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PIER Working Paper 01-043

"Why is Child Labor Illegal?"

by

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Why is Child Labor Illegal?

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June 12, 2001

Abstract

We argue from an empirical analysis of Latin-American household surveys that per capita income in the country of residence has a negative effect on child labor supply, even after controlling for other household characteristics. We then develop a theory of the emergence of mandatory-education laws. If parents are unable to commit to educating their children, child-labor laws can increase the welfare of altruistic parents in an *ex ante* sense. The theory suggests that measures that reduce child wages can make poor families better off, but that this may come at the expense of even poorer families.

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1. Introduction

Until a little more than 150 years ago, child labor was the rule among poor children in most countries, including the US and Great Britain. Today, many countries have laws banning or restricting child labor. The ILO convention C138 against child labor has been ratified by 89 countries, indicating opposition to child labor generally among these countries. Yet it is not clear from the current state of economic theory why full-time education of children should be compulsory. Indeed, given standard versions of the economic theory of the household, as in Becker (1976) and Rosenzweig and Evenson (1977), in which altruistic parents only send their children to work when this enhances the welfare of the family, laws against child labor can only reduce the welfare of households, particularly those so poor that children's income is essential for survival.[1]

Under standard assumptions, the simplest explanation of the above observations is that child labor laws are not binding; they merely formalize the optimal decisions of households in countries that have become so rich over time that even the poorest parents want to educate their children. In Figure 1, we present the results of a regression for 54 countries for which the UN has reported positive child-labor rates: we see that child labor around the world is negatively related to GDP per capita. In fact, variation in GDP explains 68% of the variance in child-labor rates among these countries.

[1] As today in poor countries, the children of poor parents were likely to spend little time in education and instead work in paid employment outside the home, or in a family business, such as agriculture or a cottage industry. Equivalently, children were also likely to devote their time to domestic work, enabling parents to spend more time in labor outside the home. In India today, Anker and Melkas (1996) has estimated that children's contributions to the household often constitute as much as 25% of the household's income, per child.

Grootaert and Kanbur (1995) show that only after the incidence of child labor had already begun to decline, in 1833, a time when 36.6 % of boys aged 10-14 were working, did Britain pass legislation restricting child labor. This, as well as the observation by Goldin (1979) that higher wages for fathers in Philadelphia in the late 19th century reduced the probability of child labor, suggest that the forces driving child labor in poor countries today are fundamentally similar to those experienced by the US and England in the 19th century.

This raises two questions. First, are child labor and education laws really responsible for reducing child labor? If the answer to this question is affirmative, the second question is why such laws are enacted. Of course it is always possible to explain such laws by appealing to externalities in the labor market, or to inter-dependent preferences, but the question is whether there is a simple explanation, closer to standard theory, that yields empirically falsifiable predictions about the emergence of restrictions on child labor?

It is not obvious how to answer the first question, because there do not exist simple measures of the status of child labor by country. There are several reasons for this difficulty. First there are many ways in which enacted laws may restrict child labor; some laws restrict labor directly, while others require compulsory schooling, and each approach can differ along many dimensions, such as minimum ages, maximum hours, and wage controls.[2] Second, there is often a huge gap between legal status and enforcement; in England, for instance, laws restricting child labor were introduced in the 1820's, but were not rigorously enforced until the 1860's. Third the status of child labor may vary by administrative region of the country, or there may be conflicting status at different levels of government.[3] For all of these reasons, it is not possible to construct a reliable measure from legal status alone.

In this paper, we address the first question by proposing a simple measure of the permissiveness of a country towards child-labor. We ask whether the country a child lives in has an effect on the child's labor force participation, controlling for observable household characteristics such as income, family size and education of the parents. Applying this measure to household data from Latin America, we argue that the answer to the first question is that yes, the country of residence does indeed have a highly significant effect on children's labor force participation. Our measure does not distinguish between the effects of child labor laws and some other country characteristic, such as culture, social norms or differences in labor market conditions, that could result in lower child labor, but we show that this measure is negatively correlated with whether a country has approved the ILO convention against child

[2] See Krueger's paper for an analysis of the choice between labor restrictions and compulsory schooling. Basu has a child-labor based theory of the minimum wage.

[3] See Moehling (1999) for an analysis of variation in child-labor laws across the U.S. in the early 20th C.

labor, suggesting that the country's government is indeed opposed to permitting child labor.

A good feature of our test is that it cuts through the complications arising from the gap between enactment and enforcement of child labor laws. A drawback is that it may reflect some other country characteristics unrelated to both household characteristics and the legal status of child labor. In the absence of theory therefore, we cannot definitively answer the first question. It is easy to draw up a list of country characteristics in addition to child-labor's legal status that may jointly influence the decisions of all parents in the country. In other words, having established the strength of country effects on child labor, we must turn to the second question in order to answer the first.

Why do countries enact laws against child labor? We propose a theory based on the assumption that parents suffer from a commitment problem with respect to their children's education/labor decision. Faced with the trade-off between education of their children and household income from child labor, poor parents may choose less education for their child than they would were they able to commit to an education path at the time they become parents. If laws are chosen according to a process in which the median voter is decisive, then our theory provides a threshold condition which poor countries must pass for child labor laws to be enacted. This theory explicitly incorporates competing roles for income and the rate of return to education as explanations of the country effect on child labor, and implicitly allows a role for other country characteristics that affect the parent's payoff from education of the child.

In our theory of child-labor, parents are more impatient between today and tomorrow than they are between adjacent periods further in the future. in other words, they have time-inconsistent 'quasi-geometric' preferences, of the type familiar from Laibson (1997) and Krusell and Smith (1999). In the absence of other institutions allowing parents to commit, child-labor laws may increase the welfare of poor households in an *ex ante* sense by allowing parents to achieve a higher level of education for their children than they would be able to achieve with an unconstrained choice set. The assumptions of our model imply that only when parents have wage levels in an intermediate interval will child-labor restrictions make them better off; low-wage parents are worse off and high-wage parents are indifferent. This suggests a simple model of child-labor laws in which a country is composed of parents who differ by their education and hence skill levels. Initially, most parents are too poor to even desire a full-time education for their child. Over time, skill levels and hence parental wages may increase; at the moment when the parent with the median skill level enters the wage interval defined above, a majority of the adult population would favor legislation compelling full-time education of all children, or other restrictions on child labor.

For analyzing child-labor decisions, the argument is especially appealing because the time between making such decisions and the full benefits from schooling may be quite long. For instance 15 years will elapse between the decision whether to educate a 10-year old child and the time when the wage of an educated worker overtakes that of an unskilled worker. If the payoff to educating children is weighted towards the end of the parent's life, as would be the case if children's income is considered provision for old age of the parent, then this makes the time scale of the education decision of the same order of magnitude as that of the retirement-savings decision, where the time-inconsistency issue has become increasingly prominent, as in Laibson, Repetto, and Tobacman (1999).

Recent theories of child labor in the literature include Glomm (1997) and Dessy (2000), but these models do not imply a theory of the emergence of child-labor laws. Other approaches to analyzing child labor however could also yield a theory of child-labor laws. For instance Basu and Van (1998), rely on the hypothesis of multiple equilibria in the market for unskilled labor to explain why in some countries banning child-labor could be welfare-enhancing. To the extent that child labor and adult labor are substitutes, a poverty-induced massive participation of children in the labor force may contribute to a decline in adult wages, thus maintaining in place the forces that perpetuate poverty and child labor. It is not clear however what the empirical implications for child labor laws would be of such an approach; poor countries would seem to benefit equally from banning child-labor, so an explanation of the tolerance of child labor in these countries would be required. This is also a difficulty for Baland and Robinson (2000), who argue that child-labor laws can reduce inefficiency in inter-generational allocations, but not why some countries fail to ban child labor. However in our model, such tolerance of child labor naturally persists until median income reaches a minimum threshold level.

In the sections that follow, we first develop our empirical measure of a country's permissiveness towards child labor. In the second section, we present a general formulation of the model of parental allocation of children's time. In the third and fourth sections we analyze the implications of the model for two policy issues: a reduction in child wages, and the emergence of mandatory-education laws. The final section summarizes our findings.

2. Child Labor in Latin America

In this section, we analyze a cross-country dataset, comprised of the results of representative household surveys of 12 countries in Latin America, to compile an index of the permissiveness of each country towards child labor. These indices reflect the extent to which the country of residence helps to predict whether children are in the labor force, controlling for family characteristics, such as income and education, and are measured as the country fixed effects in OLS regressions with child employment measures as the dependent variables. We find that there are indeed significant country effects, after controlling for parental income. [4] At the end of this section, we show how these indices relate to per capita GDP and whether the country is a signatory to convention C-138. In addition, we show that whether a child is in the labor force is strongly correlated with measures of education, such as whether the child is attending school, and how many years of schooling the child is lagging behind the maximum potential years for her age.

[4] Earlier versions of these surveys have been used previously to analyze similar issues, as in Psacharopoulos (1997), who examined the relationship between child labor and educational attainment in Bolivia and Venezuela, and by Moe (1998), who analyzes fertility and human-capital investment in Peru. Szekely and Hilgert (1999) use these surveys to analyse the sources of income inequality across the different countries, while Dahan and Gaviria (1999) analyze the relationships between social mobility and marital sorting on the one hand, and income inequality on the other.

Child labor is inherently difficult to measure; much of it is unpaid work, often for family members around the house or the farm. It is also possible that parents suppress information on their children's work, and for some countries, children's labor variables are automatically set to zero for children younger than 12. Even though the dataset in question includes direct measures of child labor, such as hours worked, labor income, and an indicator of the child's employment, it is likely that these variables understate significantly the prevalence of child labor. Therefore we also use indirect measures, such as whether children are attending school, and the gap between potential and reported years of education.

For each measure $L_{i,j}$ of the labor of child i in country j, we estimate the following equation on the characteristics x_i of the child's family:

$$L_{i,j} = \alpha_j + \beta x_i + \varepsilon_{i,j}$$

One of the most important specification decisions is whether fertility or family size should be included in the family characteristics. The argument for including some measure of the number of children is that children add to the household's desired consumption, while older children potentially increase the family's income, with their own labor capacity. Hence families with more children may either be more inclined to send a working age child to work, if the other children are younger, or less inclined, if the other children are older. However we believe that such measures should be excluded, because fertility decisions are themselves responses to child-labor conditions. Under standard, Beckerian fertility models, such as Becker, Murphy, and Tamura (1990), child labor reduces the cost of having children, and hence increases fertility[5]. Therefore controlling for fertility would bias the estimate of the country's effect on fertility, by falsely attributing to fertility part of the effect that is due to the status of child labor in the household's country. [6] The variables that we would like to include are those indicators that standard theory suggests are relevant for the child-labor decision, but not strongly dependent on that decision, such as parental education and family income net of child labor.

[5] See Dopeke (1999) for a model in which this interaction plays a key role in economic development.

[6] For a recent theoretical analysis of fertility and child labor, see Doepke (1999).

2.1. The Data

The data set in question is a compendium of representative household surveys of 12 countries in Latin America. The surveys are designed to be representative of the population of their respective countries. This is a small sample, but it proved impossible to extend the analysis to other countries because most surveys ignore labor force participation of children. Uruguay reports labor force behavior for children over the age of 14, but was excluded because it does not cover children under that age. The advantage of focussing on Latin America is that these countries are quite similar in many ways; polygamy is not an accepted practice, nomadic peoples are the exception, and European education traditions are well established.

Earlier versions of these surveys have been used individually to analyze similar issues, as in Psacharopoulos (1997), who examined the relationship between child labor and educational attainment in Bolivia and Venezuela, and by Moe (1998), who analyzes fertility and human-capital investment in Peru. These surveys have also been used previously in the literature on income inequality. Szekely and Hilgert (1999) show that these surveys indicate a wide variation in the degree of income inequality across the different countries, while Dahan and Gaviria (1999) use this data to analyze social mobility and income inequality. The data include education and labor earnings variables for all members of sample families.

The sample is restricted to single-family households with children in the age range 10-17 that reported positive family income. The lower bound of the age range represents the earliest age at which most countries collect child labor information, and the upper bound the oldest age at which children are generally in secondary education. The key assumption behind this age range is that children have significant labor capacity, and that it is the parents who are deciding the children's time allocation across work and education.

Child labor is inherently difficult to measure; much of it is unpaid work, often for family members around the house or the farm. It is also possible that parents suppress information on their children's work, and for some countries, children's labor variables are automatically set to zero for children younger than 12. Even though the dataset in question includes direct measures of child labor, such as hours worked, labor income, and an indicator of the child's employment, it is likely that these variables understate significantly the prevalence of child labor. Therefore we also use indirect measures, such as whether children are attending school, and the gap between potential and reported years of education.

Table 1 shows some basic descriptive statistics for the data. Income and wages have been converted to US dollars, by equating purchasing power parity across countries to the US. level, using measures published by the OECD. The table shows the averages for several key variables: number of children per family, hours that employed children spend in paid employment, the income of employed children, the age of the child, and the total income of the family, excluding children's earnings. These are reported by the age-group of children: the interval 10-14 years, and the interval 15-17 years. Child labor is also reported at younger ages in some of the surveys, such as Peru, but the number of observations by country is too small to allow reliable statistical estimates at these ages.

