may make them feel less sad. As introduced above, let us assume there is a social norm that says if you send your child to work, you are considered a bad parent. Sending a child to work produces embarrassment – a *social stigma cost* – that is reflected in lower utility. That embarrassment, however, will be lower the higher the proportion of people that are violating the norm. The higher the level of child labor in the economy, the lower the social stigma cost, for a given supply of child labor for a specific household.

Our model presents a model similar to that of setting Akerlof and Kranton (2000). They introduce a utility function that depends on the consumption of goods and services, the individuals own actions and the actions of others, and a given “prescription” (something that should or should not be done). This is exactly the setting we propose here.

In this model, the aggregate level of child labor, E , shall be taken as given by individual households. The effect of one individual’s decision on the aggregate variable is seen as negligible by the concerned decision-maker. The expectation of what the aggregate level would be, though, will influence the optimal level of child labor for the decision-maker in the household.

Let us suppose that we have N households in the economy, each one composed of one adult and one child. The general specification of preferences is given by a utility function, E , $W = W(c, e, E)$, whose arguments are total household consumption, c , the child’s effort level, $e \in [0, 1]$, which denotes the fraction of the child’s non-leisure time

⁸ As a referee has pointed out, people also under-report income because they do not believe that there is no legal threat. The later may also be true. I would argue, however, that in either case the reason for under-reporting is unknown, and we would have to gather subjective data for a subjective concept to make sure that our explanation, though plausible in both cases, can be verified.

⁹ “Common malady, half happiness”.

spent at work, number of hours at work, and the aggregate level of child labor in the economy. The last two arguments are related to what will be termed the "stigma cost". It will be assumed that the utility function is separable in consumption and "stigma cost", the latter being a function of e and E . The social stigma reduces the parent's utility. There will be one decision maker in the household, the parent, following the tradition of the unitary model (Becker, 1965). The problem of the parents is then:

$$\max_{c,e} W(c, e, E) = U(c) - S(e, E) \quad (1)$$

s.t.

$$c \leq w + w_c e \quad (2)$$

where the wages of the adults and the children are w and w_c , respectively. Both w and w_c are later determined endogenously, though each household treats these (as well as E) to be given. The assumption on the functions $U(c)$ and $S(e, E)$ are $U_c > 0$, $U_{cc} \leq 0$, $S_e > 0$, $S_{ee} \geq 0$, $S(0, E) = 0$, $eS_E \leq 0$, and finally $S_{eE} < 0$, i.e., the marginal disutility from child's effort is decreasing in the total amount of child labor in the economy. The first four assumptions are standard while $S(0, E) = 0$ captures the fact that the stigma cost is zero if the child is not working. The latter implies that if $e = 0$, then $S_E = 0$. The condition $eS_E \leq 0$ implies that if $e > 0$, $S_E \leq 0$. In other words, an increase in aggregate child labor weakly diminishes the stigma cost, provided that the child is working in the first place. Note that these assumptions imply that $S(e, E) > 0$ whenever $e > 0$. Therefore, it is being assumed that even if E is very large, as long as one child's works the stigma cost does not vanish. Thus, child labor is not a value neutral activity with a reward for keeping up with the Jones. It is something that society considers to be inherently "bad".

Clearly, the constraint will always be binding, since $U_c(\cdot) > 0$. Hence, we may insert (2) into the utility function of the agent, (1), and obtain the first order condition

$$U'(w + w_c e)w_c = S_e(e, E) \quad (3)$$

which simply states that the marginal benefit of an extra unit of child labor supplied, measured in terms of utility from extra consumption, has to equal the marginal cost, as given by the stigma to be borne by the parent, as a function of individual and aggregate child labor supply. From (3), it is possible to obtain the optimal amount of child labor hours supplied by the individual household, given by

$e^*(w, w_c, E)$. Hence, the agent considers the wage rates and the *expected* level of child labor in the economy, E , in order to choose the optimal number of hours that her child should work.

