

Child Labor: The Role of Financial Development and Income Variability across Countries

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This article studies the relationship between child labor and the development of credit markets at a cross-country level. In particular, we examine whether financial development in the period 1960–95 is associated with a reduction in child labor, and whether it is plausible to view this relationship as causal. This is an important question for a number of reasons. First, although child labor is widely viewed as a source of concern (and has been since at least the nineteenth century; see Basu [1999]), in the absence of perfectly functioning credit markets or without other market failures, it is not clear that child labor is an inefficient phenomenon. It could be the outcome of an optimal trade-off among the various uses of children's time. Second, it has been argued that the primary cause of child labor is poverty and, consequently, that economic growth will "automatically" eradicate child labor over time. However, to the extent that market failures are the actual cause of child labor, government intervention in the specific market where the inefficiency occurs is preferable (Grootaert and Kanbur 1995). Furthermore, since economic development is often a slow process, addressing issues of credit market imperfections provides an additional policy dimension in thinking about child labor.

There are several mechanisms through which the development of credit

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markets might affect child labor. At the household level, credit constraints can prevent households from optimally trading off a child's contribution to current household income against future returns from her schooling. In particular, households might resort to child labor to smooth transitory income shocks. Credit markets also potentially affect the demand for child labor through their impact on firms' development.

Even though credit markets are theoretically central to child labor, there has been little work done to assess their importance empirically (see Brown, Deardorff, and Stern 2001). In this article, we pursue a cross-country strategy.¹ We measure child labor as a country aggregate and use the extent of financial intermediation at the country level to measure the development of the credit market. We find that child labor is significantly and negatively associated with financial development. This result is robust to controlling for a range of potentially important covariates and is also robust in instrumental variables and fixed-effects specifications. The relationship between the variables is particularly sizable in the subset of low-income countries—countries that have less developed financial markets and a greater prevalence of child labor and, as such, are of greater policy interest. Finally, we identify a plausible channel through which financial development affects child labor, as we find that income variability has a large, positive impact on child labor in countries where financial markets are underdeveloped, while this is not the case where financial markets are developed. This is consistent with the hypothesis that credit markets allow households and firms to smooth shocks in the economy.

The empirical strategy that we pursue in this article has a number of strengths and some possible weaknesses. First, credit constraints at both the firm and household level typically are not directly observable. Although perhaps subject to measurement error (we address this issue below), the aggregate measure of credit that we use (credit directed to the private sector as a share of gross domestic product [GDP]) is a readily available, widely used proxy for the level of development of financial markets. Second, we are able to capture the total effect of credit markets on child labor through a range of channels, at both the household and the firm level, rather than through a single mechanism. While we view this as a strength, it must be acknowledged that this complicates the interpretation of our results: rather than corresponding with the effect of credit in a single model or decision, it captures an aggregate, reduced-form effect. Third, there is substantial variation in child labor and credit across and within countries over long time horizons. Microeconomic

¹ In a related, subsequent paper, we study the role of credit constraints as determinants of child labor using micropanel data for Tanzania; see Beegle, Dehejia, and Gatti (2003).

studies (using standard within-country short panels) would miss these sources of variation, whereas the evidence we present encompasses a relatively long time span (1960–95) and many countries. Ultimately, we view our work as being complementary to microeconometric studies examining the same question (several recent papers, following our own, include Beegle et al. [2003], Guarcello, Mealli, and Rosati [2003], and Edmonds [2004]).

The article is organized as follows: Section I reviews the relevant literature and provides a framework for thinking about the relationship between child labor and credit. Section II describes the data and presents our results. Section III examines their robustness. Section IV concludes.

I. Framework and Review of the Literature

There are several channels through which financial markets can affect child labor. In Section I, we sketch some of these mechanisms and briefly review the relevant literature.²

A. Household Access to Credit

The role of household access to credit in determining the extent of child labor has been addressed by a recent strand of the theoretical literature (Parsons and Goldin 1989; Ranjan 1999, 2001; Baland and Robinson 2000; Jafarey and Lahiri 2002; and Rosati and Tzannatos 2004). Analytically, this question is closely related to the literature on bequests within altruistic, unitary models of the family à la Becker (1974). This literature has highlighted the fact that the nonnegativity constraint in bequests can lead to an inefficient allocation of resources within the family (see, e.g., Becker and Murphy 1988). Similarly, borrowing constraints result in inefficiently high child labor.

