Targeting Child Labor in Debt Bondage: Evidence, Theory and Policy Implications*

Arnab K. Basu†

and

Nancy H. Chau‡

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**Abstract:** Despite recent multilateral efforts to single out child labor in debt bondage as one of the “Worst Forms of Child Labor”, yet to be addressed are a number of important questions: How pervasive is the phenomenon? Are there systematic correlations between the incidence of children in debt bondage and the economic, legislative and financial development indicators of the economy? How do national and international policy measures aimed at targeting this form of child labor fare once the phenomenon of debt bondage is understood in the context of these economic, legislative and financial correlates? This paper addresses each of these questions. The empirical findings suggest strong correlation between the likelihood of the incidence of bonded child labor with the stage of development of an economy; the stage of financial development; and the enforcement of core labor rights. Building on these evidence, this paper presents a theoretical model that highlights the relative drawbacks and merits of a number of policies aimed at putting checks on child labor in debt bondage in both a static and a dynamic context.

**JEL Classification:** F16, J43, O12, O16.

**Keywords:** Credit-Labor Interlinked Markets, Bonded Child Labor, Transfers and Consumption Smoothing.

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†Department of Economics, College of William and Mary, Williamsburg VA 23187. Ph: (757) 221-1318; E-mail: akbasu@wm.edu

‡Department of Applied Economics and Management, Cornell University, Ithaca NY 14853. Ph: (607) 255-4463; E-mail: hyc3@cornell.edu
1 Introduction

The call for an abolition of child labor in debt bondage has been longstanding. As early as 1956, the United Nation Supplementary Convention on the Abolition of Slavery outlaws the institution of debt bondage.\(^1\) More recently in 1999, the adoption of, and the popular international support received by the ILO Convention concerning the “Worst Forms of Child Labor”, aroused renewed interests in coordinating international actions to address the plight of children who are put to work in the face of outstanding debts.

In response, a number of international policy actions have been put in place to liberate children and poor households from debt bondage. These include law enforcement efforts such as the training of labor inspectors to enforce child labor laws (ILO-IPEC 1997); direct actions that assist and provide funding for governments and local NGOs to liberate children from debt bondage and to provide education, small business loans and other forms of assistance (InFocus Programme 2002).\(^2\) Also currently in effect are a number of extra-national initiatives that condition international trade benefits based on the extent of child labor and bonded labor practices.\(^3\)

Despite all of these developments, reliable information on the incidence of children in debt bondage, along with its possible economic, legislative and structural correlates on a cross-national basis are, to date, open questions. The first objective of this paper is accordingly to provide a first and preliminary examination of the available evidence. In particular, how pervasive is the phenomenon of child labor in debt bondage? Are there systematic correlations between the incidence of children in debt bondage and economic, legislative and financial development indicators? Perhaps more importantly, how do national and international policy measures aimed at targeting this form of child labor fare

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\(^1\) The 1956 Convention defines debt bondage as “the status or condition arising from a pledge by a debtor of his personal services or of those of a person under his control as security for a debt, if the value of those services as reasonably assessed is not applied towards the liquidation of the debt or the length and nature of those services are not respectively limited and defined”.

\(^2\) In November 2000, a US$3.5 million program was launched by the ILO to achieve the sustainable liberation of an estimated 75,000 men, women and children in Nepal from bonded labor through education.

\(^3\) See Office of the United States Trade Representative 1997 for a listing of General System of Preference suspensions, partial suspensions and reviews, and Brenton (2000) for the GSP conditionality of the European Union.
once the phenomenon is understood in the context of these economic, legislative and financial indicators?\footnote{For studies of interlinked credit-labor arrangements, see Braverman and Stiglitz (1982), Bardhan (1984), Basu, K. (1987), Braverman and Srinivasan (1982), Sadoulet (1992) and Genicot (2002). These studies highlight the efficiency implications of such arrangements, such as when alternative sources of credits or insurance other than the landlord are not available, or when the need to repay outstanding debt elicits incentive to work that are otherwise absent. None of these studies, however, address the dynamics of child labor and the welfare implications of bondage.}

To this end, we begin with an examination of the available cross-national evidence on the incidence of child labor in debt bondage. An index of the incidence of child labor in debt bondage is constructed for 134 countries. Additionally, the data cover three other sets of information: respect for core labor rights, financial development and credit market imperfection indicators; macro-economic variables and country fixed factors. Our findings suggest systematic correlation between the likelihood of the incidence of child labor in debt bondage with the stage of development of an economy; the stage of financial development; and the enforcement of core labor rights. In addition, child labor in debt bondage is found to be prevalent particularly in countries where agriculture is the mainstay economic activity, and where other core labor rights such as freedom of association, and the right to organize are not respected and effectively enforced.