The aggregate level of child labor in the economy in equilibrium, E^* , must satisfy a natural aggregate consistency requirement (Basu, 1987; Becker, 1991; and Lindbeck, Nyberg and Weibull, 1998). The consistency requirement shall be termed the “rational expectations property”. The set of E that satisfies such a property is defined as

$$\psi(w, w_c) = \left\{ E \mid E = N e^*(w, w_c, E) \right\}$$

Let us now turn to the description of firms. Firms maximize profit using a production function whose only input is “effective” units of labor, i.e., adult and child labor corrected by the adult equivalence parameter, γ , which tells us how productive a child is compared to an adult. In other words, it is assumed, for analytical simplicity, that adult labor and child labor are substitutes, subject to an equivalency correction.

Thus, for a firm that employs A adults and C children, its effective labor input is $L \equiv A + \gamma C$. Given the assumptions, it is obvious that if $\gamma w < w_c$, no firm will employ children and if $\gamma w > w_c$ no firm will employ adults. Hence, whenever both adults and children work, $\gamma w = w_c$. From now on, it will be assumed, without loss of generality, that this is the case. Then, whenever it is said that the adult wage is w , it should be presumed that child wage is γw .

With this in mind, note that if the wage is w , then the representative firm maximizes $\pi = f(L) - wL$, and the first order condition is simply $f'(L) = w$. Assume constant returns to scale, so that profits are equal to zero. The optimal amount of effective units of labor demanded is

$$L^* = f'^{-1}(w) \tag{4}$$

Without loss of generality, let us assume that this economy has only one firm. We are now in a position to define an equilibrium. Intuitively, an equilibrium is a situation where the demand for child labor is equal to its supply, the demand for adult labor equals the demand of adult labor, and the amount of child labor satisfies the rational expectations property discussed above.

The *equilibrium* for this economy can now be defined formally as a triple (w^*, w_c^*, E^*) such that:

$$(i) \quad \gamma w^* = w_c^*$$

$$(ii) E^* \in \psi(w^*, \gamma w^*),$$

and

$$(iii) N + \gamma E^* = f'^{-1}(w^*)$$

Condition (ii) above establishes that the aggregate level of child labor must satisfy the rational expectations property at the equilibrium, i.e., each parent's choice of e , given wages and expected level of E , must result in E^* . The third condition, (iii), is the market clearing in the labor market, in terms of effective units of labor. The wage w^* must be such that the firm's demand equals the summation of N (adult labor supply) and total child labor supply in effective units, γE^* .

In order to show in a simple way the multiplicity of equilibria introduced by the social interactions in this model, let us assume that $U(c) = \ln(c)$. Using this specification of $U(c)$ has the advantage that the optimal supply of labor will be independent of the level of wages, which allows us to illustrate the main result in a simple manner. In the next section, this specification is changed so as to incorporate the interaction with wages. The first order condition is as follows:

$$\frac{\gamma}{(1 + \gamma e)} = S_e(e, E) \quad (5)$$

It is easy to show that the model yields strategic complementarity in terms of child labor supply, for any positive level of e . In this case, strategic complementarity depends on the sign of

$$\frac{de^*}{dE},$$

which can be obtained by totally differentiating (5):

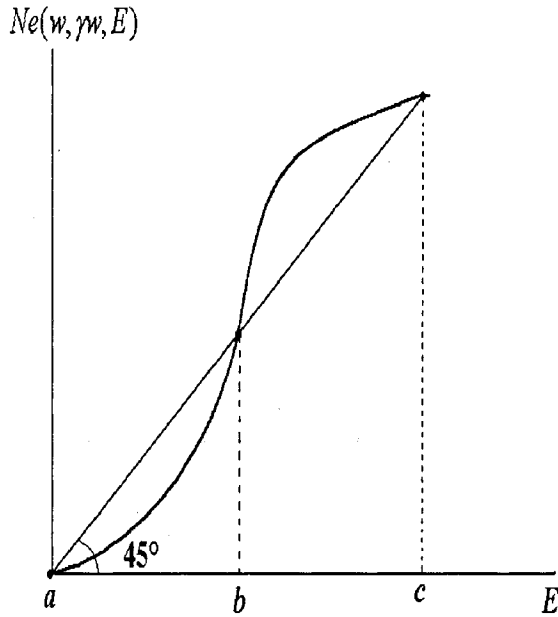
$$\frac{de^*}{dE} = -\frac{(1 + \gamma e)S_{eE}}{\gamma S_e + (1 + \gamma e)S_{ee}} \geq 0 \quad (6)$$

and this will be a strict inequality for $e > 0$.