The basic intuition is that child labor creates a trade-off between current and future income. Putting children to work raises current family income, but by interfering with children's human capital development, it reduces their future income. If parents cannot borrow to smooth income over time, they might choose to make their children work "too much," that is, at a level where the marginal return to time spent in school is higher than its marginal cost, as measured by an extra unit of child labor.

We can illustrate this point analytically following Baland and Robinson (2000). Consider a 2-period model where the parent and the child live contemporaneously. In each period the parent supplies labor inelastically, earning income A . In period 1, the parent decides how much to save for the following

² The literature on child labor is vast. See Basu (1999), Brown et al. (2001), Edmonds and Pavcnik (2004), and Orazem and Gunnarson (2004) for surveys of empirical and theoretical contributions.

period, s , and the extent to which his child will work, $l_c \in [0, 1]$. When working in period 1, the child earns l_c , which the parent can appropriate completely. In period 2, the child, now an adult, will supply one unit of labor, which will earn her an income of $b(1 - l_c)$, where b is the human capital accumulated in period 1; $b(\cdot)$ is decreasing in l_c and is strictly concave, with $b(0) = 1$.

We assume that the parent is altruistic. He cares about his own consumption in periods 1 and 2, c_p^1 and c_p^2 , respectively, and about the child's utility to the extent λ . Because of altruism, the parent might want to leave a bequest b to the child in period 2.

For simplicity, parental utility is additively separable, and there is no intertemporal discount. The child is selfish and cares only about her own consumption c_c (for further simplicity, the child only consumes in period 2).

The parent's utility function is

$$W_p = u(c_p^1) + u(c_p^2) + \lambda W_c(c_c),$$

where $W_c(c_c)$ is the child's utility function and $u(\cdot)$ and $W_c(\cdot)$ are concave and well-behaved functions.

The parent's budget constraints in periods 1 and 2 are

$$c_p^1 = A + l_c - s$$

and

$$c_p^2 = A - b + s.$$

The child's budget constraint is

$$c_c = b(1 - l_c) + b.$$

In order to illustrate how inefficiently high child labor might emerge if individuals cannot borrow, we focus on the case where $s \geq 0$.³ The first-order conditions are as follows: (1) with respect to b , $u'(c_p^2) = \lambda W'_c(c_c)$ if $b > 0$; (2) with respect to s , $u'(c_p^1) \geq u'(c_p^2)$ if $s \geq 0$; and (3) with respect to l_c , $u'(c_p^1) = \lambda W'_c(c_c)b'(1 - l_c)$. In this setup, the chosen level of child labor is efficient when the marginal return to time spent in school equals its marginal cost (the opportunity cost of child labor). Here the return to education is $b(1 - l_c)$, and the opportunity cost of child labor is l_c . Efficient child labor is therefore defined by $b'(1 - l_c) = 1$. Baland and Robinson (2000) show that if the borrowing constraint is binding ($s = 0$), the parent will choose to make his child work too much, to the point where $b'(1 - l_c) > 1$. Intuitively, if the parent cannot

³ For simplicity, we allow only transfers from the parent to the child and derive first-order conditions under the assumption that $b > 0$.

smooth consumption between periods 1 and 2 through borrowing, he will use child labor to increase consumption in period 1 at the expense of his child's human capital accumulation. This model suggests that the availability of credit should be a factor that predicts the incidence of child labor empirically. Moreover, finding evidence of such an effect will imply that the child labor we observe is in fact inefficiently high.

Finally, it is worth noting that access to credit (either formal or informal) also serves an insurance function (see Townsend 1994). In the absence of both formal insurance and credit, child labor could serve as a mechanism for smoothing consumption over short-run shocks.

B. Firms' Access to Credit

In addition to an impact on the household supply of child labor, credit markets can have an impact on the demand for child labor through firms. In particular, firms use access to credit to finance productive investments. The question of interest is whether firms that have access to credit use more or less child labor relative to agriculture and to those firms that do not have access to credit. Given that most child labor in developing countries (and historically in developed countries) is rural and that firms with access to credit markets are more likely to be urban, we expect that improving access to credit markets will reduce the demand for child labor. For example, Dehejia and Lleras-Muney (2003) argue that this was the case in the United States during the first half of the twentieth century.