Somewhat surprisingly, we find that in developed and developing countries alike, child labor work in agriculture are frequently exempt from national minimum age legislations. Indeed, we find little cross-national evidence which suggest that the incidence of child labor in debt bondage is significantly correlated with the application of minimum age legislation to employment in agriculture. Finally, four financial development indicators are examined to trace out possible linkages between the ease of access to credit, and child labor arising out of debt bondage. These indicators include the interest rate gap, the share of private credit to GDP, the Heritage index of banking and finance, and an estimated country-specific coefficient of consumption smoothing. While these are at best imperfect proxies for the degree of access to consumption smoothing by agrarian households, countries with positive incidence of child labor in debt bondage nevertheless appear to have, on average, lower levels of financial sector development.

These findings accordingly form the building blocks of the theoretical model set
out in this paper. The basic setup singles out as root causes of bonded child labor both poverty,\(^5\) as well as the absence of a reliable and legal system through which the poor can secure loans to safeguard against hunger or unexpected consumption needs. In this context, bonded child labor grows out of an institutional arrangement wherein labor and credit contracts are \textit{interlinked}, and outstanding household debts are paid at least in part via labor services provided by children.

The basic framework extends Basu, A. and Chau (2002), and highlights the principal-agent problem confronting landlords-cum-moneylenders and agrarian households. In addition, household demand for consumption loans to finance subsistence consumption is endogenized in the context of an overlapping generations framework. In particular, the basic setup takes into account the dynamic consequences of bondage in a context where individual generations in the agrarian economy are linked via intergenerational transfers (Becker (1981), Galor and Zeira (1993)). These transfers serve two interrelated purposes: (i) as a means for altruistic parents to enhance the welfare of the next generation and relatedly, (ii) as a means to smooth consumption for the next generation during periods of low income.

The findings illustrate how agrarian households respond to the need to service outstanding debts and to finance subsistence consumption by putting children to work. In addition, the need to service debts also gives rise to intergenerational spillovers through the amount of transfers available from one generation to the next. Indeed, debt bondage in one generation sets off a sequence of increasing indebtedness that affects the welfare, and the ability to break free from debt bondage for all subsequent generations. Child labor in this context is thus endemic across generations, and can be shown to prevail as a steady state phenomenon, so long as the degree of credit market imperfection is sufficiently acute.\(^6\)


\(^6\)Grote, Basu, A. and Weinhold (1999) and Baland and Robinson (2000) study the welfare consequences of child labor in a context of credit market imperfection which puts limits on education undertakings. The appeal of removing child labor away from the work force thus lies in overcoming the undersupply of educated laborers. While we also take credit market imperfection as a starting point, we find that rational anticipation on the part of landlords that child labor supply will rise with interlinkage turns out to be sufficient for debt bondage to have perverse welfare implications for peasant households.
In this context, we consider four classes of policy actions to eliminate the employment of children arising out of debt bondage. These include: (i) strengthening enforcement efforts of minimum age laws, (ii) direct actions to remove children and agrarian households from bondage through transfers, (iii) providing alternative sources of credit and finally, (iv) providing alternative sources of employment during periods of low income. In each of these cases, we find that joint consideration of the principal-agent interaction between landlords and households, along with policy induced intergenerational spillovers in terms of the demand for consumption loans, bear important implications on the effectiveness of child labor policies. In particular, enhancing minimum age law enforcement effort has a direct and negative impact on the demand for child labor. However, as long as the reduction in derived demand for child labor translates to a corresponding reduction in household disposable income, the net impact of enforcement efforts can in fact be an increase in the demand for consumption loans during periods of low household income. Indeed, the implicit interest rate that the landlord can extract through debt bondage can increase, and indebted households respond by once again putting children to work.