Thus, under the reasonable assumptions made above, to wit $S_{eE} < 0$, $S_e > 0$, and $S_{ee} > 0$, strategic complementarity obtains. Expectations regarding the aggregate level of child labor in the economy, i.e., what the others will do, affect each individual's decision and thus the outcome, opening up the possibility of multiple equilibria, as shown in figure 1. The response of the agents to the expected

aggregate level of child labor results in multiple rational expectations equilibria, shown as points A, B, and C in the figure. The social effect is introduced by the norm, given that the adult's expectation of E determines the expected stigma cost –“embarrassment” level– she will face for a given e .

Figure 1
Multiplicity with Social Interactions

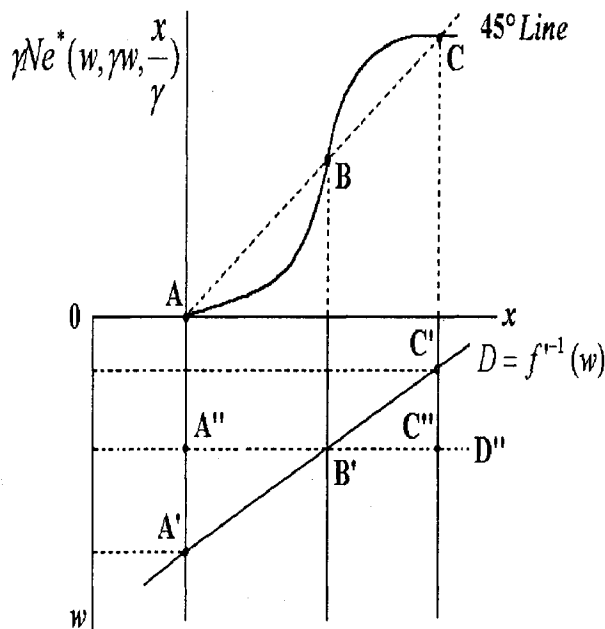


The possibility of multiple equilibria in the labor market is shown in figure 2, for a given shape of the stigma cost.¹⁰ The horizontal axis is in units of x , which is defined as aggregate child labor measured

¹⁰ It is important to note that a linear specification of the stigma cost, given that e is bounded both from above and below, would result in the same multiplicity.

in adult equivalence, $x = \gamma E$. The distance $0A$ in the quadrant below is equal to N , and represents the fact that parents supply their labor inelastically. The main quadrant shows the points that satisfy the rational expectations property for E , points A, B, and C. The vertical axis represents the total amount of effective child labor supplied in response to the expected aggregate level, E , for given wages. The total amount of effective child labor supplied in response to the expected aggregate level is obtained by correcting for adult equivalence the optimal amount supplied by the individual household, and multiplying it by the number of households, N .

Figure 2
Rational Expectations Equilibria and the Labor Market



The quadrant below in figure 2 is the one that depicts the market clearing in the labor market, showing the demand for effective units of labor, $L^* = f^{-1}(w)$, as well as the supply. The supply is inelastic

with respect to wages and determined by the expectations about E (see first order condition). The two stable rational expectations equilibria are A and C . These determine two stable equilibria in the labor market, A' and C' , as shown in the quadrant below.

The main result thus obtains:

1) One equilibrium is at C' , where wages are low and children work; and

2) A second equilibrium is represented by A' , with high wages and no child labor.

This result derives directly from the social stigma attached to parents who send their children to work, and the quite realistic assumption that such an “embarrassment” decreases as the proportion of children working in the economy increases. Thus, a social norm, sustained through social pressure, results in a coordination problem.

The existence of multiple equilibria is robust to different specifications of the demand for labor. Suppose this is a small, open economy, which implies that the labor demand is perfectly elastic at a given wage level, D'' . The two stable equilibria are then A'' and C'' . The existence of multiple equilibria is robust to that specification, as opposed to the model in Basu and Van (1998). Though the wage level in such a case does not change, one of the stable equilibria shows no child labor and the other full child labor supply.