2.2. Child Labor and Education

A key assumption in the paper is that child labor reduces education. Some empirical evidence for this assumption is presented in Table 2. The table shows results for a probit regression in which the dependent variable is an indicator equal to one for kids in school, and zero otherwise. The explanatory variables include an employment variable, the age of the child and family characteristics, such as household income, father's education and number of kids aged less than 6 years old. The employment variable is set to 1 if kids worked 10 hours per week or more, zero otherwise. Age variables are based on deviations from the mean, while income variables appear as deviations from the median; both appear in the regression equation as the logs and the squares of the logs. Consider a family in which the parents have 6 years of education each, and earn the median income. Suppose they live in a country where the fixed effect = 1. The table suggests that employment reduces the probability that a child aged 10-13 attends school from 91% to 75% for boys and from 93% to 86% for girls.

An alternative measure of the impact of child labor on education is the education gap, which equals the potential education of the child as a function of age, less the attained education, measured in years. Table 3 shows OLS estimation results for a regression of education gap on the same explanatory variables described above. The estimates suggest that employment increases the gap by 0.38 years for boys in the younger group, and by 2.82 for girls. For the older group, the estimates are 0.767 and 0.266, respectively. These numbers are associated with high t-values, and reinforce the impression from the previous table, that child labor competes with education in the allocation of children's time. While these numbers do not seem large as a percent of average educational attainment, it is likely that children with interrupted schooling will not return; hence a positive gap indicates that attainment will not increase with age. This argument is explored explicitly in Psacharapoulos (1981), who reports even larger education gaps associated with child employment in Peru.

Obviously there is no attempt here to deal with unobserved heterogeneity or with co-linearity among the explanatory variables. If less able students were more likely to leave school , then these estimates would represent upper limits on the effect of child labor. On the other hand, assuming that parental income does not directly affect education, the bias resulting from co-linearity between employment and family income is clearly towards understating our result: children with low income do worse in school, holding ability constant, because they are more likely to be employed. In the absence of further evidence, it is reasonable to assume that the results are not driven by bias from omitted variables, and hence we conclude that child labor does indeed have a large and significant effect on educational attainment.

2.3. Country Effects on Child Employment

To see how child-labor patterns vary across countries, we report in Table 4 results for a regression of child labor-hours on parental income, parental education and the age of the child, as well as a set of dummy variables for each country. The table shows that children's hours are higher among the older age group of children, and that the cross-country patterns are otherwise similar across age groups. Parental income reduces the probability of child employment, as does education of the parents, with mother's education having a slightly larger effect than father's education. Hence the impression that emerges is that child labor is a response to poverty, and parents use higher income to purchase more time in education for their child.

The main message of the country fixed-effects in the table is that child labor participation depends on the country of origin, even after controlling for parental income. The unexplained component of children's hours is significantly higher in Bolivia, Brasil, Paraguay and Peru than in the other countries. Therefore child labor is not merely a matter of parental poverty: there is a significant social effect as well. It turns out that Bolivia, Peru and Paraguay are the poorest countries in the sample, on a per-capita basis, while Brasil has the most unequal distribution of income[7]. Hence it is likely that the common denominator across countries with high child labor is indeed a low median income. Countries where child labor is least likely, controlling for parental income are Argentina, Panama and Chile; hence the fact that two of these are the most prosperous countries in the sample supports the idea that there is an income-based explanation of the country-effects on child labor.

2.4. Explaining the Country Effects

We interpret the fixed effects estimated in Table 4 as indicators of the permissiveness of the countries in question towards child labor. In this section we examine how these effects are correlated with per capita income and with whether a country has ratified the ILO's C-130 convention against child labor.

Table 5 shows how these estimated fixed effects relate to per capita GDP. The relation between GDP and the child labor fixed effect is negative, and often quite strongly so; the estimated coefficient is shown in the row labeled "log(GDP)", and below it the standard error, the t-statistic, the probability of the t-statistic under the null hypothesis, and the R-squared coefficient. [8] The country-GDP relation is much stronger for girls in both age

[7] See *Facing up to Inequality in Latin America*, 1998, Inter-American Development Bank, Washington, D.C.

[8] Quadratic terms had very little effect on R-squared, so these higher-order regressions are not reported.

groups than for boys; labor supply of girls declines more quickly with per capita GDP. It is significant that in all cases, the relationship is stronger for the younger age group than for the older, which is consistent with our interpretation, as we would expect more restrictions on child labor for the younger age group. This strong relation between GDP and the country effects suggests that an increase in GDP reduces child labor not only via higher family income of high-risk families, but also via some aggregate effect.

It is encouraging therefore to note the consistently negative correlation between these effects on the one hand, and a country's support of convention C-138 on the other. While these correlations, reported in the final two rows of Table 5, is not statistically significant on an individual basis, the negative sign suggests that countries which we find more open to child labor are less likely to have officially endorsed the convention against child labor, which is what one would expect if our indices are in fact reflecting the hostility of the general legal and political climate of a country towards child labor.

Robustness is of course a major issue in this type of regression analysis, particularly with so few data points. An important possibility is that the explanatory variable is actually reflecting the effect of some other variables with which it is correlated. These indicators of child labor are essentially residuals, and hence do not distinguish between the effects of child labor laws and other factors omitted from the regression that may also influence child labor. This issue is addressed in Table A3, which shows the effect of including a second aggregate variable in the regression of the country effects on GDP per capita. The variables, whose values are given in Table A2, are the Gini coefficient for income, the total fertility rate, the percent of the country's GDP accounted for by agriculture, and the rate of return to education. This last variable, the Mincer coefficient, is taken from Bils and Klenow (2000). The result is that GDP remains statistically significant for girls, while for boys the GDP effect is no longer statistically significant when other variables are added to the regression. This is to be expected due to the small size of the sample. However what is interesting is that the sign of the GDP effect remains negative in all cases. Furthermore, in the most successful models, such as the girls 10-13, particularly the specification with agriculture, the GDP coefficient is more significant than in the single-variable regression, and R-squared much higher.

In conclusion, it appears that GDP per capita does inhibit child labor, even after taking into account household income. The sample is too small to allow multi-variate analysis, but the finding appears robust to inclusion of other variables. The estimated country effects behave as one might expect for an indicator of child labor permissiveness: they are negatively correlated with ratification of the ILO's anti-child labor convention, and they are stronger for young children than for older.

3. A Model of Child Labor

The empirical analysis above suggests that there is considerable variation within Latin America in regards to the tendency of children to work, and it is likely that this reflects variations in the legal status of child labor across countries. In this section we present a simple theory of parental decisions regarding the allocation of children's time between labor and education. Under our assumptions, parents may favor child-education laws because they help parents to commit to more education for the child. The key assumptions are: 1) child labor reduces education, 2) parents get utility from the education of their children, 3) parental preferences are time-inconsistent, and 4) the median voter is decisive. The main result of the model is that parents optimally choose laws that restrict children to a minimum time spent in school.

Consider an economy where agents live for $2T+1$ periods, the first T as children, and then $T+1$ periods as parents, with one child born when the parent is aged T. The parent has an endowment of human capital h_p and receives labor income wh_p. Children may become workers from the time that the parent is aged $T+1$. Their human capital on attaining adulthood at period T is given by h_T^c, which depends on the fraction e_t^c of their time they have allocated to their education at each age. This allocation is decided by the parent. The child's initial human capital is h_0^c, and evolves deterministically according to the function:

$$h_{t+1}^c = \phi\left(h_t^c, e_t^c\right) \tag{3.1}$$

.

Parents get utility $u(c_\tau)$ from their own consumption in each period τ of their own finite lives and utility $\nu(h_T^c)$ in the final period of life from the final level h_T^c of their children's education. Parent's discount factors for future utility are quasi-geometric; the discount factor between adjacent future periods is $\beta \in (0,1)$, but between the present and the immediate future, the discount factor is $\beta\delta \in (0,\beta)$. Preferences take the following time-separable form:

$$U_0 = u(c_0) + \delta\left[\beta^T \nu(h_T^c) + \sum_{\tau=1}^{T} \beta^\tau u(c_\tau)\right]$$

We interpret delta as a measure of the severity of the time-inconsistency problem: as we will see below, the lower is delta, the greater is the range of parental income over which the parent's inability to commit leads to a lower level of the child's education.

Children's labor income depends on the fraction of time $(1 - e_t^c)$ the child works in period t, and on the child's effective wage w_t^c, which is the basic child's wage w_1^c, times the child's productivity premium for age. The child's wage is not a function of the child's human capital.[9] Furthermore, following Cain (1977), it is assumed that a child aged $t+1$ is the productive equivalent of $(1+\gamma_t)$ children aged t. Therefore a child aged $t+1$ will face an effective wage rate

$$w_{t+1}^c = (1+\gamma_t)w_t^c, \qquad 0 \leq \gamma_t < 1$$

all t. As the child grows older, the productivity premium for age, γ_t, declines, as the child's wage converges toward the adult wage. A direct implication is that the sequence of age-specific productivity differentials $\{\gamma_t\}_{t=1}^{T}$ converges from above towards zero as t approaches T.

In each period $t \leq T$, parental consumption is constrained by the total household labor income, which is equal to the sum of parental labor income and that of the child. Let p_t denotes the period-t per unit education cost reflecting for example, expenditures on school supplies, registration fees, transportation costs etc. Then the parent period-t budget con-

[9] This assumption is standard in the literature on child labor; see Glomm (1997); Baland and Robinson 2000; or Dessy 2000.

straint is given by:

$$c_t \leq w_p h_p + (1 - e_t^c)\, w_t^c - p_t e_t \tag{3.2}$$

This parental budget constraint implies that, in addition to the direct cost, $p_t e_t$, of educating a child, there is also an indirect cost, in the form of household income foregone from child labor sources $w_t^c e_t^c$. The essential point, that child labor significantly reduces both educational time and eventual attainment, is well supported by empirical studies, such as Rosenzweig and Evenson (1977) and Psacharopoulos (1997).

In their first period, children are physically incapable of working, so parental consumption equals $w_p h_p$. Since parents make no time-allocation decisions this period, when their child has age $t = 1$, it will be ignored below, except to consider voting over labor laws.

It will be assumed below that the above functions obey the following standard conditions:

U.1 $u' > 0$; $u'' < 0$; $u'(c) \to \infty$ as $c \to 0$; $u'(c) \to 0$ as $c \to \infty$.

U.2 $v' > 0$; $v'' < 0$; $v'(h) \to \infty$ as $h \to 0$; $v'(h) \to 0$ as $h \to \infty$.

U.3 $\phi_e > 0, \phi_h > 0, \phi_{ee} < 0, \phi_{hh} < 0, \phi_{e,h} > 0$.

Assumption 3 implies that education time and previous attainment are complements in the production of next period's attainment. Furthermore the second-derivative assumptions imply enough concavity that interior solutions, when they exist, are optimal.

3.1. Optimal Education Decisions

In general the choice of education at time $T - j$ will deviate for two reasons from the choice of a parent who can commit at $t = 0$. First is the direct effect of impatience, i.e. the change in discount factor between $T - j$ and $T - j + 1$. Second, there may be strategic interaction between the parent's decisions at different time periods. These effects are illustrated below.

It is straight-forward to solve the parent's problem by backwards induction. In the last period of life, the parent's payoff is given by $\nu\left(\phi\left(h_{T-1}^c, e_{T-1}^c\right)\right)$. Therefore when allocating the child's time between education and labor in the penultimate period, the parent faces the following dynamic programming problem:

$$V_{T-1}^{0}\left(h_{T-1}^{c},h_{p}\right)=\max_{e_{T-1}^{c}}\left\{u\left[w_{p}h_{p}+\left(1-e_{T-1}^{c}\right)w_{T-1}^{c}-e_{T-1}^{c}p_{T-1}\right]+\beta\delta\nu\left(\phi\left(h_{T-1}^{c},e_{T-1}^{c}\right)\right)\right\}$$

, subject to (3.2) and (3.1).

An interior solution satisfies the following first-order condition:

$$\left[w_{T-1}^{c}+p_{T-1}\right]u'\left(c_{T-1}\right)=\beta\delta\nu'\left(h_{T}^{c}\right)\phi_{e}\left(h_{T-1}^{c},e_{T-1}^{c}\right) \tag{3.3}$$

. Diminishing marginal utility implies that if the optimal e_{T-1}^{c} is interior, then the child's education will be increasing in the parent's human capital, h^{0}. Furthermore, the presence of δ on the right hand side implies that the education choice, if interior, will be strictly less than what the parent would have chosen could he have committed to e_{T-1}^{c} at some earlier time.