The second policy measure addresses the supply side of the market for bonded child labor. The analysis spells out how the availability of outside options, and the well-being of households that choose to remain free from debt bondage, constitute the key determinants of the equilibrium terms of the credit-labor service contract between landlords and households. In particular, we show that any direct transfers that target only households in bondage, but leaves the welfare of other households who remain free unaltered, have at best a temporary impact on the equilibrium incidence of child labor in bondage. In fact, once landlords and households fully anticipate, and accordingly incorporate the possibility of direct transfers into the terms of the interlinked contract, not only will equilibrium child labor incidence remain unaffected, landlords are the sole beneficiaries of any direct transfer that are intended for the indebted households.

The next two policies accordingly proceed to evaluate any potential difficulties that may hamper the effectiveness of providing outside options to agrarian households. These include the provision of alternative source of credits, and the provision of employment
options during periods of poor labor market outcomes. The latter of these two options has the added virtue that it does not stand in direct competition with landlords in either the labor or the credit market. Indeed, once the basic model is extended to illustrate the possibility of default on loans, it can be shown that circumstances exist where landlords always out-compete independent credit agencies in providing consumption loans in agrarian economies that are sufficiently poor.

Thus, while our main findings are consistent with the emphasis put forward by recent international efforts aimed at combating debt bondage, the policy implication of the same setup also cautions against wholesale implementation of policy measures without due consideration of the specific features of bondage. The rest of this paper is organized as follows. Section 2 presents the data, and provides an account of the economic, legislative, and financial development characteristics of countries in which bonded child laborers prevail. Section 3 presents the basic theoretical model. Section 4 turns to an examination of the policy implications of the theoretical setup. Section 5 concludes.

2 Cross-National Evidence on Debt Bondage

Incidence of Child Labor in Debt Bondage

With very few exceptions,\(^7\) precise cross-national estimates of the incidence of child labor in debt bondage do not exist. Our approach to construct an admittedly crude measure of the incidence of child labor in debt bondage involves an indicator variable “bondchild”, where “bondchild” = 1 whenever incidence(s) of child labor in debt bondage have been reported, and “bondchild” = 0 otherwise. The information on which this indicator is based is taken from entries in the Human Rights Report (U.S. Department of State 1999) on each of the 134 countries. Table 1 summarizes the relevant statements in the Human Rights Report pertaining to Bulgaria, India, Iraq and the United States, and the corresponding values of “bondchild” assigned to each of these four countries.\(^8\) One potential

\(^7\)These include Nepal, India and Pakistan where some information on the extent of child labor in debt bondage is available from government / NGO estimates. In bears emphasis that data from difference sources tend to differ by wide margins. See, for example, Basu, A. and Chau (2002) an account of available survey evidence on all three countries.

\(^8\)We do not use observations of bonded child labor that involves the smuggling of children from another country to focus on the source country of debt bondage. The case of the United States is a case
drawback of relying solely on descriptive reports, however, is that data on the incidence of debt bondage in developed countries are frequently missing. We address this potential sample bias by appending the data with observations of $bondchild = 0$ whenever the incidence of child labor (between the ages of 10 to 14) is reported as zero in World Bank (2001).

Table 1

<table>
<thead>
<tr>
<th>Country</th>
<th>Human Rights Report Entry</th>
<th>“bondchild”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>“Cases of forced or bonded labour have not been reported”</td>
<td>0</td>
</tr>
<tr>
<td>India</td>
<td>“An estimated 15 million children are working under bondage”</td>
<td>1</td>
</tr>
<tr>
<td>Iraq</td>
<td>“No information about forced child labour is available”</td>
<td>–</td>
</tr>
<tr>
<td>U.S.</td>
<td>“Alien smuggling organisations use Suriname as an intermediate destination to smuggle Chinese nationals, including women and girls, to the United States, where frequently they are forced into bonded labour situations”</td>
<td>0</td>
</tr>
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</table>

Observance of Core Labor Rights

To address the question of whether a country adequately observes core labor rights, we take into account three distinct indicators. The first is a legislative measure which deals with national legislations regarding the treatment of child labor in agriculture (ILO, 2001). In particular, an indicator variable (“legexag”) is constructed for each country, where “legexag” is assigned a value of 1 whenever child labor work in agriculture is exempt from national minimum age legislations as reported in ILO (2001). The second is an enforcement measure which deals with the enforcement of core labor rights, and adopts the four-point score in OECD (2000). The variable “enforce” is equal to 4 if the enforcement of freedom of association and rights to organize is deemed adequate. Countries in which severe violations have been reported have the lowest score, with “enforce” = 1. The final indicator is an outcome measure which gives the share of economically active children between the ages of 10 to 14 (World Bank 2001).