4. Extension: Wages Affecting the Set of Rational Expectations Equilibria

In the model presented above the wages do not play any role. The example was used to illustrate in the simplest case the possibility of multiple equilibria introduced by the social norm. The use of a more general utility function than $U(c) = \ln(c)$ makes the rational expectations property sensitive to wages. This provides a more realistic setting and also allows us to analyze the validity in this setting of the “luxury axiom” proposed in Basu and Van (1998). In order to be consistent with the latter model, the utility function, whose arguments are the same as before, is taken to be of the Stone-Geary type, specified as:

$$V(c, e, E) = \begin{cases} (c - \bar{c}) [z - es(\bar{E})] & \text{if } c \geq \bar{c} \\ (c - \bar{c}) & \text{if } c < \bar{c} \end{cases}$$

Where \bar{c} is the subsistence level of consumption, z is a constant, c , and e are defined as before. The aggregate level of child labor, E ,

is normalized as $\tilde{E} = \frac{E}{N}$, so that \tilde{E} is the total proportion of available child labor time that is actually in the labor market. Notice that $\tilde{E} \in [0, 1]$. Consumption still represents total household consumption. Thus, for consumption above the subsistence level, \bar{c} , the agents care about the stigma cost, which is increasing in e and decreasing in \tilde{E} , given that $s'(\tilde{E}) < 0$. For simplicity, assume that $s(1) > 0$, and $z = s(0)$, the latter being the maximum stigma cost, when no aggregate child labor is offered in the labor market but the household is contemplating full time work by the child. It is easy to verify that $U_c > 0$,¹¹ $U_{cc} = 0$, $S_e \geq 0$, $S_{ee} = 0$, $S_E \leq 0$, and $S_{e\tilde{E}} \leq 0$. In this case, when household consumption falls below the subsistence level, only consumption matters.

As before, agents take the expected level of aggregate child labor, \tilde{E} , as given, and decide on the optimal level of child labor, e^* , at the given wage, w . The equilibrium for this economy is defined as in section 3 above, namely a triple $(w^*, w_c^*, \tilde{E}^*)$ such that the labor market clears, wages for children equal the wages of the adults corrected for productivity, and the individual and aggregate proportions of child labor are consistent in the rational expectations sense described above.

In the case where the total potential income of the households when they send the child to work full time is below the subsistence level of consumption, i.e., $w + \gamma w \leq \bar{c}$, full child labor will unambiguously occur ($e^* = 1$). This establishes result 1.

RESULT 1. *There exists a sufficiently low level of wages, $\hat{w} = \frac{\bar{c}}{1+\gamma}$, below which full child labor supply occurs, regardless of the expected stigma cost.*

If the potential income of parents is not enough to reach the subsistence level, even if they send their children to work, substitution possibilities are lost and they only care about consumption. In this case full child labor supply occurs. Whether such a wage can occur in equilibrium or not depends on labor demand conditions in the economy, as will be evident from the discussion below.

For the range of wages where the stigma cost plays a role, the first order condition of the decision maker is:

$$[z - es(\tilde{E})]w\gamma = (w(1 + \gamma e) - \bar{c})[s(\tilde{E})] \quad (7)$$

¹¹ Strictly speaking, $U_c > 0$ as long as $z - es(\tilde{E}) > 0$. If $z - es(\tilde{E}) = 0$, then $U_c = 0$.

since $c = w(1 + \gamma e)$. Combining result 1 and expression (7), it is possible to characterize the optimal supply of child labor for the household as:

$$e^* = \begin{cases} \text{mid} \left\{ 1, \frac{z}{2s(\bar{E})} + \frac{\bar{c}}{2w\gamma} - \frac{1}{2\gamma}, 0 \right\} & \text{if } w \geq \frac{\bar{c}}{1 + \gamma} \\ 1 & \text{if } w < \frac{\bar{c}}{1 + \gamma} \end{cases} \quad (8)$$

The upper line of the expression above means that the child labor supply would be the mid-value among the three expressions in brackets. Given the fact that household's child labor supply is normalized to lie between zero and one, whenever the expression

$$e^* = \frac{z}{2s(\bar{E})} + \frac{\bar{c}}{2w\gamma} - \frac{1}{2\gamma}$$

becomes larger than or equal to one, child labor will be one, whereas for levels below zero, the intermediate value will be zero, and so will child labor supply.