Given the above assumptions, it is important to ask whether parents whose children have higher level of human capital carried over from the preceding period will tend to invest less in their children at time $T-1$. As shown in the following proposition, the answer to this question depends upon whether a marginal increase in the level of human capital carried over from the previous periods "sufficiently" raises the marginal productivity of child's time allocated to education:

Proposition 1. *Let assumptions $U.1-U.3$ hold. Then (i)*, if

$$\phi_{eh}<\frac{-\nu''}{\nu'}\phi_{e}\phi_{h}, \tag{3.4}$$

$\partial e_{T-1}/\partial h_{T-1}^{c}<0$. *Furthermore, (ii)* $\partial e_{T-1}/\partial h_{p}>0$, *and (iii)* $\partial e_{T-1}/\partial\delta>0$, *where* $e_{T-1}=g_{T-1}(\delta,h_{p},h_{T-1}^{c})$ *denotes the interior solution to (3.3).*

P roof. Given the properties of the functions u, ν, and ϕ, the second order condition for a maximum is satisfied: $\left[w_{T-1}^{c}+p_{T-1}\right]^{2}u''+\beta\delta\left[\nu''\phi_{e}^{2}+\nu'\phi_{ee}\right]<0$. The implicit function theorem may then be applied to establish all three results. ■

Condition (3.4) states that the increase in the productivity of time allocated to schooling due to a marginal increase in the level of human capital carried over from the previous periods is not "too" large. Part (i) of proposition 1 states that child's time allocated to education tends to be smaller(greater), the higher (smaller) the child's human capital level carried over from the previous period. Part (ii) of proposition 1 states that richer parents tend to invest more on their children's education. Part (iii) states that child's time allocated to schooling declines with the severity of the time-inconsistency problem.

To define the solutions for the preceding periods, it is convenient to analyze the parental decision as the outcome of a 2-stage dynamic-programming problem, as in Laibson, Repetto, and Tobacman (1998) and Krusell and Smith (1999). Using the definition of the optimal education policy, the resulting children's human capital is given by:

$$h^c_{t+1} = \phi\left[h^c_t, g_t\left(\delta, h_p, h^c_t\right)\right]. \tag{3.5}$$

At time $T-2$, the parental problem is to maximize:

$$V^0_{T-2}\left(h^c_{T-2}, h_p\right) = \max_{e^c_{T-2}} \left\{u\left[w_p h_p + \left(1 - e^c_{T-2}\right) w^c_{T-2} - e^c_{T-2} p_{T-2}\right] + \beta\delta W^0_{T-1}\left(h^c_{T-1}, h_p\right)\right\}$$

subject to

$$\begin{aligned} W^0_{T-1}\left(h^c_{T-1}, h_p\right) &= u\left[w_p h_p + \left(1 - g\left(h^c_{T-1}; h_p\right)\right) w^c_{T-1} - g\left(h^c_{T-1}; h_p\right) p_{T-1}\right] \\ &\quad + \beta\left[\nu\left(\phi\left[h^c_{T-1}, g\left(h^c_{T-1}; h_p\right)\right]\right)\right] \end{aligned} \tag{3.6}$$

and $h^c_{T-1} = \phi\left[h^c_{T-2}, e^c_{T-2}\right]$, where (3.6) denotes the continuation value at $T-1$.

>From the point of view of period $T-2$, the discount factor between periods $T-1$ and T is given by β, but the parent knows that when the time comes to choose e^c_{T-1}, the discount factor between periods $T-1$ and T will be $\beta\delta$.

The first-order condition at time $T-2$ is:

$$-\left[w^c_{T-2} + p_{T-2}\right] u'\left(c_{T-2}\right) + \beta\delta \frac{\partial W^0_{T-1}\left(h^c_{T-1}, h_p\right)}{\partial h^c_{T-1}} \phi_e\left(h^1_{T-2}, e^c_{T-2}\right) = 0. \tag{3.7}$$

This first order condition is satisfied by the education time e that equates the marginal cost of educating the child at $T-2$ to the marginal (future) utility from raising the child's human capital level. Given that the parent will act impatiently in the future, at $T-2$ she perceives the marginal benefit of education as:

$$\begin{aligned} \frac{\partial W^0_{T-1}\left(h^c_{T-1},h_p\right)}{\partial h^c_{T-1}} &= \frac{\partial g_{T-1}}{\partial h^c_{T-1}}\cdot\left[-\left[w^c_{T-1}+p_{T-1}\right]u'(c_{T-1})+\beta\nu'\left(h^1_T\right)\phi_{e^c}\left(h^c_{T-1},g_{T-1}\right)\right] \\ &\quad +\beta\nu'\left(h^1_T\right)\phi_h\left(h^c_{T-1},g_{T-1}\right) \end{aligned} \tag{3.8}$$

where $g_{T-1}\equiv g_{T-1}(\delta,h^c_{T-1},h_p)$.

The second term on the right hand side is perfectly standard; the first term however only appears due to the time-inconsistency of the parental preferences; otherwise the envelope theorem tells us that the term multiplying the policy function derivative would be zero at the optimum, in which case

$$\frac{\partial W^0_{T-1}\left(h^c_{T-1},h_p\right)}{\partial h^c_{T-1}}=\beta\nu'\left(h^1_T\right)\phi_h\left(h^c_{T-1},g_{T-1}\right)$$

. However without commitment, it becomes important to investigate whether the marginal benefit of an additional increment in the child's level of human capital carried over from the preceding period (the term $\partial W^0_{T-1}\left(h^c_{T-1},h_p\right)/\partial h^c_{T-1}$) turns out to be larger or smaller than the level that would obtain under commitment (the term $\beta\nu'\left(h^1_T\right)\phi_h\left(h^c_{T-1},g_{T-1}\right)$). The answer to this question is summarized by the following proposition.

Proposition 2. *Let condition (3.4) hold. Then*

$$\frac{\partial W^0_{T-2}\left(h^c_{T-1},h_p\right)}{\partial h^c_{T-1}}<\beta\nu'\left(h^1_T\right)\phi_h\left(h^c_{T-1},g_{T-1}\right).$$

P roof. Since condition (*3.4*) hold, by proposition 1, $\partial g_{T-1}/\partial h^c_{T-1}<0$. Furthermore, since by proposition 1 $\partial g_{T-1}/\partial\delta>0$, then

$$-\left[w^c_{T-1}+p_{T-1}\right]u'\left[w_ph_p+\left(1-g_{T-1}\right)w^c_{T-1}-g_{T-1}p_{T-1}\right]+\beta\nu'\left(h^1_T\right)\phi_{e^c}\left(h^c_{T-1},g_{T-1}\right)>0,$$

implying that the policy $g_{T-1}(\delta,h^c_{T-1},h_p)$ is sub-optimal from the point of view of period $T-2$. Hence the result. ■

Proposition 2 states that both the direct and strategic effects of time inconsistency reduce the perceived future benefits of educating the child at $T-2$. This in turn causes parents to choose inefficient levels of child's schooling time in each period.

Earlier stages of the game are solved by applying the same approach. At time $T-3$, the parental problem is to maximize:

$$V_{T-3}^{0}\left(h_{T-3}^{c}, h_p\right) = \max_{e_{T-2}^{c}} \left\{ u\left[w_p h_p + w_{T-3}^{c} - e_{T-3}^{c}\left(w_{T-3}^{c} + p_{T-3}\right)\right] + \beta\delta W_{T-2}^{0}\left(h_{T-2}^{c}, h_p\right)\right\}$$

subject to the continuation value from the period $T-3$ point of view,

$$\begin{aligned} W_{T-2}^{0}\left(h_{T-2}^{c}, h_p\right) &= u\left[w_p h_p + w_{T-2}^{c} - e_{T-2}^{c}\left(w_{T-2}^{c} + p_{T-2}\right)\right] \\ &\quad + \beta W_{T-1}^{0}\left(h_{T-1}^{c}, h_p\right) \end{aligned} \tag{3.9}$$

the policy $e_{T-2}^{c} = g\left(h_{T-2}^{c}; h_p\right)$, the continuation value from the period $T-2$ point of view,

$W_{T-1}^{0}\left(h_{T-1}^{c}, h_p\right) = u\left[w_p h_p + w_{T-1}^{c} - \left(w_{T-1}^{c} + p_{T-1}\right) g\left(h_{T-1}^{c}; h_p\right)\right] + \beta\nu\left(\phi\left[h_{T-1}^{c}, g\left(h_{T-1}^{c}; h_p\right)\right]\right)$

and $h_{T-1}^{c} = \phi\left[h_{T-2}, g\left(h_{T-2}^{c}; h_p\right)\right]$.

Consider $\partial W_{T-2}^{0}\left(h_{T-2}^{c}, h_p\right)/\partial h_{T-2}^{c}$. It can easily be established that

$$\begin{aligned} \frac{\partial W_{T-2}^{0}\left(h_{T-2}^{c}, h_p\right)}{\partial h_{T-2}^{c}} &= \frac{\partial g_{T-2}}{\partial h_{T-2}^{c}} \cdot \left[-\left[w_{T-2}^{c} + p_{T-2}\right] u'(c_{T-2}) + \beta \frac{\partial W_{T-2}^{0}\left(h_{T-2}^{c}, h_p\right)}{\partial h_{T-2}^{c}} \phi_e\left(h_{T-2}^{c}, g_{T-2}\right)\right] \\ &\quad + \beta \frac{\partial g_{T-1}}{\partial h_{T-1}^{c}} \cdot \left[-\left[w_{T-1}^{c} + p_{T-1}\right] u'(c_{T-1}) + \beta\nu'\left(h_T^{1}\right)\phi_e\left(h_{T-1}^{c}, g_{T-1}\right)\right]\phi_h\left(h_{T-2}^{c}, g_{T-2}\right) \\ &\quad + \beta^2 \phi_h\left(h_{T-2}^{c}, g_{T-2}\right)\nu'\left(h_T^{1}\right)\phi_h\left(h_{T-1}^{c}, g_{T-1}\right) \end{aligned}$$

Note that the first two terms are negative due to strategic interaction. Therefore adding more periods worsen the effect of time -inconsistency in the sense that the future benefits of educating the child today becomes even smaller.

To solve for the complete sequence of education investments is simply a matter of continuing the procedure of backwards induction described here all the way back to the first period of the child's life. If the conditions of proposition 2 are satisfied, this means that adding more periods to the analysis will further aggravate the time-inconsistency problem but not qualitatively change our results, so from now on we restrict attention to the simple case $T = 3$.

3.2. Parametric Example

In this section we sacrifice some of the richness of the model in order to obtain analytical results. We consider a simple 2-period version of the model with logarithmic preferences and Cobb-Douglas technology. This specification implies the strategic effect is zero. What do we lose by restricting the model in this way? Under the conditions of Proposition 2 above, the strategic interaction effect and the addition of more periods of education both intensify the time-inconsistency problem, so in a world characterized by these conditions, the simple version below could be considered a reduced-form version of the full model, in which the time-inconsistency parameter δ is made smaller to reflect the two omitted effects.

For the policy analysis to be conducted here, we need the answer to two questions: (1) Who benefits from banning child labor? and (2) How does the optimal level of compulsory education depend on the parental state? Some analytical results are possible for a sufficiently simple choice of time structure and functional forms. Since the data we have on children's education and labor time is available only for two periods (primary and secondary education), we restrict the analysis to education decisions over two periods of childhood.

Suppose that $T = 3$, so that parents choose their children's activities for two periods. Let $u(c) = \ln c$ and $\nu(h_T^1) = A \ln h_T^1$, where $A > 0$. Human capital in every state is now given by:

$$h_t^c = \phi\left(h_{t-1}^c, e_{t-1}^c\right) = \begin{cases} h_1^c & t = 1 \\ \left(h_{t-1}^c\right)^{\eta}\left(\underline{e} + e_{t-1}^c\right)^{1-\eta} & t > 1 \end{cases}$$

where $\eta > 0$.