9The question of how the enforcement of core labor rights should be measured remains a largely open question. See, for example, Chau and Kanbur (2001).
Stage of Financial Development and Credit Market Imperfection

In the context of debt bondage in rural agriculture, an indicator of credit market imperfection should ideally capture the ease of access to consumption smoothing loans for poor agrarian households. However, in the absence of an obvious candidate that measures the size and scope of informal credit markets, the following indicators are derived and / or taken from various sources:

- “intspread” denotes the average interest rate gap “intspread” and captures the the gap between official lending interest rate and the deposit rate (1994-1998) (World Bank, 2001)

- “priv” denotes the share of private credit (by deposit money banks and other financial institutions) to GDP (Beck, Demirguc-Kunt and Levine, 1999)

- “bankfin” is taken from the Heritage index of banking and finance (1995-1999 average) – a five-point score indicating decreasing degrees of freedom for private sector to access banking and financial services.

A fourth indicator attempts to measure the development of insurance markets by estimating the extent to which variability in gross domestic product per capita ($\Delta \log y_{it}$) translates to the variability of household consumption per capita ($\Delta \log c_{it}$) (1970 - 1998, constant 1995 prices). Data on gross domestic product and household consumption per capita are taken from World Bank (2001). For each country $i$, the variable “riskshare” is taken to be the estimated least squares regression coefficient $\beta_i$ of the following regression equation:

$$\Delta \log c_{it} = \alpha_i + \beta_i \Delta \log y_{it} + \epsilon_{it}.$$

When $\beta_i$ takes on a value of 0, household consumption is fully insured from per capita income shocks in country $i$. Meanwhile, if $\beta_i = 1$, there is perfect pass through of income variability to household consumption variability.

The Findings

Table 2 presents summary statistics of the basic macro-economic characteristics and regional distribution respectively of countries with and without reported incidence of children in debt bondage. The prevalence of children in debt bondage is reported in 43 of the 134 countries for which data on debt bondage is available. As may be expected,
child labor in debt bondage is a developing country phenomenon, although the converse is not true. Approximately 60 percent of countries free from observed incidence of debt bondage are in fact low and middle income countries (World Bank 2001). In addition, debt bondage ceases to prevail in countries with mean GDP per capita (1994-98) greater than about $4,489 (Figure 1). This is akin to the findings established in Krueger (1997), wherein a threshold income level similarly exists that divides countries with and without reported incidence of child labor. Table 2 also shows that countries where debt bondage prevails exhibit weaker trade links both with the rest of the world, and with OECD countries.

Table 3 presents information on the relative dependence on agriculture of the two groups of countries. Over 40 percent of countries with reported incidence of children in debt bondage are exporters of non-fuel primary products, with agricultural exports contributing to more than 50 percent of total export revenue. In contrast, a core group of countries where debt bondage is non-existent are exporters of manufacturing products. Despite these observed differences in the patterns of trade in agricultural and manufacturing products, the value added of agricultural workers is significantly higher in countries where debt bondage does not exist.

In terms of the adoption of core labor standards in the two groups of countries, the average percentage of economically actively children (10 - 14 of age) is about 23 times higher in countries where children in debt bondage is reported (Table 4, Figure 2). This is despite the fact almost all of the countries included in the dataset have adopted international conventions / national legislation on minimum age in one form or another. Respect for the rights for workers to negotiate wages and form unions are much more popularly observed in countries in which children in debt bondage are not at issue (Figure 3). What may be somewhat surprising, however, is that legislative exceptions for child labor work in agriculture is in fact a common phenomenon regardless of whether debt bondage is reported or not (Figure 4).