According to the "luxury axiom", there should be a high enough level of wage beyond which parents would choose not to send their children to work. In this model, such an idea is reflected in the fact that, for high enough wages, parents can "afford" not to bear the stigma cost and will not send their children to work. That outcome, however, would only be sustainable if it satisfied the equilibrium conditions. There exists, indeed, a high enough level of wages above which child labor supply would be zero, as shown in result 2.

RESULT 2. *There exists a high enough level of wages, namely*

$$\bar{w} \geq \frac{\hat{c}s(1)}{s(1) - \gamma s(0)},$$

such that child labor supply in the economy will be zero, regardless of the expected level of aggregate child labor.

This can be verified by solving for the wage level that would make $e^* \leq 0$, for $\bar{E} = 1$, i.e., for the lowest possible stigma cost. This is the case when

$$\frac{z}{2s(1)} + \frac{\bar{c}}{2w\gamma} - \frac{1}{2\gamma} \leq 0.$$

Solving for w , the result obtains. Hence, $e^* > 0$ is never optimal above that wage level.

Results 1 and 2 are represented in figure 3 by the bold segments of the labor supply curve that are perfectly inelastic below \hat{w} and above \tilde{w} . Along one of them, only adults supply labor ($w \geq \tilde{w}$), so total labor supply is N . Along the other segment, there is full child labor ($w < \hat{w}$), and total labor supply in effective units is $N(1 + \gamma)$.

In order to characterize the supply of labor in this economy, it is necessary to investigate what the optimal supply of child labor is for wages between \hat{w} and \tilde{w} . First, it is imperative to find out the minimum level of wage at which children are withdrawn from the labor market, in the sense that it is optimal for the household to choose zero children working time, if the expected level of aggregate child labor supply is equal to zero. Likewise, let us find the maximum level of wage at which parents would respond with full child labor when expecting full child labor in the economy.

These two wage levels correspond to the lowest wage for which an equilibrium with no child labor is possible, and the highest wage at which full child labor is plausible, respectively. These are established in result 3.

RESULT 3. *The minimum wage level at which an equilibrium with zero child labor is feasible under the rational expectations property, is $w_0 \geq \frac{\bar{c}}{1-\gamma}$. On the other hand, full child labor would only be feasible for wage levels*

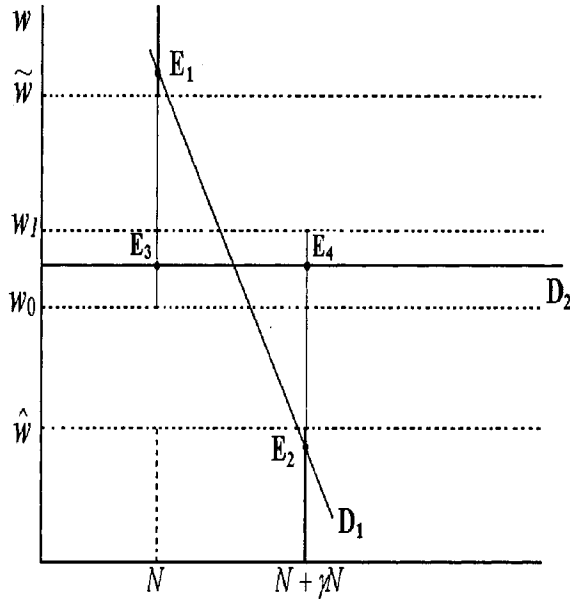
$$w_1 \leq \frac{\bar{c}s(1)}{s(1)[2\gamma + 1] - \gamma s(0)}$$

The way these two are obtained is as follows. First, let us find a wage so that $e^* \leq 0$ for an expected level of aggregate labor in the economy $\bar{E} = 0$. That is,

$$[e^* | \bar{E} = 0] \leq 0 \iff \frac{z}{2s(0)} + \frac{\bar{c}}{2w\gamma} - \frac{1}{2\gamma} \leq 0. \quad (9)$$

Using the fact that $z = s(0)$ and solving (9) for $w, w_0 \geq \frac{\bar{c}}{1-\gamma}$ is obtained. This establishes that at wage levels w_0 or above, there exists an equilibrium where child labor is eliminated, satisfying the consistency with the rational expectations property. Second, following a symmetric procedure, we obtain the wage level at which child labor is equal to one, given the expectation that the aggregate proportion of child labor in the economy will be one.