Notice that as long as $\underline{e} > 0$, the functional form for the human capital accumulation technology allows for children to have positive human capital even in the absence of parental investment in schooling. We show in appendix $A.1$ that with respect to their optimal choice of education policy pairs, (e_1^*, e_2^*), parents can be classified in four groups determined by their human capital levels. In particular, under certain conditions, all parents with human capital levels in the range:

(i) $[\underline{h}, \underline{H}_1(\delta)]$ choose $(e_1^*, e_2^*) = (0, 0)$

(ii) $\left(\underline{H}_1(\delta), \bar{H}_1(\delta)\right)$ choose $(e_1^*, e_2^*) = (e_1^c, 0)$

(iii) $\left(\bar{H}_1(\delta), \bar{H}_2(\delta)\right)$ choose $(e_1^*, e_2^*) = (1, e_2^c)$

(iv) $\left[\bar{H}_2(\delta), \bar{h}\right]$ choose $(e_1^*, e_2^*) = (1, 1)$

where

$$e_1^c = \frac{d_1}{1+d_1}\left[w(h_p, p_1, w_1^c) - \frac{\underline{e}}{d_1}\right]$$

$$e_2^c = \frac{d_2}{1+d_2}\left(w(h_p, p_2, w_2^c) - d_2^{-1}\underline{e}\right)$$

and $\underline{h} \leq \underline{H}_1(\delta) < \bar{H}_1(\delta) < \bar{H}_2(\delta) \leq \bar{h}$. Note the dependence of the size of the respective ranges on the time-inconsistency parameter, δ. This implies that the distribution of the population of parents across these ranges is affected by the degree of severity of the time-inconsistency problem. Hence the following proposition:

Proposition 3. *The lower is δ, (i) the larger the number of parents who choose not to educate their children in all periods (i.e., parents who choose $(e_1^*, e_2^*) = (0, 0)$; and (ii) the smaller the number of parents who choose to educate their children full-time in all periods (i.e., parents who choose $(e_1^*, e_2^*) = (1, 1)$).*

P roof. It suffices to note that $\underline{H}_1(\delta)$ (respectively $\bar{H}_2(\delta)$) is higher the smaller δ (i.e., the more severe the time-inconsistency problem), as established in appendix A.1. ■

Proposition 3 is the parametric analog of proposition 2; it establishes the potential inefficiency of parental education policies due to the time-inconsistency problem. Note however that since $\underline{H}_1(\delta)$ (respectively $\bar{H}_2(\delta)$) is smaller the higher δ, and $\delta \in [0, 1]$, for parents whose human capital levels fall within the range $[\underline{h}, \underline{H}_1(1)]$ or $\left[\bar{H}_2(1), \bar{h}\right]$, time-inconsistency is not a problem. Parents with human capital in the interval $[\underline{h}, \underline{H}_1(1)]$ are just too poor to afford to give up on income from child labor sources, hence $(e_1^*, e_2^*) = (0, 0)$. In contrast, parents with human capital in the interval $\left[\bar{H}_2(1), \bar{h}\right]$ are rich enough to pass on the opportunity to supplement household income with income from child labor sources, hence $(e_1^*, e_2^*) = (1, 1)$. While for the first group of parents, —the poorest ones— banning child labor will result in a welfare loss, for the second group, —the richest parents—there will be no welfare change. This raises the issue of whether there are parents who can be made better off by such a ban. We address this issue below.

4. A Reduction in Children's Wages

An important policy issue in many prosperous countries today is whether to restrict imports of goods made using child labor. The professed objective of such policies would be to make the children better off by preventing their exploitation as workers, and lower the opportunity cost of their education. >From the point of view of a poor household considering how to allocate children's time, the effect of such a policy would be perceived as a reduction in the wage for child labor. In this section we show that some families may indeed be better off, in an ex ante sense, as a result of such a policy. However these families are not necessarily the poorest ones; to benefit from a wage reduction, a family must have an income high enough that the child would attend school under the reduced wage.

Under standard preferences, an exogenous change in the children's wage reduces the welfare of those parents whose children were working before the change. In our model, it is possible that some parents are made better off by such a change. In this section we explore conditions required for this to happen.

For parents to gain from a reduction in the child's wage, there must be in increase in their indirect utility from the view point of period $T-2$. This is given by

$$\begin{aligned} W^0_{T-2}\left(h^c_{T-2}, h_p, w^c_1, p_1, p_2\right) &= u\left[w_p h_p + w^c_1 - g_1\left(h^c_{T-2}, h_p, w^c_1, p_1, p_2\right)\left(w^c_1 + p_1\right)\right] \\ &\quad + \beta W^0_{T-1}\left(h^c_{T-1}, h_p, w_p, w^c_1, p_2\right) \end{aligned}$$

where

$$\begin{aligned} W^0_{T-1}\left(h^c_{T-1}, h_p, w_p, w^c_1, p_2\right) &= u\left[w_p h_p + (1+\gamma)\, w^c_1 - g_2\left(h^c_{T-1}, h_p, w^c_1, p_2\right)\left[(1+\gamma)\, w^c_1 + p_2\right]\right] \\ &\quad + \beta\nu\left(\phi\left[h^c_{T-1}, g_2\left(h^c_{T-1}, h_p, w^c_1, p_2\right)\right]\right) \end{aligned}$$

since we restrict T to equal 3.

Now consider the effect, on parents' welfare, of an exogenous change in the basic child labor change, w^c. Denote this effect as $\partial W^0_{T-2}\left(h^c_{T-2}, h_p, w^c_1, p_1, p_2\right)/\partial w^c_1$. In appendix $A.2$ we prove the following result.

Proposition 4. *Suppose that utility satisfies constant elasticity of substitution and parental education policies are in the interior of the choice set. Then there exists a threshold* $\widetilde{h}(\delta)$ *such that if* $h_p > \widetilde{h}(\delta)$*, then*

$$\frac{\partial}{\partial w^c} W^0_{T-2}\left(h^c_{T-2}, h_p, w^c_1, p_1, p_2\right) < 0.$$

Furthermore, the more severe the time-inconsistency problem, the wider the range of parental human capital such that all parent with human capital within this range can be made better off by an exogenous reduction in the child labor wage.

P roof. See appendix $A.2$ ■

This says that some parents may indeed gain from a reduction in the children's wage, but that in general there may be poorer parents who will lose. Thus our model supports the idea that sanctions on child labor may make some poor families better off, but with the risk of hurting even poorer families, as argued above. In all cases of course, children's education will increase, but this is partly due to the simplifying assumption of no direct costs of children's education, such as tuition fees or nutrition.

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It is important to note that this result does not rely on the assumption of direct costs of education, such as tuition fees or materials; these have been included to demonstrate the robustness of our basic model. Obviously,such costs reduce the set of winners for two reasons. First, by raising the cost of education, the gains to making children attend school are reduced. Second, the wage-reduction policy, by lowering the revenue of those families whose children acquire a partial education, will reduce the education of these children even further. However in many countries, education, at the primary level at least, is heavily subsidized, so our analysis can be simplified by omitting direct costs.

5. Compulsory Education

We now explore the conditions required for the emergence of compulsory-education laws. The key assumption we make here is that laws are chosen by the median voter in an election in which the only issue is how high to set the minimum amount of time children should spend in school.[10] We also assume that parents who would choose full-time education for their own children, and therefore do not directly benefit from mandatory-education laws, will also support laws requiring full-time education.

There are 3 cases, one where the minimum binds in both periods, the others where it binds in one only. The latter cases are less interesting because they are equivalent to the median voter making the optimal education choice *ex ante*. In this section, only the first case is considered. To focus exclusively on the determinants of the timing of the adoption of laws restricting child labor, we set $\gamma = 0$. Therefore, where the minimum schooling binds in both periods, the median voter chooses $\widehat{e}$ to solve:

$$\max_{\widehat{e}} \left\{ (1+\beta) \ln \left[w_p h_p + w_c \left(1 - \widehat{e}\right) \right] + \beta^2 A \ln \left[\left(h_1^1 \right)^{\eta^2} \left(\underline{e} + \widehat{e} \right)^{(1+\eta)(1-\eta)} \right] \right\}$$

Note the absence of the time-inconsistency parameter, δ, on the median voter's problem. This is because voting acts as a commitment mechanism, in which case $\delta = 1$.

Proposition 5. *The minimum level of compulsory education is an increasing function of the median voter's income. Furthermore, unless the median voter's income is above a*

[10] To ensure that richer countries would ban child labor altogether, we would also need to assume that parents who are sufficiently rich so as to choose zero labor for their children will either favor compulsory schooling or abstain from voting on education laws.

threshold $\widetilde{H}(w_p, w^c)$*, there will be no political support for compulsory education, where*

$$\widetilde{H}(w_p, w^c) = \left[(1+\beta)\,\underline{e} - C_0\right]\left(\frac{w_c}{w_p}\right). \tag{5.1}$$

P roof. The first-order condition to the above problem is:

$$\frac{(1+\beta)\,w_c}{w_p h_p + w_c\,(1-\widehat{e})} = \beta^2 \frac{A}{\underline{e}+\widehat{e}}\,(1+\eta)\,(1-\eta) = \frac{C_0}{\underline{e}+\widehat{e}}$$

where $C_0 \equiv A\beta^2\,(1+\eta)\,(1-\eta)$. The preferred choice of education law is given by:

$$\widehat{e} = (1+\beta+C_0)^{-1}\left[C_0\widetilde{w}\,(h_p) - (1+\beta)\,\underline{e}\right] \tag{5.2}$$

. That the level of compulsory education rises in the median voter's income simply follows from the fact that $\partial\hat{e}/\partial h_p > 0$. The threshold $\widetilde{H}(w_p, w_c)$ is simply solution to the equation $\hat{e} = 0$. ■

Notice that the choice of $\hat{e}$ is independent, for the reasons discussed earlier, of the time-inconsistency parameter δ. Empirically, the implication of $\partial\hat{e}/\partial h_p > 0.$ is unusually direct: if countries all share the same parameter values, then compulsory education should be a linear function of the wage ratio of the median voter. This behavior should hold over the range for which human capital makes a difference for education laws. Countries with child-labor restrictions will be those for which $\widehat{e} > 0$. From (3.1), this implies a condition on the median voter:

$$h_p > \left[(1+\beta)\,\underline{e} - C_0\right]\left(\frac{w_c}{w_p}\right).$$

For countries where the value of the median voter's human capital falls below this threshold, increasing median income will reduce child-labor only via household income; above this threshold, there will be an additional effect of income on child labor, via the laws governing compulsory education. Thus the theory fits with the basic empirical observation we made earlier that the unexplained variation in children's labor across countries is negatively correlated with the GDP of the country, provided that median and average GDP are strongly correlated.

A basic empirical test could be performed, if data on children's wages were available, by regressing the measures of child labor discussed in the empirical section of this paper on median income and the ratio of children's wages to those of unskilled adults. Such a test would raise two issues: equilibrium wage determination and parametric differences across countries. If the demand for child labor were sufficiently inelastic, then countries with high equilibrium wage ratios could be those where child labor is less prevalent. Since child labor is relatively unskilled by assumption, such conditions are unlikely. Parametric variations are more likely to be an issue. Variations across country in the quality of available education, for instance, affects the parental decision via the return to education, here represented by the parameter η, which is the share of school time in the human capital of the child. Another important dimension along which countries may vary is the degree to which elderly parents receive utility from their children's education. The wage-skill premium would be one source of such variation, but perhaps equally important is variation in the dependence of parents on support from children in old age. Thus our theory of child labor laws is empirically verifiable, but we leave this for future research.

6. Conclusion

This paper asked how laws against child labor might emerge. Our motivation for asking this question is that while standard theory does not seem to explain why households would vote for such laws, these laws are often credited with a significant role in reducing child labor, as in Doepke (1999) and Moehling (1999). We presented an empirical analysis of child labor in Latin America that supports the hypothesis that the country of residence has an effect on the propensity of children to work, and showed that this effect is more strongly negative in countries with higher levels of per capita income. The data suggest that these country effects are not explained by cross-country variations in the return to education, not by other plausible candidates, such as the share of agriculture in GDP or the fraction of the population living in urban areas.

Although the empirical analysis was limited by the small number of countries in the dataset used here, our findings were robust to the inclusion of other variables. We interpreted this country effect on child labor as consistent with the effects of variations in child labor laws, noting a small but consistent correlation between our measure of the country effect and whether the country had officially endorsed the ILO's conventions C-138 against child labor.

We then presented a theory of child-labor based on the assumption that parents have time-inconsistent preferences and showed how, in the absence of other institutions allowing parents to commit, child-labor laws may increase the welfare of poor households in an *ex ante* sense by allowing parents to achieve a higher level of education for their children than they would be able to achieve with an unconstrained choice set. Our model does not require parents somehow to be able to commit to laws; a lag between the vote and the enforcement of the laws is all that is required. We showed that child labor laws emerge when the median voter has income in an intermediate interval that depends on the returns to the parent of the child's education. While the median voter is in this range, an increase in per-capita income will reduce child-labor supply of a given household, even after controlling for household income.

Another theoretical implication of the model is that measures that reduce the wage of children, such as a ban by foreigners on the import of goods made by child labor, will reduce the welfare of households who are sufficiently poor, but raise that of households that are somewhat richer. Thus a restriction on child-produced imports by wealthy countries, a policy that is often motivated as a way to help child workers, may indeed have the desired effect, but at the expense of children who were even worse off. Thus to assess such a policy it is necessary to know how the distribution of poor households is divided between these two categories.

From the point of view of assessing the long–run benefits of policies restricting child labor, an obvious short-coming of this model is that it takes as given the distribution of human capital in the economy. However the static model is sufficiently simple that nesting it into a dynamic model of the income distribution, as in Galor and Zeira (1993), is relatively straight-forward. Another interesting issue that may affect the timing of the adoption of child labor laws is children's learning on the job; according to Basu (1999) children's labor often does not yield a net revenue to the family for the first few years, suggesting that parents are investing in children's future labor income. This is also related to work in progress by Doepke (1999), who incorporates fertility decisions into a growth model where parents choose whether to educate their children. Thus we can see the current paper as a building block towards assessing the effects of policies to reduce child labor in developing countries.