Turning now to financial market development in Table 5, it appears that countries with bonded child labor have on average a larger interest rate gap, a lower GDP share of private credit issued by deposit money banks and other financial institutions, and a
lower degree of freedom of private access to credit markets according to the Heritage index of banking and finance. In addition, countries where no children is reported to be engaged in debt bondage also tend to perform better in terms of the ability of the average household to smooth consumption in the face of per capita income shocks.

Tables 6 - 7 present logit estimates of the marginal impact of three factors that contribute to an increase in the likelihood of children in debt bondage. These factors include a stage of economic development variable (average real gross domestic product per capita, 1994-98), a variable indicating observance of basic core labor rights (“enforce” and “legexag”), and a stage of financial development indicator. Although individual results vary in terms of magnitude and / or significance, child labor in debt bondage is less likely in countries where (i) per capita real income is relatively high, (ii) rights of workers to freely negotiate wages and form unions are respected and (iii) financial markets are better developed. Not surprisingly, since exceptions to child labor work in agriculture are popularly observed in developed and developing countries alike, the coefficients on “legexag” (Table 7) are all insignificant, and of the wrong sign.

These observations will accordingly serve as motivations for three main features of the model to be presented in the sequel. To begin with, we envisage poverty as one of the root causes of the incidence of child labor, in the sense that subsistence consumption is a key rationale for children to be put to work. Second, agrarian households are taken to have little access to formal credit markets, and consumption smoothing over periods of low income is available only through local landlords-cum-moneylender. Accordingly, the nature of interlinked transactions that we examine in what follows takes the form of a credit-labor service contract. Finally, agrarian workers have limited ability to organize and to collectively negotiate the terms of the interlinked contracts with employers. This may be due to standard free rider concerns or legal exceptions to child labor work and union activities in agriculture. In the next section, we show that the emergence and persistence of the institution of bonded child labor can be understood with these features in place.
3 The Basic Model

The basic model scrutinizes the interactions between landlords-cum-moneylenders and agrarian households in the context of an agrarian economy with overlapping generations. We take seasonality in agrarian production as the cause of household income variability over the course of each agricultural year \( s = 1, \ldots, \infty \).\(^{10}\) Specifically, each year \( s \) consists of a lean season, and a harvest season. During the lean season, a spot labor market does not exist. During the harvest season, \( N \) identical landlords compete in hiring wage laborers. In order to demonstrate the impact of debt bondage in as transparent a way as possible, revenue in the harvest season is taken to be \( X^i_s = \omega L^i_s \) for each landlord \( i = 1, 2, \ldots, N \), where \( L^i_s \) denotes labor input, and \( \omega \) denotes the marginal value product of labor.\(^{11}\)

Both adult and child laborers can engage in the harvest of \( X^i_s \). We take adult and child labor to be imperfect substitutes in harvest work, with each unit of child labor work equivalent to \( 0 < a < 1 \) amount of adult labor work. As such, the spot market returns to a unit of adult labor and child labor are respectively \( \omega \) and \( a\omega \).

Households
There is a constant number of \( n \) households with overlapping generations in the agrarian economy. Each household in generation \( \tau (= 0, 1, \ldots, \infty) \) has a \( T \)-year lifespan, and supplies inelastically one unit of adult labor during each harvest season of year \( s = \tau T + t \), \( t = 1, 2, \ldots, T \). Each household also has one unit of child labor, the supply of which is variable depending on labor market conditions and household consumption needs. In particular, as in Basu and Van (1999), each household faces a level of subsistence consumption \( \bar{C} \) during each of the two seasons, and the utility of a generation \( \tau \) household over the two seasons of year \( s = \tau T + t \) depends on: (i) net over the subsistence level household consumption during the two seasons \( (c^d_{\tau T+t} - \bar{C}, c^h_{\tau T+t} - \bar{C}) \), and (ii) child labor work in the harvest season \( (\ell^k_{\tau T+t}) \):

\[
{u}_{T+t} = \log(c^d_{\tau T+t} - \bar{C}) + \rho \left( a\log(c^h_{\tau T+t} - \bar{C}) + (1 - a) \log(1 - \ell^k_{\tau T+t}) \right),
\]

where \( 0 \leq \alpha \leq 1 \) is the preference weight attached to consumption in the harvest season.


\(^{11}\)Basu, A. and Chau (2002) for an analysis in which production is more generally of the decreasing marginal product variety.
relative to the cost of putting the child to work.\textsuperscript{12} $\rho = 1/(1+r)$ is the subjective discount factor, and $r$ is the subjective discount rate.