C. Empirical Work

At the cross-country level, much work has gone into creating a uniform definition of child labor. Two significant efforts in this direction are work by Ashagrie (1993) and Grootaert and Kanbur (1995). These previous analyses are more concerned with measuring the extent of child labor than with estimating the effect of various country characteristics on the degree of child labor. More recently, there have been a number of studies examining the relationship between child labor and specific factors contributing to child labor. Krueger (1996) establishes a strong negative relationship between the prevalence of child labor and national income, a finding that is confirmed in our study. Cigno, Rosati, and Guarcello (2002) examine the relationship between globalization (trade) and child labor. Rogers and Swinnerton (2001) examine the relationship between income distribution and child labor, arguing that increasing the equality of the income distribution does not necessarily lead to a reduction in child labor.

At the level of microdata, a number of empirical studies examine the causes

of child labor. Grootaert and Kanbur (1995) and Grootaert and Patrinos (1999) review findings from Ivory Coast, Colombia, Bolivia, and the Philippines. Other authors have examined child labor in Ghana (Canagarajah and Coulombe 1997) and Vietnam (Edmonds and Pavcnik 2001). Child labor is typically associated with poverty, but there is evidence that certain forms of wealth are correlated with an increased within-household demand for child labor (Bhalotra and Heady 2004). Among other determinants of child labor at the individual level are the child's age and gender, education and employment of the parents, and rural versus urban location.

Three recent papers, Beegle et al. (2003), Guarcello et al. (2003), and Edmonds (2004), examine the link between credit constraints and child labor using microdata. All of these studies find evidence for the role of credit constraints. As suggested in the introduction, we view this article as being complementary to these other papers because we are able to examine between-country variation and to address issues (such as the development of financial markets) that are not easily captured at the disaggregated level but are relevant for child labor.

A related set of papers has indirectly examined the link between child labor and credit constraints. The literature on the causes of child labor has noted a link between household assets and child labor (see Grootaert and Patrinos 1999; Brown et al. 2001). To the extent that assets can serve as collateral for borrowing, this link suggests that access to credit may play a role. Of course, the evidence is indirect and might also be picking up wealth effects.

A number of papers also examine the link between credit and schooling choices. Jacoby and Skoufias (1997) examine the completeness of credit markets in a data set of six Indian villages. They find that households are not fully able to insure themselves against unanticipated idiosyncratic income shocks and, as a result, reduce their children's schooling. Jacoby (1994), using data from Peru, finds that children in households with lower levels of income and durable goods (and presumably with less access to credit) are more likely to repeat grades at school. Flug, Spilimbergo, and Wachtenheim (1999) examine the effect of financial development on schooling using cross-sectional country data and find a negative and significant effect. These papers are complementary to our study, because—as shown by Ravallion and Wodon (2000) with data from Bangladesh—schooling and child labor are not necessarily one-for-one substitutes.

II. Data, Specification, and Results

The availability of data on child labor (see below) allows us to build a panel for 172 countries for the years 1950, 1960, 1970, 1980, 1990, and 1995. We first estimate a parsimonious specification, controlling for some basic deter-

minants of child labor. We include our variable of interest (a measure of the availability of credit within a country) and then investigate whether credit markets are effective in dampening risk by adding a measure of income volatility. We perform a number of robustness checks, including estimating our specification without outliers; adding a number of controls that, if not accounted for, might generate an omitted variable problem; and using fixed-effects and instrumental variables specifications.⁴

A. Data Description

We measure the extent of child labor as the percentage of the population in the 10–14-year-old age range that is actively engaged in work. These data were compiled by the International Labour Organisation (ILO) and are available at 10-year intervals, beginning in 1950 for 172 countries. “Active population” includes people who worked (for wage or salary, in cash or in kind, as well as for family unpaid work) for at least 1 hour during the reference period (International Labour Organisation 1996). The structure of the data does not allow us to infer the intensity of child labor, so we cannot distinguish between light work (which some might argue is beneficial for adolescents) and full-time labor, which might seriously conflict with human capital accumulation. Moreover, like most official statistics on child labor, these data are likely to suffer from underreporting, because work by children is illegal or restricted by law in most countries, and children often are employed in agriculture or the informal sector. These problems notwithstanding, the ILO data have the advantage of being carefully adjusted on the basis of internationally accepted definitions, thereby allowing cross-country comparisons over time (Ashagrie 1993).⁵

As a measure of credit market development we use the ratio of private credit issued by deposit-money banks to GDP. This variable isolates credit issued to the private sector (as opposed to credit issued to governments and public enterprises) and captures the degree of activity of financial intermediaries that is most relevant to our investigation: the channeling of savings into lending (Beck, Demirguc-Kunt, and Levine 1999). The existing evidence suggests that our financial development variable is plausibly correlated with the (unobserv-

⁴ All of the regressions were also run on a sample excluding 1995, as some of the data for this year did not come from country surveys but were interpolated. Results are similar.