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Appendix A.1

In this appendix, we solve for the parental education policies e_1 and e_2. Once again, the analysis proceeds by backwards induction from the final period. In the last period, the parent simply enjoys his child's human capital, so that $V_3^0 = \nu\left(h_3^c\right)$. Terminal human capital h_3^c is given by:

$$h_3^c = \left(h_2^c\right)^{\eta}\left(\underline{e} + g_2\left(h_2^c; h_p\right)\right)^{1-\eta}$$

The following technical assumption will prove necessary to derive the analytical results.

U.4 $\underline{e} > A\beta(1-\eta)$.

Suppose that the parent chooses in each period the time spent in education. The parental problem in the 2nd period is:

$$V\left(h_2^c, h_p\right) = \max_{e_2^c} U\left(h_2^c, h_p, e_2^c\right)$$

where

$$U\left(h_2^c, h_p, e_2^c\right) = \ln\left[w_p h_p + \left(1-e_2^c\right) w_2^c - p_2 e_2\right] + \beta\delta A \ln\left[\left(h_2^c\right)^{\eta}\left(\underline{e} + e_2^c\right)^{1-\eta}\right] \tag{.1}$$

. The first-order conditions for an interior solution is:

$$e_2^c: \qquad \frac{-\left(w_2^c + p_2\right)}{w_p h_p + \left(1-e_2^c\right) w_2^c - p_2 e_2} + \frac{\beta\delta A\left(1-\eta\right)}{\underline{e} + e_2^c} = 0 \tag{.2}$$

. Letting $d_2 \equiv \beta\delta A\left(1-\eta\right)$, it can be shown that the optimal education policies are:

$$e_2^{c*} = \begin{cases} 0 & \text{if } h_p \leq \underline{H}_2(\delta) \\ \frac{d_2}{1+d_2}\left(w(h_p, p_2, w_2^c) - d_2^{-1}\underline{e}\right) & \text{if } \underline{H}_2(\delta) < h_p < \bar{H}_2(\delta) \\ 1 & \text{if } h_p \geq \bar{H}_2(\delta) \end{cases} \tag{.3}$$

where

$$w(h_p, p_2, w_2^c) = \frac{w_p h_p + w_2^c}{p_2 + w_2^c}$$

$$\underline{H}_2(\delta) = \left[\frac{\underline{e}}{d_2}\left(1+\frac{p_2}{w_2^c}\right)-1\right]\frac{w_2^c}{w_p}$$

$$\bar{H}_2(\delta) = \left[\frac{(1+d_2+\underline{e})}{d_2}\left(1+\frac{p_2}{w_2^c}\right)-1\right]\frac{w_2^c}{w_p}$$

Note that since by assumption $U.4$, $\underline{e}. > A\beta(1-\eta)$ and $\delta \in (0,1)$, it is guaranteed that $\underline{H}_2(\alpha,\delta)$ and $\bar{H}_2(\alpha,\delta)$ are strictly positive.

For any program and any state, we can define the value of the program from the point of view of the first period as:

$$W_2\left(e_2^c, h_2^c, h_p\right) = u\left(e_2^c | h_p\right) + \beta\nu\left[\phi\left(e_2^c | h_2^c\right)\right] \tag{.4}$$

The value, from the point of view of the first period, of entering the second period with state (h_2^c) is given by the value of W_2, evaluated at the program chosen by the 2nd-period agent. In particular, evaluating (.4) at the optimum yields $W_2^*\left(h_2^c, h_p\right) = W_2\left(e_2^{c*}, h_2^c, h_p\right)$ where

$$W_2\left(e_2^{c*}, h_2^c, h_p\right) = \ln\left[w_p h_p + w_2^c - \left(w_2^c + p_2\right)e_2^{c*}\right] + \beta A \ln\left[\left(h_2^c\right)^\eta\left(\underline{e} + e_2^{c*}\right)^{1-\eta}\right] \tag{.5}$$

where $e_2^{c*} \equiv g_2(h_2^c, h_p)$.

Now consider the effect on the continuation value, $W_2\left(e_2^{c*}, h_2^c, h_p\right)$, of a marginal change in h_2^c, and denote this effect as $\partial W_2\left(e_2^{c*}, h_2^c, h_p\right)/\partial h_2^c$. Using (.5) this expression reduces to:

$$\frac{\partial W_2^*\left(h_2^c, h_p\right)}{\partial h_2^c} = \left[\frac{-\left[w_2^c + p_2\right]}{w_p h_p + w_2^c - \left(w_2^c + p_2\right)e_2^{c*}} + \frac{\beta A\left(1-\eta\right)}{\underline{e} + e_2^{c*}}\right]\frac{\partial e_2^{c*}}{\partial h_2^c} + \frac{\beta A \eta}{h_2^c}, \tag{.6}$$

where $W_2^*\left(h_2^c, h_p\right) = W_2^*\left(e_2^{c*}, h_2^c, h_p\right)$. Since the second period education policy is independent of h_2^c, therefore $\partial e_2^{c*}/\partial h_2^c = 0$, implying that

$$\frac{\partial W_2^*\left(h_2^c, h_p\right)}{\partial h_2^c} = \frac{\beta A \eta}{h_2^c} \tag{.7}$$

The above remarks will prove useful for solving the first-period problem.

Each period-one parent chooses the education investment program given the program chosen by the 2nd-period parent. We can write this as:

$$V\left(h_1^c, h_p\right) = \max_{e_1^c} \left\{ \ln\left[\left(w_p h_p + \left(1 - e_1^c\right) w_1^c - e_1^c p_1\right)\right] + \beta\delta W_2^*\left(h_2^c, h_p\right) \right\}$$
$$s.t. \qquad h_2^c = \left(h_1^c\right)^{\eta} \left(\underline{e} + e_1^c\right)^{1-\eta}$$

The first-order conditions for an interior solution are:

$$\frac{-\left[w_1^c + p_1\right]}{w_p h_p + w_1^c - \left(w_1^c + p_1\right) e_1^c} + \beta\delta \left[\frac{\partial W_2^*\left(h_2^c, h_p\right)}{\partial h_2^c} \frac{\partial h_2^c}{\partial e_1^c}\right] = 0 \qquad (.8)$$

Combining (.7) with (.8) leads to

$$e_1^c = \begin{cases} 0 & \text{for all } h_p \leq \underline{H}_1(\delta) \\ \frac{d_1}{1+d_1}\left[w(h_p, p_1, w_1^c) - \frac{\underline{e}}{d_1}\right] & \underline{H}_1(\delta) < h_p < \bar{H}_1(\delta) \\ 1 & h_p \geq \bar{H}_1(\delta) \end{cases}, \qquad (.9)$$

where

$$\begin{aligned} d_1 &= \beta^2 \delta A \eta (1-\eta) \\ w(h_p, p_1) &= \frac{w_p h_p + w_1^c}{p_1 + w_1^c} \\ \underline{H}_1(\delta) &\equiv \left[\frac{\underline{e}}{d_1}\left(1 + \frac{p_1}{w_1^c}\right) - 1\right] \frac{w_1^c}{w_p} \\ \bar{H}_1(\delta) &= \left[\frac{(1 + d_1 + \underline{e})}{d_1}\left(1 + \frac{p_1}{w_1^c}\right) - 1\right] \frac{w_1^c}{w_p} \end{aligned}$$

It suffices to prove the following claims:

Lemma 1. *Let assumption U.4 hold, and suppose*

$$\gamma = \frac{1}{\beta\eta\left(\underline{e} - d_1\right)}\left[1 + d_1 + (1 - \beta\eta)\,\underline{e} + \frac{1}{w_1^c}\left[(1 + d_1 + \underline{e})\,p_1 - \beta\eta\underline{e}p_2\right]\right] \qquad (.10)$$

Then, (i) unless a child attended school full-time in the first period, he will not attend school at all in the second period; (ii) at least some of the children who attended school full-time in period 1 will be pulled out of school sometime in the second period.

P roof. Note that when condition (.10) holds, $\bar{H}_1(\delta) = \underline{H}_2(\delta)$. The parameters $A, \beta, \underline{e}, \eta, p_1, p_2$ can always be chosen such that this condition is satisfied. The results then simply follow from the fact that $\underline{H}_1(\delta) < \bar{H}_1(\delta) = \underline{H}_2(\delta) < \bar{H}_2(\delta)$, whenever assumption $U.4$ hold. ■

Lemma 1 is consistent with the empirical observation that labor force participation is higher among secondary education, than primary education aged-children. In our model, this result obtains when the age-premium in wage is sufficiently high in the sense of condition (.10).

Lemma 2. $\partial\underline{H}_j(\delta)/\partial\delta < 0$ *and* $\partial\bar{H}_j(\delta)/\partial\delta < 0$ *for all* $j = 1, 2$.

P roof. The result simply follows from the fact that $\partial d_j(\delta)/\partial\delta > 0$ for all $j = 1, 2$. ■

Appendix A.2

In this appendix, we provide the proof for proposition 4.

Parent's indirect utility from the view point of period $T - 2$.

$$\begin{aligned} W_{T-2}^0\left(h_{T-2}^c, h_p, w_1^c, p_1, p_2\right) &= u\left[w_p h_p + w_1^c - g_1\left(h_{T-2}^c, h_p, w_1^c, p_1, p_2\right)\left(w_1^c + p_1\right)\right] \\ &\quad + \beta W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c, p_2\right) \end{aligned}$$

where

$$\begin{aligned} W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c, p_2\right) &= u\left[w_p h_p + (1+\gamma)\,w_1^c - g_2\left(h_{T-1}^c, h_p, w_1^c, p_2\right)\left[(1+\gamma)\,w_1^c + p_2\right]\right] \\ &\quad + \beta\nu\left(\phi\left[h_{T-1}^c, g_2\left(h_{T-1}^c, h_p, w_1^c, p_2\right)\right]\right) \end{aligned}$$

Consider the effect, on parents' welfare, of an exogenous change in the basic child labor change, w_1^c. Denote this effect as $\partial W_{T-2}^0\left(h_{T-2}^c, h_p, w_1^c\right)/\partial w_1^c$. Then

$$\begin{aligned}\frac{\partial}{\partial w_1^c}W_{T-2}^0\left(h_{T-2}^c, h_p, w_1^c\right) &= \left(1-e_1^*\right)u'\left(c_1^*\right)+\beta\frac{\partial}{\partial w_1^c}W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c\right)\\ &\quad+\left[\beta\frac{\partial W_{T-1}^0}{\partial h_{T-1}^c}\frac{\partial \phi}{\partial e_1}-\left(w_1^c+p_1\right)u'\left(c_1^*\right)\right]\end{aligned}$$

where

$$\begin{aligned}c_1^* &= w_p h_p + w_1^c - \left(w_1^c+p_1\right)e_1^*\\ e_1^* &= g_1\left(h_{T-2}^c, h_p, w_1^c, p_1, p_2\right)\end{aligned}$$

>From the first order condition for e_1^*, it follows that

$$\left(w_1^c+p_1\right)u'\left(c_1^*\right)=\beta\delta\frac{\partial W_{T-1}^0}{\partial h_{T-1}^c}\frac{\partial \phi}{\partial e_1}$$

Thus, it follows by way of substitution that:

$$\begin{aligned}\frac{\partial}{\partial w_1^c}W_{T-2}^0\left(h_{T-2}^c, h_p, w_1^c\right) &= \frac{1}{\delta}\left[\left(1-\delta\right)\left(w_1^c+p_1\right)+\delta\left(1-e_1^*\right)\right]u'\left(c_1^*\right)\\ &\quad+\beta\frac{\partial}{\partial w_1^c}W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c, p_2\right)\end{aligned}\tag{.11}$$

Note that owing to the properties of the function u, unless

$$\frac{\partial}{\partial w_1^c}W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c, p_2\right)<0\tag{.12}$$

any exogenous device that causes a decline in the basic child labor wage, w_1^c, will have a negative effect on the welfare of all parents whose choice of education policies satisfies $e_j^* \in (0,1)$ for $j=1,2$. In other words, whether there are parents who benefit from an exogenous reduction in the basic child labor wage necessarily depends on whether condition (.12) is satisfied. The main task, therefore, is that of computing $\partial W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c, p_2\right)/\partial w_1^c$.