Figure 3
Multiplicity of Equilibria Under Minimum Assumptions



Before moving on to the full characterization of the labor supply, it is important to mention that the results so far already allow for multiple equilibria (see figure 3, points E_1 and E_2).¹² Moreover, as stated in result 4 below, a sufficient condition for a potential multiplicity when the demand for labor is perfectly elastic is that the

¹² A necessary condition for multiplicity of equilibria is the existence of strategic complementarity, i.e., e^* increases with \bar{E} . In this example,

$$\frac{de^*}{d\bar{E}} = -\frac{z}{2s(\bar{E})^2 s'(\bar{E})} > 0$$

given that $s'(\bar{E}) < 0$. Thus, strategic complementarity holds. This is not, however, a sufficient condition.

stigma cost increases rapidly as people withdraw their children from the labor market when one's own child continues to work.¹³

RESULT 4. *Assume that the labor demand is perfectly elastic. A sufficient, though not necessary, condition for the existence of a range of wages in which multiple equilibria exist is that $s(0) > 3s(1)$.*

The condition stated in result 4 allows for equilibria like E_3 and E_4 in figure 3. It is, however, a relatively strong condition. From figure 3, it can be easily verified that equilibria like E_1, E_2, E_3 , and E_4 are stable in the sense that after small perturbations around those points, the market mechanism would guarantee that the economy would return to the initial situation through excess demand and price, i.e., wage - adjustments. Those points are also consistent with the rational expectations property and stable from the point of view of social interactions. The analysis below will distinguish between two types of equilibrium stability, for which the following definitions are required.

NORM-STABLE EQUILIBRIA. *Is an equilibrium point to which the economy would return after a small perturbation and where the adjustment mechanism takes place through social interactions, i.e., through the corresponding adjustment of the individual's own child's labor supply as a response to expected aggregate child labor, at the given wages.*

MARKET-STABLE EQUILIBRIA. *Is an equilibrium to which the economy would eventually return after a small perturbation and where the adjustment mechanism takes place purely through excess-demand and wage changes.*

The distinction between those two types of equilibrium stability in the model is important, for the mechanism through which the adjustment takes place is different in an interesting way. In the case of *market-stability* the mechanism is standard excess demand and price, in this case, wage - adjustment. In the case of *norm-stability* the adjustment takes place through social interactions: adjustments in the individual's own child labor supply affect the expected level of aggregate child labor and thus individual responses, which in turn affect wages and then lead to a new adjustment in expectations and actual of aggregate child labor.

¹³ That is, the relative stigma cost of sending one's child full time to work when there is zero child labor in the economy is high enough, as compared to the cost incurred when there is full child labor.

With these definitions, let us analyze the types of potential multiplicity. Assume that the stigma cost function is such that the optimal child labor supply, as a function of the expected aggregate level of child labor, is *S*-shaped, as in the simple model in the previous section.¹⁴ In that case, from (8), increases in the wage rate would shift the *S*-shaped curve downwards, as shown in figure 4. It is easy to verify that the supply of labor would then look as in figure 5. The types of multiplicity would then depend on the demand curve. Consider the following examples.

Example 1. The demand curve is D_1 . Equilibrium points are $D1_a$, and $D1_b$. $D1_a$ is *market stable* and *norm stable*. For any perturbation around that point, both wage adjustment and optimal child labor supply would lead the economy back to the place where it started. Equilibrium $D1_b$, however, is *norm-stable* but *market-unstable*. If the wage increases slightly above the level consistent with such point, there will be excess demand for labor, which would cause the wage to increase even further, until it reaches point $D1_a$. The opposite would happen for reductions in the wage level.