⁵ The ILO data are estimates of child labor based on country surveys, which are then adjusted by population estimates. To the extent that underreporting is a time-invariant country characteristic or an overall time trend across countries, our fixed-effects estimator will not be subject to this bias. However, within country, we expect financial development to be associated with better measurement of child labor. This would bias our results toward finding a positive effect of financial development on child labor.

TABLE 1
DATA DESCRIPTION

Variable	Observations	Mean	SD	Minimum	Maximum
Child labor ^a	860	.15	.17	0	.79
Credit ^b	482	.28	.25	.00029	1.67
Standard deviation of income growth	631	.04	.04	.00059	.79
Log real GDP per capita	705	7.76	1.06	5.41	10.58
Percent rural population	857	.54	.24	0	.98
Percent agriculture	599	.22	.16	.001	.75
Exports as a share of GDP	630	.32	.24	.02	2.15

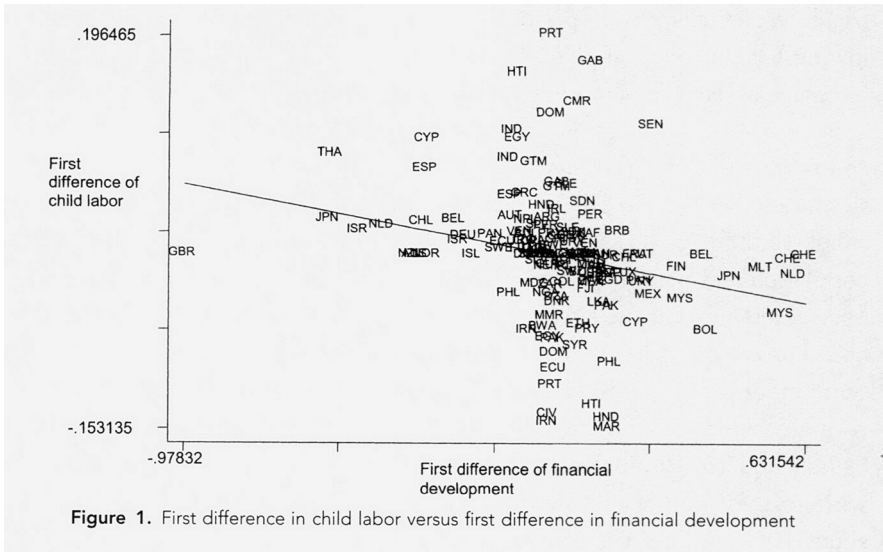
Note. GDP = gross domestic product.
^a Child labor is measured by the International Labour Organisation as the percentage of the population in the 10–14-year-old age range that is actively engaged in work.
^b Credit is measured as the ratio of private credit issued by deposit-money banks to GDP.

able) share of households and firms that are actually credit constrained within a country. For example, using data on nearly 3,000 small- and medium-sized firms and 48 countries from the World Business Environment Survey data set, Beck, Demirguc-Kunt, and Maksimov (2002) show that financial development is negatively and significantly correlated with the extent to which enterprise managers perceive financing to be an obstacle for their business (a correlation of -0.20 , significant at the 1% level).⁶ It is plausible that small- and medium-size enterprises face financing problems similar to those of households. Moreover, financial development is negatively correlated with the spread between lending and deposit rates, which is often interpreted as a measure of the cost of intermediation to households and firms (in our sample, the correlation is -0.24 , significant at the 5% level).

To measure economic volatility we follow Flug et al. (1999) and construct the standard deviation of annual per capita income growth rates in the previous 5 (and 10) years. We expect that more children enter the labor force when economic volatility is high, all the more so if financial institutions are underdeveloped and credit cannot be used to smooth consumption over time.

The various specifications account for a number of other controls, including linear and squared log GDP per capita, percentage of rural population, continent dummies, and share of exports of GDP. All of these variables have been widely used in cross-country empirical work. The appendix describes the variables in detail. Table 1 reports sample averages for the main variables. The mean level of child labor is 0.15, although it ranges from a low of zero to a maximum of 0.79. Figure 1 plots child labor and credit in first differences.

⁶ For more details, see Beck et al. (2002).