Using the definition of $W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c\right)$, it can be established that

$$\frac{\partial}{\partial w_1^c}W_{T-1}^0\left(h_{T-1}^c, h_p, w_p, w_1^c, p_2\right)=\left(1+\gamma\right)\left[\left(1-e_2^*\right)u'\left(c_2^*\right)+\beta\nu'\left(h_T^c\right)\frac{\partial \phi}{\partial e_2}\frac{\partial g_2}{\partial w_1^c}\right]\tag{.13}$$

>From the first order condition for e_2, optimality implies that

$$\beta\nu'\left(h_T^c\right)\frac{\partial\phi}{\partial e_2}\equiv\frac{1}{\delta}\left[(1+\gamma)w_1^c+p_2\right]u'\left(c_2^*\right)$$

Thus, it follows by way of substitution that:

$$\frac{\partial}{\partial w_1^c}W_{T-1}^0\left(h_{T-1}^c,h_p,w_p,w_1^c\right)=\frac{(1+\gamma)u'\left(c_2^*\right)}{\delta}\left(\delta\left(1-e_2^*\right)+\left[(1+\gamma)w_1^c+p_2\right]\frac{\partial g_2}{\partial w_1^c}\right)\quad(.14)$$

Substituting the above result in (.11) yields:

$$\begin{aligned}\frac{\partial}{\partial w_1^c}W_{T-2}^0\left(h_{T-2}^c,h_p,w_1^c,p_1,p_2\right) &= \frac{1}{\delta}\left(\delta\left(1-e_1^*\right)+(1-\delta)\left[w_1^c+p_1\right]\right)u'\left(c_1^*\right)\\ &\quad+\frac{\beta(1+\gamma)u'\left(c_2^*\right)}{\delta}\left(\delta\left(1-e_2^*\right)+\left[(1+\gamma)w_1^c+p_2\right]\frac{\partial g_2}{\partial w_1^c}\right)\end{aligned}\quad(.15)$$

where

$$\begin{aligned}c_1^* &= w_ph_p+w_1^c-\left(w_1^c+p_1\right)e_1^*\\ c_2^* &= w_ph_p+(1+\gamma)w_1^c-\left[(1+\gamma)w_1^c+p_2\right]e_2^*\end{aligned}$$

For any parent whose choice of education policies satisfies $e_j^*\in(0,1)$ for $j=1,2$, it is clear that a necessary condition for him/her to experience a welfare gain from an exogenous reduction in the child labor wage is that his/her human capital, h_p, satisfies

$$\frac{\partial g_2}{\partial w_1^c}<-\frac{\left[(1-\delta)\left(w_1^c+p_1\right)+\delta\left(1-e_1^*\right)\right]u'\left(c_1^*\right)+\beta\delta(1+\gamma)\left(1-e_2^*\right)u'\left(c_2^*\right)}{\beta(1+\gamma)\left[(1+\gamma)w_1^c+p_2\right]u'\left(c_2^*\right)}\quad(.16)$$

Recall that $g_2\left(h_{T-1}^c,h_p,w_1^c,p_2\right)$ satisfies

$$-\left[(1+\gamma)w_1^c+p_2\right]u'\left(c_2^*\right)+\beta\delta\nu'\left(\phi\left[h_{T-1}^c,g_2\left(h_{T-1}^c,h_p,w_1^c,p_2\right)\right]\right)\frac{\partial}{\partial e_2}\phi\left[h_{T-1}^c,g_2\left(h_{T-1}^c,h_p,w_1^c,p_2\right)\right]\equiv 0$$

Therefore, the implicit function theorem may be applied to establish that

$$\frac{\partial g_2}{\partial w_1^c}=\frac{(1+\gamma)\left[u'\left(c_2^*\right)-\left(1-e_2^*\right)u''\left(c_2^*\right)\right]}{\left[(1+\gamma)w_1^c+p_2\right]^2u''\left(c_2^*\right)+\beta\delta\left[\nu''\left(h_T^c\right)\left(\phi_e\right)^2+\nu'\left(h_T^c\right)\phi_{ee}\right]}<0\quad(.17)$$

where $e_2^*=g_2\left(h_{T-1}^c,h_p,w_1^c,p_2\right)$. Therefore condition (.16) combined with (.17) implies that

$$\frac{\beta(1+\gamma)^2\left[(1+\gamma)w_1^c+p_2\right]\left[u'\left(c_2^*\right)-\left(1-e_2^*\right)u''\left(c_2^*\right)\right]u'\left(c_2^*\right)}{\left[(1-\delta)\left(w_1^c+p_1\right)+\delta\left(1-e_1^*\right)\right]u'\left(c_1^*\right)+\beta\delta(1+\gamma)\left(1-e_2^*\right)u'\left(c_2^*\right)}<-\Delta\quad(.18)$$

where $\Delta \equiv [(1+\gamma) w_1^c + p_2]^2 u''(c_2^*) + \beta\delta \left[\nu''(h_T^c)(\phi_e)^2 + \nu'(h_T^c)\phi_{ee}\right] < 0$, by the second order conditions for a maximum. To determine whether there are parents who benefit from an exogenous reduction in the child labor wage, we look for sufficient conditions for (.18) to hold.

Let

$$\epsilon_{u/c}(c_j) = -u''(c_j)\frac{c_j}{u'(c_j)}$$

denotes the consumption-elasticity, at the point c_j $(j = 1, 2)$, of the parental periodic marginal utility $u'(c_j)$. Then condition (.18) becomes

$$\frac{-\beta(1+\gamma)^2[(1+\gamma)w_1^c + p_2]\left[\frac{c_2^*}{\epsilon_{u/c}(c_2^*)} + (1-e_2^*)\right]u'(c_2^*)u''(c_2^*)}{[(1-\delta)(w_1^c+p_1)+\delta(1-e_1^*)]u'(c_1^*) + \beta\delta(1+\gamma)(1-e_2^*)u'(c_2^*)} < -\Delta$$

To prove proposition 4, it suffices to prove the following two claims: (i) there exists a range of parental human capital such that all parents with human capital within this range can be made better off by an exogenous reduction in the child labor wage; (ii) this range is wider the more severe the time inconsistency problem. We begin with the first claim.

Lemma 3. *Suppose* $\forall c_j$,

$$\epsilon_{u/c}(c_j) = \bar{\epsilon}. \tag{.19}$$

There exists a threshold $\widetilde{h}(\delta)$ *such that if* $h_p > \widetilde{h}(\delta)$ *then*

$$\frac{\partial}{\partial w_1^c} W_{T-2}^0\left(h_{T-2}^c, h_p, w_1^c, p_1, p_2\right) < 0$$

where $\widetilde{h}(\delta)$ *is solution to*

$$\frac{\beta(1+\gamma)^2(w_p h_p - p_2)u'[w_p h_p + (1+\gamma)w_1^c]}{[(1+\gamma)w_1^c + p_2]\left[\bar{\delta}u'(w_p h_p - p_1) + \beta\delta(1+\gamma)u'(w_p h_p - p_2)\right]\bar{\epsilon}} = 1 \tag{.20}$$

with $\bar{\delta} = (1-\delta)(w_1^c + p_1) + \delta$.

P roof. Suppose by way of contradiction that $h_p > \widetilde{h}(\delta)$, but

$$\frac{\partial}{\partial w_1^c} W_{T-2}^0\left(h_{T-2}^c, h_p, w_1^c\right) \geq 0 \tag{.21}$$

First, define

$$f(h_p) = \frac{\beta (1+\gamma)^2 (w_p h_p - p_2) u' [w_p h_p + (1+\gamma) w_1^c]}{\bar{\epsilon} [(1+\gamma) w_1^c + p_2] \left[\bar{\delta} u' (w_p h_p - p_1) + \beta\delta (1+\gamma) u' (w_p h_p - p_2)\right]}$$

Using elementary calculus, it can be established that $f' > 0$, implying that $f(h_p) > f\left[\widetilde{h}(\delta)\right]$. Now (.21) implies that

$$\frac{1}{\bar{\epsilon}} \frac{-\beta (1+\gamma)^2 [(1+\gamma) w_1^c + p_2] [c_2^* + \bar{\epsilon} (1 - e_2^*)] u' (c_2^*) u'' (c_2^*)}{[(1-\delta)(w_1^c + p_1) + \delta (1 - e_1^*)] u' (c_1^*) + \beta\delta (1+\gamma)(1 - e_2^*) u' (c_2^*)} \geq -\Delta \tag{.22}$$

Note that both sides of (.22) are positive. Since $-\Delta > -[(1+\gamma) w_1^c + p_2]^2 u'' (c_2^*)$, clearly

$$\frac{-\beta (1+\gamma)^2 [(1+\gamma) w_1^c + p_2] [c_2^* + \bar{\epsilon} (1 - e_2^*)] u' (c_2^*) u'' (c_2^*)}{[(1-\delta)(w_1^c + p_1) + \delta (1 - e_1^*)] u' (c_1^*) + \beta\delta (1+\gamma)(1 - e_2^*) u' (c_2^*)} > -[(1+\gamma) w_1^c + p_2]^2 u'' (c_2^*) \bar{\epsilon}$$

or, equivalently

$$\frac{1}{[(1+\gamma) w_1^c + p_2] \bar{\epsilon}} \frac{\beta (1+\gamma)^2 [c_2^* + (1 - e_2^*) \bar{\epsilon}] u' (c_2^*)}{[(1-\delta)(w_1^c + p_1) + \delta (1 - e_1^*)] u' (c_1^*) + \beta\delta (1+\gamma)(1 - e_2^*) u' (c_2^*)} < 1 \tag{.23}$$

Denotes the left-hand side of (.23) as LHS. Then since $\forall e_j^* \in (0,1)$, $j = 1, 2$, $u' (w_p h_p - p_1) \geq u' [w_p h_p + w_1^c - (w_1^c + p_1) e_1^*]$ and

$$u' (w_p h_p + (1+\gamma) w_1^c - [(1+\gamma) w_1^c + p_2] e_2^*) \geq u' [w_p h_p + (1+\gamma) w_1^c],$$

it can be verified that

$$LHS > \frac{\beta (1+\gamma)^2 (w_p h_p - p_2) u' [w_p h_p + (1+\gamma) w_1^c]}{[(1+\gamma) w_1^c + p_2] \left[\bar{\delta} u' (w_p h_p - p_1) + \beta\delta (1+\gamma) u' (w_p h_p - p_2)\right] \bar{\epsilon}} > 1$$

since $f' > 0$ and $h_p > \widetilde{h}(\delta)$. A contradiction. Hence the result. **EndProof** ■

Condition (.19) implies that the utility function is of the constant elasticity of substitution form. Note that depending upon the function u, equation (.20) can have one or multiple solutions. Therefore proposition 2 states that there exists at least one interval for h_p such that all parents with levels of human capital within that interval benefit from an exogenous reduction in the child labor wage, w_1^c.

Furthermore, note that $h_p \in \left[\underline{h}, \overline{h}\right]$, where $1 < \underline{h} < \overline{h} \leq +\infty$. Thus, in order for the interval spanned by $\widetilde{h}(\delta)$ to be non-empty, it must be that $\underline{h} \leq \widetilde{h}(\delta) < \overline{h}$. Given w_p, w_1^c,

p_1, p_2, β, and δ, the function u, and the parameters γ, $\bar{\epsilon}$, $\underline{h}$, and $\overline{h}$ can always be chosen such that this interval is non-empty. The key issue however is how large or narrow is this interval, and how is its width affected by changes in the degree of severity of the time-inconsistency of parental preferences. Recall that the degree of severity of the time-inconsistency problem is inversely related to the parameter δ. In other words, the lower δ the more severe the time-inconsistency problem.

To address this issue, recall equation (.20). This equation can be rearranged as follows

$$G(h_p;\delta) = 0$$

where

$$\begin{aligned} G(h_p;\delta) \;\; &\equiv \;\; \beta\,(1+\gamma)^2\,(w_p h_p - p_2)\,u'\,[w_p h_p + (1+\gamma)\,w_1^c] \\ &\quad - [(1+\gamma)\,w_1^c + p_2]\left[\bar{\delta} u'\,(w_p h_p - p_1) + \beta\delta\,(1+\gamma)\,u'\,(w_p h_p - p_2)\right]\bar{\epsilon} \end{aligned}$$

Since $\widetilde{h}\,(\delta)$ solves $G(h_p;\delta) = 0$, to the extent that $G_h(h_p;\delta) \neq 0$, the implicit function theorem may be applied to establish that

$$\frac{\partial}{\partial\delta}\widetilde{h}'\,(\delta) = -\frac{G_\delta(h_p;\delta,\bar{\epsilon},\gamma)}{G_h(h_p;\delta,\bar{\epsilon},\gamma)}$$

Hence the following result.

Lemma 4. *Let*

$$\bar{\epsilon} < \frac{w_p \underline{h} + (1+\gamma)\,w_1^c}{w_p \bar{h} - p_2}, \tag{.24}$$

and suppose

$$\frac{u'\,(w_p h_p - p_2)}{u'\,(w_p h_p - p_1)} > \frac{w_1^c + p_1 - 1}{\beta\,(1+\gamma)}. \tag{.25}$$

Then the more severe the time-inconsistency problem, the larger the interval for parental human capital within which a parent benefits from an exogenous reduction in the child labor.