Example 2. The demand curve is D_2 . Again, there are three equilibria: $D2_a$, $D2_b$, and $D2_c$. $D1_a$ and $D1_c$ are both *norm* and *market stable*. Equilibrium point $D1_b$ is *market-stable* but *norm-unstable*. Small perturbations around such point would make people adjust their own child's labor supply in a way that would induce a feedback through the expected aggregate level of child labor, diverging from the initial point.

Example 3. When the demand curve is as in D_3 , there will be three equilibria, all of them being *norm-stable*; only $D3_b$ is *market-unstable*.

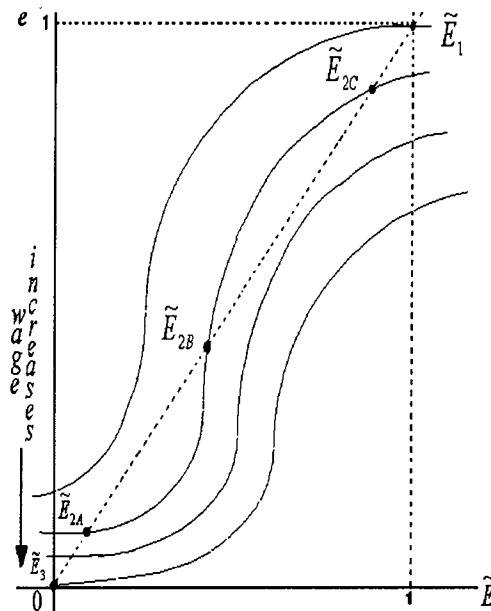
Example 4. Flat labor demand curve, as in D_4 . Equilibrium points are $D4_a$, $D2_b$, and $D4_c$. In such case, only $D2_b$ is *norm-unstable*.

¹⁴ This is equivalent to assuming that there exists an $0 \leq \bar{E} \leq 1$ such that

$$\frac{d^2 e^*}{d \bar{E}^2} > 0 \text{ if } 0 \leq \bar{E} \leq \bar{E}, \text{ and } \frac{d^2 e^*}{d \bar{E}^2} < 0 \text{ if } \bar{E} < \bar{E} \leq 1,$$

which is equivalent to requiring that $s''(\bar{E}) < 0$ if $0 \leq \bar{E} \leq \bar{E}$, and $s''(\bar{E}) > 0$ if $\bar{E} < \bar{E} \leq 1$. This implies that at low levels of aggregate child labor in the economy, a reduction in such a level would increase the stigma cost at an increasing rate, for a given amount of individual child labor. Also, at large levels of \bar{E} , an increase would reduce the stigma cost at an increasing rate.

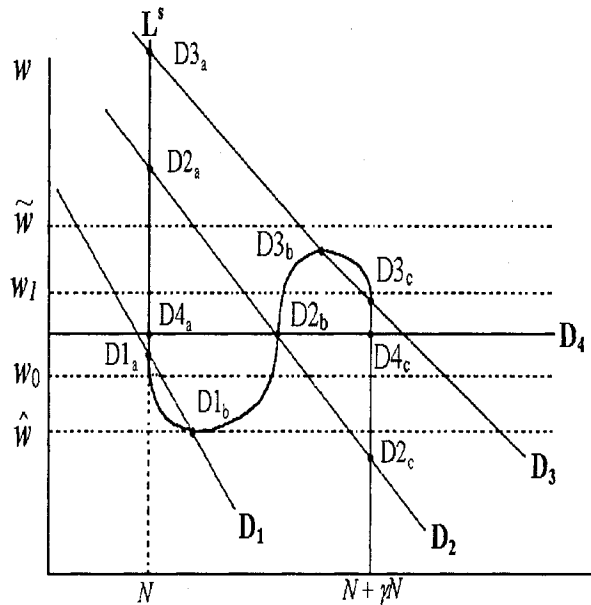
Figure 4
 Individual and Aggregate Child Labor
 with S-shaped Stigma Cost



From figures 4 and 5, for equilibria within the interval $(N, (1 + \gamma)N)$, *norm-stability* will be satisfied along the negatively-sloped segments of the labor supply curve, whereas equilibrium points along the positively-sloped segments are *norm-unstable*. This is due to the fact that the positively-sloped segment of the labor supply within that range derives from the unstable rational expectations equilibria in figure 4, for shifts of the S-shaped curve that are induced by changes in wages.