B. Base Specification

The empirical literature uniformly indicates that income is an important predictor of child labor (in general, children of poorer families are more likely to work; see, however, evidence to the contrary in Bhalotra and Heady [2004]). It seems reasonable to expect income to be an important determinant of child labor at the aggregate level as well. To control for this effect, we include in our specification (the log of) per capita income and allow for linear and quadratic terms.

Child labor is highly correlated over time. The correlation between child labor in 1950 and child labor in 1980 is close to 0.9. Consequently, it is important to control for initial conditions, and we include the level of child labor in 1950 in our specification.⁷ In some sense, including child labor in 1950 amounts to controlling for a country-specific effect and, to some extent, addresses the spurious cross-sectional correlation that is often problematic in cross-country regressions. (In Sec. III, we address this issue more directly, by allowing for country fixed effects.) We also include in the equation the percentage of rural population to control for the fact that in developing (and also historically in developed) countries child labor is strongly associated with the rural economy. Similarly, we include the share of agriculture in GDP to account for the structure of production across countries. Finally, we account for a time

⁷ We treat the initial level of child labor as a nonstochastic starting value. Although this is a strong assumption, as a robustness check we estimate a (nondynamic) model with country fixed effects.

trend. We estimate this specification using ordinary least squares (OLS), allowing for clustering at the country level.

Financial development enters with the expected sign (negative—as the aggregate availability of credit increases, the prevalence of child labor decreases) and is statistically significant (table 2, col. 1). Both income terms are highly significant, with child labor reaching a minimum at a per capita income of about \$4,000. As anticipated, initial child labor is highly significant. Rural population and percentage of agricultural production are overall insignificant.

As a test of robustness we exclude outliers from the regressions. With 387 observations and 130 countries, extreme observations in principle might be quite influential. We use Hadi's (1992) selection criterion for outliers in multivariate regressions.⁸ In this context, four countries (Myanmar, Hong Kong, Switzerland, and Zaire) are identified as outliers. We rerun the OLS specification without these outliers. The magnitude of the coefficient of credit increases by about 10%, and the significance is unaltered.

Our results confirm that financial development is significantly associated with child labor. However, there are several pathways through which this effect could operate, none of which are captured explicitly by our reduced-form specification. In table 2, columns 3–5, we explore one possible mechanism: smoothing income shocks. As outlined in Section I, families might resort to sending their children to work to cope with negative income shocks. If credit is widely available, households instead can borrow to smooth income variability and may not need to disrupt their children's education (or leisure time). When we introduce our measure of income volatility (the standard deviation of annual GDP growth in the previous 5 years) into the specification, we find that the estimated coefficient is large and highly significant.⁹ In principle, though, the variability of income should affect child labor mostly in those countries where credit is not accessible. To investigate this possible effect, we split the sample into high- and low-credit groups, using the mean of credit in the sample as the cutoff. In table 2, column 4, we see that for the low-credit group, income variability enters the specification significantly, and the magnitude of the coefficient is substantial. For the high-credit group (table 2, col. 5), instead,

⁸ Hadi's (1992) technique is particularly useful to identify outliers in a multivariate regression setting and is based on a procedure that recursively defines distance of an observation from a cluster of observations in the model.

⁹ Results are virtually the same when we instead use the standard deviation of annual GDP growth in the previous 10 years.

TABLE 2
OLS ROBUSTNESS CHECKS

Sample	Full Sample (1)	Excluding Outliers (2)	Excluding Outliers (3)	Low Credit (4)	High Credit (5)	Low Income (6)	High Income (7)	Low Income (8)	Low Income (9)
Credit	-.0360* (.0208)	-.0398* (.0216)	-.0353* (.0220)			-.1586** (.0608)	-.0286** (.0134)	-.1284** (.0600)	-.1289** (.0616)
Standard deviation of growth			.1845** (.0790)	.2043** (.0854)	.1508 (.1328)				
Log real GDP per capita	-.3670*** (.0620)	-.4192*** (.0538)	-.3669*** (.0607)	-.2419*** (.0681)	-.7601*** (.2012)	-.0681 (.2232)	-.5453*** (.1755)	-.1727 (.2378)	-.1689 (.2340)
Log real GDP per capita ²	.0220*** (.0038)	.0251*** (.0034)	.0222*** (.0038)	.0147*** (.0045)	.0434*** (.0114)	.0025 (.0165)	.0313*** (.0101)	.0119 (.0178)	.0118 (.0175)
Rural population	.0182 (.0229)	.0165 (.0229)	.0236 (.0230)	.0475 (.0307)	.0475 (.0344)	.0447 (.0507)	-.0110 (.0232)	.0815 (.0580)	.0822 (.0589)
Child labor in 1950	.6343*** (.0438)	.6239*** (.0437)	.6460*** (.0467)	.7294*** (.0373)	.2896*** (.0866)	.7661*** (.0481)	.4386*** (.0862)	.7262*** (.0517)	.7176*** (.0564)
Percentage agriculture	.0675* (.0348)	.0575 (.0356)	.0577 (.0374)	.0294 (.0402)	.0147 (.1287)	.0243 (.0397)	.1196 (.0781)	.0679 (.0416)	.0554 (.0410)
Exports as a share of GDP									-.04 (.04)
Regional dummies								Yes	Yes
Observations	387	384	375	259	116	189	198	189	187
R ²	.91	.91	.91	.92	.80	.88	.68	.90	.90