P roof. I suffices to show that $\partial\widetilde{h}'(\delta)/\partial\delta > 0$. By using the definition of $\bar{\epsilon}$, it can be shown that

$$\begin{aligned} G_h(h_p;\delta,\bar{\epsilon}) &= (1+\gamma)^2 w_p u'\left[w_p h_p + (1+\gamma) w_1^c\right]\left[1 - \frac{(w_p h_p - p_2)\bar{\epsilon}}{w_p h_p + (1+\gamma) w_1^c}\right] \\ &\quad -\bar{\epsilon} w_p\left[(1+\gamma) w_1^c + p_2\right]\left[\bar{\delta} u''(w_p h_p - p_1) + \beta\delta(1+\gamma) u''(w_p h_p - p_2)\right] \end{aligned}$$

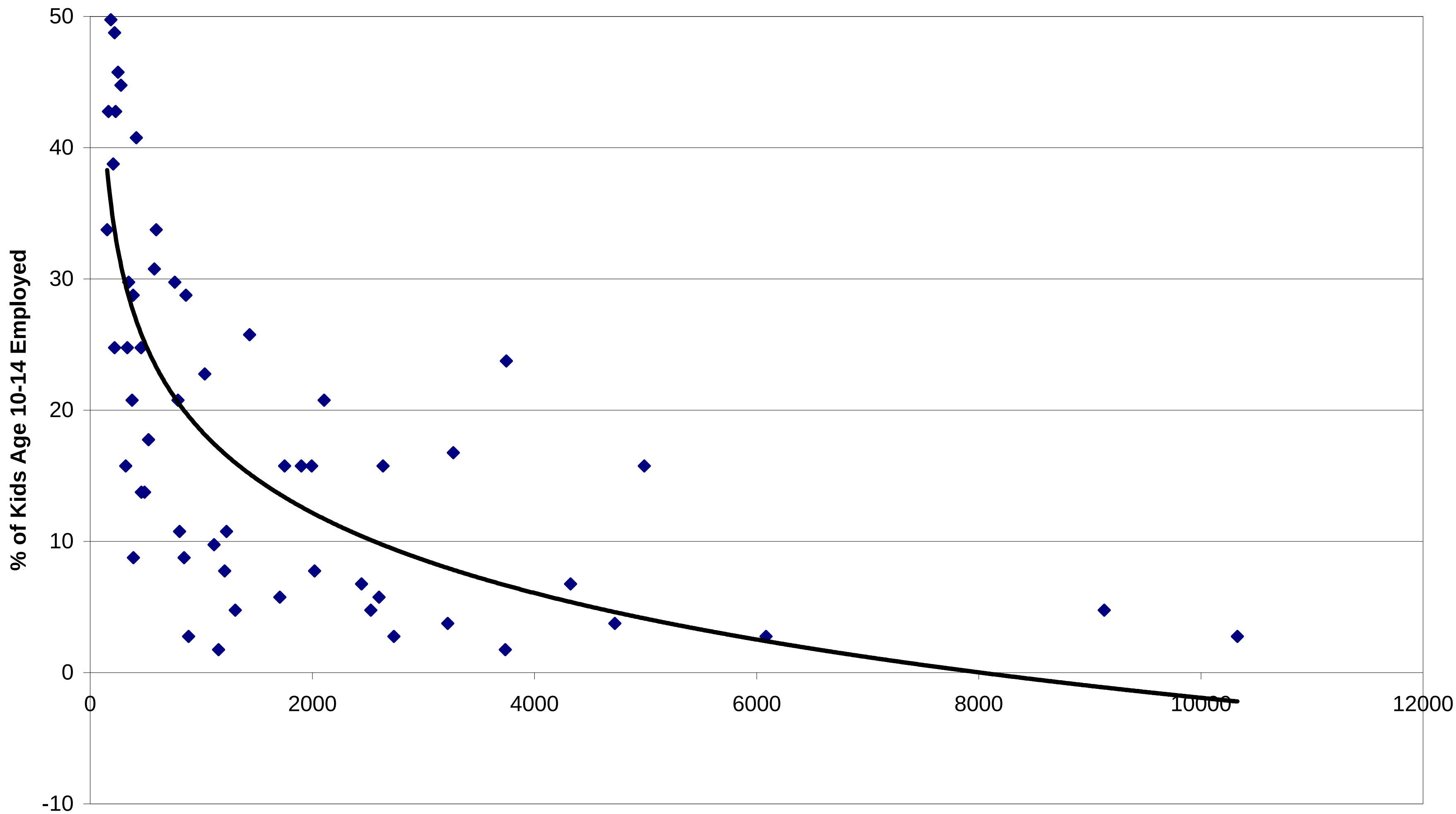
which is necessarily positive, due to condition (.24). Furthermore,

$$G_\delta(h_p;\delta) = -\bar{\epsilon}\left[(1+\gamma) w_1^c + p_2\right]\left[(w_1^c + p_1 - 1) u'(w_p h_p - p_1) - \beta(1+\gamma) u'(w_p h_p - p_2)\right]$$

which is negative by condition (.25). Hence the results. **EndProof** ■

Note that condition (.24) can easily obtain for an appropriate choice of $\underline{h}$, $\bar{h}$, γ, and p_2. It simply states that the elasticity of substitution is not too high. Condition (.25) is purely technical and can also easily obtain for an appropriate choice of the function u and the unit cost p_1 and p_2.

Figure 1: Child Labor: by Country, 1998



Per Capita Income (US PPP 97)
Source: UNDP Human Development Report

Table 1(a): Children's Characteristics

Country	Age Group	Year	Obser-vations	Statistic	Attends School	Years of Education	Education Gap
Argentina	10 to 14	1996	7689	mean	0.98	4.90	0.59
				std.	0.12	2.55	2.03
	15 to 17		4458	mean	0.83	8.97	0.51
				std.	0.38	1.90	2.07
Bolivia	10 to 14	1997	3455	mean	0.95	4.22	1.22
				std.	0.21	1.68	1.46
	15 to 17		1745	mean	0.81	7.45	1.97
				std.	0.40	2.41	2.27
Brasil	10 to 14	1996	26058	mean	0.94	3.07	2.45
				std.	0.24	1.75	1.61
	15 to 17		14038	mean	0.79	5.49	3.92
				std.	0.41	2.58	2.55
Chile	10 to 14	1996	9088	mean	0.99	4.44	1.03
				std.	0.11	1.48	1.04
	15 to 17		5191	mean	0.86	7.95	1.49
				std.	0.35	1.86	1.65
Colombia	10 to 14	1997	9723	mean	0.92	4.12	1.38
				std.	0.28	1.84	1.65
	15 to 17		5450	mean	0.75	6.98	2.49
				std.	0.43	2.46	2.40
Costa Rica	10 to 14	1996	3336	mean	0.92	4.09	1.31
				std.	0.27	1.51	1.20
	15 to 17		1633	mean	0.61	6.78	2.65
				std.	0.49	2.03	2.05
Ecuador	10 to 14	1996	2889	mean	0.96	5.14	0.37
				std.	0.20	1.63	1.28
	15 to 17		1712	mean	0.83	8.30	1.16
				std.	0.38	2.05	1.96
Mexico	10 to 14	1996	6597	mean	0.92	4.74	0.73
				std.	0.27	1.67	1.40
	15 to 17		3430	mean	0.59	7.57	1.87
				std.	0.49	2.55	2.53
Panama	10 to 14	1997	2436	mean	0.96	4.75	0.71
				std.	0.19	1.61	1.27
	15 to 17		1205	mean	0.76	7.84	1.61
				std.	0.43	2.14	2.08
Paraguay	10 to 14	1998	1626	mean	0.94	4.18	1.29
				std.	0.24	1.60	1.34
	15 to 17		736	mean	0.68	7.08	2.28
				std.	0.47	2.13	2.09
Peru	10 to 14	1997	1742	mean	0.97	4.71	0.75
				std.	0.18	1.56	1.39
	15 to 17		907	mean	0.81	7.83	1.63
				std.	0.39	2.08	1.93
Venezuela	10 to 14	1996	5601	mean	0.97	4.89	0.60
				std.	0.18	2.06	1.85
	15 to 17		3164	mean	0.77	7.75	1.72
				std.	0.42	3.01	2.95

* Refers to sample of kids working 10 hours or more per week.
Source: Author's calculations from national household surveys, 1995-1998

Table 1 (b): Children in Employment

Country	Age Group	Statistic	Employment Rate of Kids*	Child's Hours*	Child's Wage*
Argentina	10 to 14	mean	0.003	20.56	1.92
		std.	0.052	2.28	4.06
	15 to 17	mean	0.055	38.43	1.88
		std.	0.228	0.83	1.74
Bolivia	10 to 14	mean	0.127	30.67	0.61
		std.	0.333	1.95	0.92
	15 to 17	mean	0.256	44.89	0.78
		std.	0.436	1.16	0.87
Brasil	10 to 14	mean	0.102	31.89	0.66
		std.	0.303	0.70	0.90
	15 to 17	mean	0.310	42.19	0.92
		std.	0.462	0.35	0.98
Chile	10 to 14	mean	0.003	22.91	1.05
		std.	0.057	2.38	1.59
	15 to 17	mean	0.062	38.14	1.39
		std.	0.241	0.93	1.65
Colombia	10 to 14	mean	0.031	33.98	0.98
		std.	0.173	1.13	1.52
	15 to 17	mean	0.171	41.29	1.32
		std.	0.376	0.58	1.25
Costa Rica	10 to 14	mean	0.030	33.06	1.23
		std.	0.171	1.72	1.55
	15 to 17	mean	0.227	43.77	1.73
		std.	0.419	0.85	0.93
Ecuador	10 to 14	mean	0.038	38.17	0.48
		std.	0.190	1.98	0.70
	15 to 17	mean	0.153	44.82	0.72
		std.	0.361	1.12	0.79
Mexico	10 to 14	mean	0.051	37.66	0.52
		std.	0.219	1.32	0.51
	15 to 17	mean	0.274	46.39	0.76
		std.	0.446	0.62	0.60
Panama	10 to 14	mean	0.005	24.46	0.60
		std.	0.067	4.63	1.26
	15 to 17	mean	0.062	36.73	0.79
		std.	0.240	1.88	0.84
Paraguay	10 to 14	mean	0.065	33.92	1.07
		std.	0.247	1.75	0.81
	15 to 17	mean	0.171	44.66	1.57
		std.	0.377	1.41	1.04
Peru	10 to 14	mean	0.175	23.87	0.43
		std.	0.380	2.60	0.54
	15 to 17	mean	0.303	39.19	0.79
		std.	0.460	1.46	0.64
Venezuela	10 to 14	mean	0.018	34.09	1.03
		std.	0.133	1.64	0.63
	15 to 17	mean	0.134	40.60	1.33
		std.	0.341	0.77	0.94

* Refers to sample of kids working 10 hours or more per week.Hours and wages are median, age-adjusted .
Source: Author's calculations from national household surveys, 1995-1998

Table 2: Probit Estimates for School Attendance Model

Variable	Age 10-13				Age 14-17			
	Boys		Girls		Boys		Girls	
	coef	std	coef	std	coef	std	coef	std
Age of Kid	-0.142	(0.000)	-0.180	(0.001)	-0.201	(0.001)	-0.211	(0.001)
Age Squared	-0.068	(0.000)	-0.047	(0.000)	-0.013	(0.001)	-0.028	(0.001)
LogFamInc	0.102	(0.001)	0.166	(0.001)	0.129	(0.001)	0.156	(0.001)
LogFamInc2	0.014	(0.000)	0.018	(0.000)	0.010	(0.000)	0.006	(0.000)
Log(Dad's Educ)	0.098	(0.002)	0.112	(0.002)	-0.172	(0.002)	-0.052	(0.002)
Log(DadEduc) Squared	0.059	(0.001)	0.056	(0.001)	0.191	(0.001)	0.149	(0.001)
Log(Mom's Educ)	0.124	(0.002)	0.140	(0.002)	-0.096	(0.002)	0.018	(0.002)
Log(Mom's Educ) Squared	0.074	(0.001)	0.077	(0.001)	0.154	(0.001)	0.132	(0.001)
Child Employed > 10hrs	-0.826	(0.001)	-0.593	(0.002)	-1.086	(0.001)	-0.731	(0.001)
Argentina	0.934	(0.003)	1.028	(0.003)	-0.219	(0.002)	-0.282	(0.003)
Bolivia	1.641	(0.004)	1.408	(0.003)	0.988	(0.003)	0.701	(0.004)
Brasil	1.372	(0.002)	1.279	(0.002)	0.842	(0.002)	0.635	(0.002)
Chile	1.478	(0.004)	1.322	(0.004)	0.379	(0.002)	0.222	(0.003)
Colombia	0.981	(0.002)	0.908	(0.002)	0.497	(0.002)	0.291	(0.002)
Costa Rica	0.541	(0.003)	0.347	(0.003)	-0.044	(0.003)	-0.402	(0.003)
Ecuador	1.047	(0.004)	1.028	(0.004)	0.389	(0.003)	0.261	(0.004)
Mexico	1.139	(0.003)	0.647	(0.002)	0.097	(0.002)	-0.426	(0.002)
Panama	0.953	(0.004)	1.007	(0.004)	-0.039	(0.004)	0.046	(0.004)
Paraguay	1.248	(0.004)	0.952	(0.004)	0.428	(0.004)	0.099	(0.004)
Peru	1.704	(0.005)	1.361	(0.005)	0.837	(0.004)	0.295	(0.004)
Venezuela	1.153	(0.003)	0.085	(0.002)	0.109	(0.003)	1.242	(0.003)

*SOURCE: Author's calculations from household surveys.