The assumption of an S-shaped response curve is not necessary to obtain the types of multiplicity described above. As an example, if the stigma cost function were linear—the simplest case—the market would look as shown in figure 6. The equilibria along the positively sloped segment of the labor supply are all *norm-unstable*.

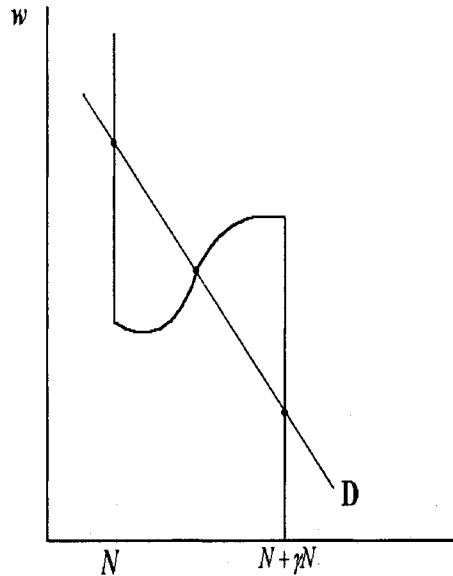
Figure 5
Different Examples for a Given Demand for Labor for Labor



The results above are of special interest for the several reasons. First, the multiplicity arises from the social interactions, i.e. the existence of the social norm and the fact that individuals consider what the others do in order to optimally choose their own decision. Second, the result is robust to different specifications of the demand for labor in the economy, which makes the multiplicity of equilibria described above more likely to arise. Third, there exist equilibria that, though *market-stable*, are *norm-unstable*, and thus small perturbations around equilibrium points would lead to a completely different final outcome, due to the relevance of the individuals' response to what they expect the others would do as a response of such a change. Finally, assuming that the existence of the stigma cost is a realistic assumption, room for intervention is related to the specific conditions of the labor market. Government policy could indeed play a role as a coordination device. Its effectiveness, however, is ambiguous and hence its applicability becomes an empirical question.

It is important to mention that related empirical work has found evidence of the relevance of this type of social interactions on child labor (Lopez-Calva, 2002). When the incidence of child labor in the community is taken as a variable related to the “social acceptance” of child labor, and controlling for all relevant economic and demographic variables, this variable does show a positive and statistically significant effect on the probability of a child working, using labor data for Mexico.

Figure 6
Individual-Aggregate Child Labor with Linear Stigma Cost



5. Concluding Remarks

Social norms matter in household decision making. This paper has developed a model of child labor supply where a social stigma is imposed on parents that send their children to work. This stigma cost

which parents internalize in their preferences, declines as the proportion of child labor in the economy increases. The latter comes from the fact that a community tends to be more tolerant of practices that are more prevalent. Wages for children and adults are determined in equilibrium, whereas parents take both the aggregate amount of child labor in the economy and the wages as given.

Under reasonable assumptions as to stigma cost function, multiplicity of equilibria arise. This multiplicity is consistent with the results obtained in Basu and Van (1998). Moreover, in this case the result is robust to different specifications of the labor demand, including a perfectly elastic one, as would be realistic in the case of a small, open economy (Dixit, 1998). Results are also consistent with an interpretation of the so-called "luxury axiom", introduced in Basu and Van (1998). It has been shown that there is a high enough level of wages beyond which child labor is eliminated.

The interaction between the adult and the child labor market is hereby supported in a model where social interactions yield multiple equilibria. The main contribution of this paper is the introduction of social interactions into a model of child labor supply. According to the model, the better a substitute child labor is of adult labor, the less likely it is that the no-child labor equilibrium exists. Moreover, the equilibrium points could be either stable or unstable not only from the traditional perspective of market adjustment, but also through the parents' adjustment of their expectations of what the others would do, which is termed *norm stability*. Intervention could, under specific circumstances, switch the equilibrium from a situation of positive child labor to one without it, which may be preferred from a welfare perspective. The effect of interventions, however, turns out to be ambiguous in this model, and subject to conditions whose verification requires empirical investigation. The latter is a promising avenue for future research.

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