Note. OLS = ordinary least squares; GDP = gross domestic product. The dependent variable is child labor. All specifications include year controls. Standard errors are in parentheses. Standard errors are corrected for heteroscedasticity and clustering within countries.

* Significant at the 10% level. A time trend is included but not reported.

** Significant at the 5% level. A time trend is included but not reported.

*** Significant at the 1% level. A time trend is included but not reported.

the effect of income volatility on child labor is not significantly different from zero.¹⁰

The magnitude of the estimated coefficient of credit in the full sample is small when compared, for example, with the effect of GDP per capita. For the OLS estimates, a one-standard-deviation increase in access to credit is associated with a 6% decrease in child labor relative to the mean. By contrast, the magnitude of the effect of GDP per capita is much larger. If a country were to move from the 5th to the 10th percentile of GDP per capita in 1995 (i.e., from \$504 to \$618), child labor would decrease by about 2 percentage points, compared with a base prevalence of child labor of 38% for that level of income. By contrast, moving between the same percentiles of access to credit would be associated with a 0.1 percentage point decrease in child labor. However, as we will see below, the magnitude of the effect is much larger for the subsample of low-income countries. It is also plausibly easier to increase household access to credit than to induce general economic development, so it might be reasonable to consider larger increases in the level of access to credit.¹¹ For example, a move from the 25th to the 75th percentile of access to credit is associated with a one percentage point, or 7%, decrease in child labor.

Table 2, columns 6 and 7, present our results for the subsamples of rich and poor countries (where we split the data by mean GDP per capita).¹² This is a natural dimension along which to search for heterogeneity in the effect of credit. We expect the effect to be greater for poorer countries, where improvements in access to credit presumably extend the basic infrastructure of financial markets. Instead, the effect of access to credit in richer countries is higher order and less likely to affect child-labor decisions. Our results are consistent with this argument. The effect of credit is significant in both subsamples but is four times larger among low-income countries than our estimate for the full sample. A move from the 25th to the 75th percentile of credit is associated with a 5 percentage point decrease in child labor, or a 17% reduction in child labor among low-income countries. In our subsequent tables and discussion, we focus on low-income countries, since these are the countries of greatest policy interest.

In table 2, columns 8 and 9, we introduce additional controls. We first add

¹⁰ Note that this difference is statistically significant in a model where the standard deviation of growth is interacted with credit. When we instrument for both credit and the interaction, the signs of the coefficients are similar, but the estimates are less precise.

¹¹ More precisely, although it is also difficult to increase the level of financial development of a country, it is presumably easier to increase household access to credit, which is the underlying variable of interest, e.g., by targeting credit to poorer households with children.

¹² The cutoff is log per capita GDP of 7.75 or \$2,321.

continent dummies. These are important because cross-continent comparisons could be misleading if, for example, high child-labor and low-credit countries are solely concentrated in Africa. On a purely econometric basis, these controls also have the virtue of being unimpeachably exogenous to our specification. Our coefficient of interest declines slightly (from -0.15 to -0.13) but remains statistically significant. We then include the share of exports in GDP. Exports could both spur financial development and lead to a reduction in child labor. The coefficient of interest remains unchanged.

III. Robustness Checks

So far we have documented an association, rather than a causal relationship, between credit and child labor. Whether this association is causal depends on the extent to which we believe our specification to be free of omitted variable and simultaneity bias.

In order to bridge the gap between these two concepts, we must address several confounding factors. First, there could be time-invariant unobservable country characteristics. Second, there could be time-varying country unobservables. We address each of these in turn.