Table 3: OLS Estimation of Education Gap

Variable	Boys 10-13			Girls 10-13			Boys 14-17			Girls 14-17		
	Estimate	Std. Error	t-Value	Estimate	Std. Error	t-Value	Estimate	Std. Error	t-Value	Estimate	Std. Error	t-Value
Age of Kid	0.166	(0.006)	26.000	0.130	(0.006)	21.090	0.442	(0.016)	27.620	0.370	(0.016)	22.830
Age Squared	-0.017	(0.005)	-3.380	-0.008	(0.005)	-1.740	0.004	(0.028)	0.140	0.006	(0.027)	0.220
LogFamInc	-0.235	(0.010)	-23.400	-0.226	(0.010)	-22.840	-0.360	(0.016)	-22.590	-0.353	(0.016)	-21.710
LogFamInc2	-0.004	(0.004)	-0.990	-0.002	(0.004)	-0.440	-0.001	(0.007)	-0.140	0.041	(0.007)	5.570
Log(Dad's Educ)	-0.783	(0.035)	-22.600	-0.742	(0.033)	-22.200	-1.005	(0.054)	-18.470	-1.076	(0.056)	-19.190
Log(DadEduc) Squared	0.140	(0.013)	10.730	0.133	(0.013)	10.460	0.140	(0.021)	6.780	0.165	(0.021)	7.910
Log(Mom's Educ)	-0.601	(0.035)	-17.000	-0.711	(0.034)	-20.670	-0.824	(0.056)	-14.690	-0.973	(0.057)	-16.960
Log(Mom's Educ) Squared	0.047	(0.014)	3.400	0.100	(0.013)	7.430	0.051	(0.022)	2.330	0.103	(0.022)	4.670
Child Employed > 10hrs	**0.380**	**(0.027)**	**14.140**	**0.282**	**(0.037)**	**7.700**	**0.767**	**(0.032)**	**24.080**	**0.266**	**(0.040)**	**6.700**
Argentina	2.488	(0.039)	63.380	2.283	(0.038)	60.480	3.954	(0.065)	60.980	3.960	(0.064)	61.600
Bolivia	2.584	(0.047)	55.390	2.531	(0.046)	55.350	3.583	(0.082)	43.670	3.774	(0.082)	46.300
Brasil	4.090	(0.028)	145.730	3.671	(0.026)	140.430	5.982	(0.049)	123.240	5.437	(0.047)	115.000
Chile	3.053	(0.042)	73.340	2.866	(0.040)	70.810	4.403	(0.062)	71.530	4.263	(0.061)	69.920
Colombia	3.269	(0.039)	83.960	2.925	(0.037)	78.450	4.916	(0.059)	83.930	4.562	(0.058)	78.050
Costa Rica	3.205	(0.059)	54.400	3.110	(0.057)	54.620	5.194	(0.082)	63.250	5.106	(0.083)	61.520
Ecuador	2.369	(0.050)	47.450	2.227	(0.049)	45.380	3.864	(0.082)	47.130	3.790	(0.084)	45.310
Mexico	2.299	(0.043)	53.720	2.224	(0.040)	55.080	3.748	(0.063)	59.310	3.891	(0.062)	62.420
Panama	2.742	(0.053)	52.020	2.447	(0.052)	47.030	4.485	(0.091)	49.030	3.953	(0.094)	42.070
Paraguay	3.090	(0.060)	51.900	2.835	(0.058)	48.780	4.485	(0.114)	39.360	4.381	(0.112)	39.220
Peru	2.356	(0.061)	38.650	2.311	(0.058)	39.670	3.651	(0.106)	34.310	3.722	(0.101)	36.670
Venezuela	2.686	(0.040)	66.470	2.229	(0.038)	58.330	4.602	(0.068)	67.650	4.004	(0.067)	59.500

*SOURCE: Author's calculations from household surveys.

Table 4: OLS Estimation of Children's Work Hours*

Variable	Boys 10-13			Girls 10-13			Boys 14-17			Girls 14-17		
	Estimate	Std. Error	t-Value	Estimate	Std. Error	t-Value	Estimate	Std. Error	t-Value	Estimate	Std. Error	t-Value
Age of Kid	1.273	(0.043)	29.290	0.583	(0.030)	19.340	3.041	(0.147)	20.730	1.554	(0.118)	13.160
Age Squared	0.228	(0.033)	6.830	0.066	(0.023)	2.830	-0.405	(0.254)	-1.600	0.062	(0.200)	0.310
LogFamInc	**-0.877**	**(0.069)**	**-12.790**	**-0.361**	**(0.048)**	**-7.470**	**-0.587**	**(0.147)**	**-3.990**	**-0.066**	**(0.119)**	**-0.560**
LogFamInc2	**0.232**	**(0.030)**	**7.730**	**0.128**	**(0.018)**	**6.980**	**0.186**	**(0.061)**	**3.030**	**0.209**	**(0.054)**	**3.910**
Log(Dad's Educ)	-2.819	(0.237)	-11.890	-0.435	(0.164)	-2.660	-1.800	(0.501)	-3.590	-0.274	(0.410)	-0.670
Log(DadEduc) Squared	0.394	(0.089)	4.410	-0.004	(0.062)	-0.060	-0.843	(0.190)	-4.430	-0.487	(0.153)	-3.180
Log(Mom's Educ)	-1.408	(0.243)	-5.810	-1.309	(0.168)	-7.780	-2.201	(0.517)	-4.260	-1.428	(0.419)	-3.410
Log(Mom's Educ) Squared	0.045	(0.094)	0.470	0.217	(0.066)	3.300	-0.724	(0.202)	-3.590	-0.234	(0.162)	-1.450
Argentina	6.955	(0.267)	26.080	2.728	(0.184)	14.800	19.800	(0.582)	33.990	8.834	(0.466)	18.970
Bolivia	7.826	(0.317)	24.690	4.726	(0.222)	21.280	22.170	(0.740)	29.950	13.008	(0.587)	22.160
Brasil	9.119	(0.185)	49.230	3.869	(0.126)	30.660	27.893	(0.401)	69.570	13.320	(0.332)	40.120
Chile	5.635	(0.284)	19.840	2.130	(0.198)	10.760	18.621	(0.553)	33.670	7.835	(0.442)	17.720
Colombia	7.455	(0.264)	28.190	2.237	(0.182)	12.270	22.644	(0.517)	43.780	7.565	(0.424)	17.860
Costa Rica	8.880	(0.402)	22.080	2.874	(0.279)	10.310	27.724	(0.734)	37.760	9.564	(0.603)	15.850
Ecuador	7.729	(0.340)	22.710	3.037	(0.240)	12.650	22.994	(0.740)	31.070	8.733	(0.608)	14.350
Mexico	9.370	(0.290)	32.350	3.544	(0.197)	17.980	26.294	(0.556)	47.320	12.214	(0.448)	27.260
Panama	5.816	(0.361)	16.130	2.316	(0.255)	9.090	17.038	(0.836)	20.380	7.695	(0.685)	11.230
Paraguay	10.830	(0.404)	26.790	3.907	(0.284)	13.760	30.762	(1.028)	29.920	13.165	(0.812)	16.210
Peru	10.003	(0.414)	24.170	6.087	(0.283)	21.520	24.145	(0.965)	25.030	14.254	(0.733)	19.440
Venezuela	7.865	(0.272)	28.900	2.225	(0.186)	11.940	23.869	(0.598)	39.920	7.501	(0.485)	15.470

Table 5: Correlation of Child-labor fixed effects with GDP and C-190 Ratification

Age	Sex	Results of OLS Estimation					C-190
		log(GDP)	StdErr	tValue	Prob(t-val)	R-squared	Correlation
10-12 yrs	Boys	-1.963	1.016	-1.930	0.082	0.272	-0.385
	Girls	-1.962	0.651	-3.010	0.013	0.476	-0.273
12-14 yrs	Boys	-3.743	2.800	-1.340	0.211	0.152	-0.268
	Girls	-3.958	1.550	-2.550	0.029	0.395	-0.319

*Source: Author's calculations based on data from ILO Web page and Table 3

Table A1: Child Lab or Force Participation rates and Real GDP

Country	RGDPC	Child Labor	Country	RGDPC	Child Labor
Algeria	1097	1	Mauritius	3688	23
Argentina	9070	4	Mexico	4265	6
Bangladesh	286	29	Morocco	1246	4
Botswana	3209	16	Mozambique	94	33
Brasil	4930	15	Myanmar	274	24
Burkina Faso	160	48	Namibia	2046	20
Burundi	126	49	Nepal	217	44
Cambodia	159	24	Nicaragua	431	13
Chad	149	38	Niger	191	45
China	745	10	Nigeria	1376	25
Colombia	2384	6	Pakistan	466	17
Congo	702	29	Panama	3159	3
Costa Rica	2540	5	Paraguay	1961	7
Côte d'Ivoire	731	20	Peru	2674	2
Dominican Republic	1841	15	Philippines	1151	7
Ecuador	1648	5	Portugal	10269	2
Egypt	1168	10	Rwanda	170	42
El Salvador	1935	15	Senegal	519	30
Ethiopia	104	42	Sierra Leone	260	15
Guatemala	1691	15	Sri Lanka	826	2
Guinea	535	33	Thailand	2576	15
Haiti	398	24	Togo	327	28
Honduras	785	8	Ukraine	973	22
India	402	13	Uruguay	6026	2
Indonesia	1055	9	Venezuela	3678	1
Iran (Islamic Rep.	2466	4	Viet Nam	330	8
Kenya	356	40	Yemen	318	20
Malaysia	4665	3	Zimbabwe	802	28

SOURCE: UN Human Development Report, 2000

Table A2: Aggregate Variables for Country Regression Analysis

Country	GDP per capita	Income Gini	Agriculture as % of GDP	Total Fertility	Mincer coefficient
Argentina	10300	47.0	7.0	2.6	0.107
Bolivia	2880	58.8	16.0	4.4	0.073
Brasil	6480	59.1	8.0	2.3	0.154
Chile	12730	56.4	7.0	2.4	0.121
Colombia	6810	56.7	11.0	2.8	0.145
Costa Rica	6650	45.9	15.0	2.8	0.105
Ecuador	4940	56.0	12.0	3.1	0.098
Mexico	8370	52.8	5.0	2.8	0.141
Panama	7168	57.6	8.0	2.6	0.126
Paraguay	3980	62.0	23.0	4.2	0.103
Peru	4680	50.5	7.0	3.0	0.085
Venezuela	9200	49.6	4.0	3.0	0.084

Source: GDP from World development CD(2000); Mincer coefficient from Bils and Klenow (1997); other variables from UNDP CD (2000).

Table A3: Robustness check for correlations of child labor fixed effects

Age	Sex	Results of OLS Estimation					
		Variable	Estimate	StdErr	tValue	Prob(t-val)	R-squared
10-13 yrs	Boys	GINI	-7.184	(9.500)	-0.760	0.469	0.315
		logGDP	-2.347	(1.156)	-2.030	0.073	
		AGRIPCT	0.026	(0.114)	0.230	0.824	0.276
		logGDP	-1.728	(1.484)	-1.160	0.274	
		TOTFERT	-0.054	(1.170)	-0.050	0.965	0.272
		logGDP	-2.031	(1.818)	-1.120	0.293	
		MINCER	9.243	(19.180)	0.480	0.641	0.290
		logGDP	-2.214	(1.179)	-1.880	0.093	
	Girls	GINI	-5.772	(5.974)	-0.970	0.359	0.525
		logGDP	-2.270	(0.727)	-3.120	0.012	
		AGRIPCT	-0.110	(0.063)	-1.740	0.115	0.608
		logGDP	-2.959	(0.824)	-3.590	0.006	
		TOTFERT	-0.566	(0.726)	-0.780	0.455	0.509
		logGDP	-2.673	(1.128)	-2.370	0.042	
		MINCER	-3.609	(12.387)	-0.290	0.777	0.481
		logGDP	-1.864	(0.761)	-2.450	0.037	
14-17 yrs	Boys	GINI	-8.172	(26.854)	-0.300	0.768	0.160
		logGDP	-4.179	(3.267)	-1.280	0.233	
		AGRIPCT	0.298	(0.299)	1.000	0.344	0.236
		logGDP	-1.047	(3.889)	-0.270	0.794	
		TOTFERT	0.206	(3.224)	0.060	0.950	0.152
		logGDP	-3.484	(5.009)	-0.700	0.504	
		MINCER	43.206	(51.544)	0.840	0.424	0.213
		logGDP	-4.915	(3.168)	-1.550	0.155	
	Girls	GINI	-1.443	(14.934)	-0.100	0.925	0.395
		logGDP	-4.035	(1.817)	-2.220	0.054	
		AGRIPCT	-0.113	(0.170)	-0.670	0.522	0.423
		logGDP	-4.983	(2.215)	-2.250	0.051	
		TOTFERT	-0.796	(1.765)	-0.450	0.663	0.408
		logGDP	-4.958	(2.743)	-1.810	0.104	
		MINCER	19.807	(28.881)	0.690	0.510	0.425
		logGDP	-4.496	(1.775)	-2.530	0.032	

*SOURCE: Author's calculations from household surveys