Denote $U_{\tau T+1}$ as the lifetime utility of generation $\tau$ at the beginning of $t = 1$, and $U_{(\tau+1)T+1}$ as the lifetime utility of the succeeding generation $\tau + 1$, $U_{\tau T+1}$ is given by:

$$ U_{\tau T+1} = \sum_{t=1}^{T} \rho^{2(t-1)}u_{\tau T+t} + \rho^{2T}U_{(\tau+1)T+1}. $$

It will also be useful to define:

$$ U_{\tau T+t'} = u_{\tau T+t'} + \frac{1}{\rho^{2(t'-1)}} \left( \sum_{t=t'+1}^{T} \rho^{2(t-1)}u_{\tau T+t} + \rho^{2T}U_{\tau T+1} \right), $$

where $U_{\tau T+t'}$ simply denotes the discounted lifetime utility of a generation $\tau$ household starting from year $t'$.

With intergenerational welfare linkage displayed in the definition of $U_{\tau T+t}$, household budget allocation must therefore account not just for the tradeoffs between the income generating role of child labor and the dis-utility of child labor work, but equally importantly, the tradeoffs between: (i) harvest and lean season consumption needs, along with (ii) current and future generations’ consumption needs.

To this end, denote $B_{\tau T+t}$, $t = 1, ..., T$, as the savings of harvest income earned in time $t$ of generation $\tau$. $B_{\tau T+T} = B_{(\tau+1)T}$, in particular, denotes the bequests of generation $\tau$ to the succeeding generation $\tau + 1$. Clearly, savings and bequests depend critically on household access to credit market during periods of low income, and we turn next to a description of credit market access of households and landlords.

**Asymmetric Access to Credits and Seasonal Budget Constraints**

Landlords have access to formal credit markets, and face an interest rate $i > 0$ per season. In contrast, individual households have only two options: (i) rely only on savings / bequests to fulfill lean season consumption needs, or (ii) supplement savings / bequests

\textsuperscript{12}While not explicitly modeled, $1 - \alpha$ can be interpreted more generally as the dis-utility of child labor work, which may be due to time away from school, hazardous child labor work or disease-prone work environment.
with a loan from a landlord, with outstanding debts to be repaid in the form labor services in the harvest season. The utility of a household that elects the first option thus establishes a baseline, in the sense that any interlinked debt-labor service contract must offer households of any generation \( \tau \) at least the baseline level of utility in order to induce participation at each year \( t \). Our examination of the phenomenon of child labor in debt bondage accordingly begins with an examination of the welfare of households selecting in the presence of each of these two options.

### 3.1 Households in the Absence of Debt Bondage

Without access to lean season consumption loans, the decision problem of the household simply involves: (i) determining the size of realized household income by devoting a fraction \( \ell_{\tau T+t}^{k} \) of child labor to harvest work, and (ii) allocating realized household income between household consumption needs and savings for next year, and / or (iii) allocating realized household income between current generation consumption and bequests to the next generation.

Taking as given inherited savings from the previous year or bequests from the previous generation \( (B_{\tau T+t-1}, t = 1, ..., T) \), each generation \( \tau \) household at \( s = \tau T + t \) faces two budget constraints respectively for the lean and the harvest seasons:

\[
c_{\tau T+t}^{l} = B_{\tau T+t-1}, \quad c_{\tau T+t}^{h} = \omega(1 + a\ell_{\tau T+t}^{k}) - B_{\tau T+t}.
\] (1)

\( \omega(1 + a\ell_{\tau T+t}^{k}) \) denotes realized harvest season income of the peasant household, to be allocated towards consumption \( (c_{\tau T+t}^{h}) \) and savings \( (B_{\tau T+t}) \). Note that households consume their entire available budget during the lean season. We show in Appendix A this pattern of lean and harvest season budget allocation is a necessary condition for debt bondage to prevail as an equilibrium outcome. In particular, if \( \rho(1 + \rho)(B_{\tau T} - \bar{C}) < \omega(1 + a) - 2\bar{C} \), or equivalently, if harvest season income net of subsistence consumption is no less than discounted inheritance \( \rho(1 + \rho)(B_{\tau T} - \bar{C}) \), the household cannot be made better-off by consuming \( c_{\tau T+t}^{l} < B_{\tau T+t-1} \) at \( t = 1, ..., T \).