A. Selection on Time-Invariant Unobservables

Notwithstanding the controls that we have included in the specification, there may still be inherently unobservable institutional differences among the countries we examine. Some countries may have better institutions, and these could simultaneously lead to a reduction in child labor and encourage the development of credit markets. We explore this issue in columns 1 and 2 of table 3 by estimating the specification with fixed effects. In table 3, column 1, we present the base specification, and in column 2 we add an additional control (export share of GDP).¹³ In column 1, the effect is about half the size of the OLS estimates in table 2 but is still statistically significant at the 10% level. If we are willing to view this effect as causal, the estimated coefficient implies that a movement from the 25th to the 75th percentile of credit would lead to a 7% reduction in child labor. The coefficient remains essentially unchanged in table 3, column 2, with the additional control.

B. Instrumental Variables

There are a number remaining concerns with our results. It is possible that time-varying omitted variables at the country level could confound our results.

¹³ Of our other time-varying controls, continent dummies are subsumed by country dummies, and there is insufficient within-country variation in the ratification of the ILO convention.

TABLE 3
FIXED-EFFECTS AND INSTRUMENTAL VARIABLES, LOW-INCOME COUNTRIES

Specification	Fixed Effects (1)	Fixed Effects (2)	Instrumental Variables ^a (3)	Instrumental Variables ^a (4)
Credit	-.0591* (.0314)	-.0559* (.0311)	-.8360* (.4688)	-.7128* (.4051)
Log real GDP per capita	.0656 (.1167)	.0397 (.1185)	-.2129 (.4141)	-.28 (.38)
Log real GDP per capita ²	-.0059 (.0086)	-.0040 (.0088)	.0189 (.0285)	.0230 (.0263)
Percent rural population	.13** (.06)	.12** (.06)	.08 (.09)	.07 (.08)
Percent agriculture	-.04 (.03)	-.05 (.03)	-.13 (.09)	-.08 (.08)
Export share of GDP		-.04 (.03)		.06 (.04)
Country fixed effects	Yes	Yes		
Observations	189	187	119	117
No. of countries	71			
R ²	.78
OIR test (P-value)		.76	.92	.88

Note. GDP = gross domestic product; OIR = overidentifying restrictions. The dependent variable is child labor. All specifications include a time trend. Standard errors are in parentheses. The overidentifying restrictions test cannot reject the validity of the instruments at standard levels. A Hausman test does not reject the null of no endogeneity in the credit variable. Standard errors are corrected for heteroscedasticity and clustering within countries.

^a Instruments are origin of the legal system (La Porta et al. 1998) and mortality among colonial settlers (Acemoglu, Johnson, and Robinson 2001).

* Significant at the 10% level.

** Significant at the 5% level.

At the same time, there could be measurement error in our credit variable. We address both problems by using a set of instrumental variables for credit market institutions.

As instruments for financial development we use the rate of mortality among colonial settlers and the origin of legal systems. These variables have been extensively employed in the literature as instruments for institutional development (see, e.g., Levine, Loyaza, and Beck 2000). Acemoglu et al. (2001) suggest that colonization strategies and the quality of institutions in colonial territories were determined by the disease environment found by initial settlers. In particular, colonizers tended to create “settlers colonies” in countries where the conditions were more suitable for their survival (e.g., in the United States, Australia, and New Zealand), while they created “extractive states” in places where they faced high mortality rates (e.g., Congo or Ivory Coast). Beck, Demirguc-Kunt, and Levine (2003b) argue that this theory is directly applicable to the development of financial markets. In extractive states, colonizers were more likely to oppose the development of financial markets because competitive financial markets might threaten the acquired rights of the “ex-

tractors." Conversely, it was in the interest of settlers that free and competitive financial markets developed.

For the purpose of our analysis, we should note that the effect of mortality rates among European settlers (a proxy for the type of environment faced by colonizers) is an exogenous variable (because of the distribution of disease). More important, it is an excluded variable—since settler death is measured between the seventeenth and nineteenth centuries, it would influence contemporary outcomes primarily through the persistence of institutions.

La Porta et al. (1998) document that the origin of a country's legal system is associated with a number of country-specific institutional settings, such as investors' rights and corruption. A priori, legal origin can affect financial development through two main mechanisms: the "political" channel and the "adaptability" channel (see Beck, Demirguc-Kunt, and Levine 2003a). In particular, common code systems appear to give more priority to individual property rights vis-à-vis the state than civil code systems. Moreover, relatively more flexible systems (such as the common code or the German civil law), it is argued, can better suit a constantly evolving commercial environment than rigid legal systems and can foster financial development as a result.

Because all of the instruments relate to structural aspects of a country's institutional development, they are likely to be exogenous with respect to child labor choices. Moreover, the presence of multiple instruments allows us to test their validity, and we find that the test of overidentifying restrictions cannot reject the null hypothesis that the instruments are valid.

Our results are presented in table 3, columns 3 and 4. We see that the effect of credit remains negative and statistically significant at the 5% level. At the same time, the magnitude of the effect increases considerably as compared with the OLS estimates. A movement from the 25th to the 75th percentile of credit in this sample now leads to a 10-percentage-point reduction in the level of child labor. There could be several reasons why the coefficients are substantially larger than the OLS estimates. First, the sample of countries for which we observe our instruments is smaller than the low-income sample. Second, and more fundamentally, as noted by Angrist, Imbens, and Rubin (2000), the effect we are identifying is the local average treatment effect rather than the average treatment effect. In our case, this implies that we are identifying the effect of credit on child labor for exactly those countries for which our instruments induce better financial market institutions. Third, to the extent that our instrumental variables results correct for measurement error, these estimates could be correcting a downward bias in the OLS results.¹⁴

¹⁴ It is worth noting that, despite the magnitude of the difference between the OLS and instrumental variables, a Hausman test cannot reject that the credit variable is exogenous.

IV. Conclusion

In this article we have investigated the relationship between child labor and financial development across countries. Our empirical results confirm the existence of a significant association between child labor and private credit as a share of GDP. This relationship is particularly large, robust, and significant in the sample of poor countries, which have both less-developed financial markets and more child labor and, as such, are of greater policy interest. A priori, there are many channels through which financial development might affect child labor. We find that strong financial markets dampen the impact of income variability on child labor, which would otherwise be sizable. This is consistent with the notions that families actively resort to child labor to cope with income variability and that widening households' access to credit could be effective in reducing the extent of child labor.

As with most work using cross-country data, caution must be exercised in interpreting the estimated coefficients causally. There are many potential sources of spurious correlation and selection. We subject our results to a wide array of robustness checks, including adding a range of controls and using fixed-effects and instrumental variables specifications. The relationship remains strong under all of these alternatives. Thus, we tentatively conclude that we are indeed measuring the causal effect of financial development on child labor.

These results are important for two reasons. First, they underline the significant role that credit markets play in determining the prevalence of child labor. Although a large literature has emphasized the relationship between financial development and growth (King and Levine 1993; Rajan and Zingales 1998), the impact of financial development on outcomes of concern for social policy has not previously been explored. Second, to the extent that household credit constraints are a mechanism through which financial development affects child labor, our results lend support to an important strand of the theoretical literature and open an important policy window on alleviating the problem of child labor. In particular, our findings suggest that increasing access to credit could be a useful tool in reducing the extent of child labor. Such a policy has distinct advantages over other remedies. Compared with legal restrictions and direct bans, it can decrease child labor without lowering household welfare, and it is arguably a simpler goal than general economic development and can have a more immediate impact.

Appendix

Data Description and Sources

CHILDLABOR	The share of the active population between ages 10 and 14 over the total population between ages 10 and 14. The active population includes people who, during the reference period, performed “some work” for wage or salary, in cash or in kind. The notion of “some work” is interpreted as work for at least 1 hour during the reference period. Source: International Labour Organisation (1996).
CREDIT	Ratio of private credit by deposit money banks to GDP. Source: Beck et al. (1999).
Ln(GDPPC)	The natural logarithm of real GDP per capita in constant dollars, chain index, expressed in international prices, base 1985. Source: Summers-Heston (1991).
RURAL	The rural population, as a percentage of the total population. Source: World Development Indicators, World Bank (2001).
AGRICULTURE	The share of agriculture in GDP. Source: World Development Indicators, World Bank (2001).
SDGROW5	The standard deviation of per capita GDP growth over the previous 5 years.
EXP	The share of exports on GDP. Source: World Development Indicators, World Bank (2001).
LEGAL ORIGIN	The origin of a country’s legal system. These dummies classify the legal origin of the company law, or of commercial code of each country. The identified origins are five: (1) English common law, (2) French commercial code, (3) German commercial code, (4) Scandinavian commercial code, and (5) socialist-communist laws. Source: La Porta et al. (1998), extended from Central Intelligence Agency (1995–96) and Reynolds and Flores (2004).
MORTALITY	The mortality rate among European settlers in the colonies between the seventeenth and the nineteenth century. Source: Acemoglu et al. (2001).

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