Indeed, as will become clear in the sequel (Section (4)), if \( \rho(1 + \rho)(B_{\tau T} - \bar{C}) < \omega(1 + a) - 2\bar{C} \) is not met, debt bondage will be a non-issue, in the sense that there is little reason for landlords to offer lean season consumption loans, even if landlords face
minimal opportunity cost of loans ($i = 0$).

In effect, if initial lean season budget is sufficiently small, the agrarian household literally lives year-to-year, in such a way that the effective planning horizon of the household starting from any harvest season is observationally equivalent to one which is cut short to include only: (i) the current harvest season, and (ii) next year’s lean season. As such, it can be readily confirmed that the decision problem of any generation $\tau$ household during year $t$, and given $B_{\tau T+t-1}$, involves maximizing $U_{\tau T+t}$ by choice of $\ell_{\tau T+t}^k, B_{\tau T+t}$, or:

$$V_s^o(B_{\tau T+t-1}) = \max_{\ell_{\tau T+t}^k, B_{\tau T+t}} \{ \log(B_{\tau T+t-1} - \bar{C}) + \rho(\alpha \log(\omega(1 + a\ell_{\tau T+t}^k) - B_{\tau T+t}) \\
+ (1 - \alpha) \log(1 - \ell_{\tau T+t}^k)) \} + \rho^2 \log(B_{\tau T+t} - \bar{C}) + \rho^3 V^o, \quad (2)$$

where

$$V^o = \frac{1}{1 - \rho^2} \log \left( \alpha^\alpha \frac{1 - \alpha}{\alpha \omega} \right)^{1-\alpha} \frac{1/(1 + \rho)}{(1 + \rho)^{1+\rho}} \quad (3)$$

is independent of $B_{\tau T+t-1}, \ell_{\tau T+t}^k$ and $B_{\tau T+t}$. Thus, without loss of generality, and for notational economy, subscript $s$ will henceforth denote the time subscript for generation $\tau$ at year $t$ ($s = \tau T + t$).

With these observations, the lifetime utility maximizing level of child labor work of during the harvest season of any year $s$ is given by:

$$\ell_{s}^{ko}(\omega) = \min\{1, \max\{0, 1 - \frac{(1 - \alpha)(\omega(1 + a) - 2\bar{C})}{(1 + \rho)\alpha \omega}\}\}. \quad (4)$$

There is thus positive incidence of child labor if and only if (i) the dis-utility of child labor work $(1 - \alpha)$ is not too large, (ii) child and adult laborers are close substitutes, so that $(1 - \alpha)(1 + a)/(a(1 + \rho)) < 1$, and (iii) adult wage income $\omega$ is small relative to subsistence consumption needs $\bar{C}$. Equation (4) implies a downward sloping labor supply schedule as shown in Figure 5. In particular, $\hat{\omega} \equiv 2(1 - \alpha)\bar{C}/((1 - \alpha)(1 + a) - (1 + \rho)a)$ denotes a threshold level of adult labor income such that $\ell_{s}^{ko}(\omega) = 0$ for all $\omega \geq \hat{\omega}$. In addition, if $\omega \leq \omega' \equiv 2\bar{C}/(1 + a)$, child labor supply is similarly independent of small changes in the spot wage, as the household deploys all available adult and child labor time to fulfill subsistence consumption needs. Since the primary focus of the paper

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13 All technical proofs are relegated to the Appendix A.
is that of child labor in the presence of debt bondage, \( \omega \) is taken to be in the range \( (\underline{\omega}, \bar{\omega}) \).

It follows that the child labor supply of a household free from debt bondage is given by \( \ell^{ko} \) in the figure. In addition,

\[
c_s^{bo} - \bar{C} = \frac{\alpha}{1 + \rho} (\omega (1 + a) - 2\bar{C}),
\]

where \( \omega (1 + a) - 2\bar{C} \) is the full disposable income of the household, once expenditure on subsistence consumption is accounted for. In terms of intergenerational transfers,

\[
B_s^o = \frac{\rho}{1 + \rho} (\omega (1 + a) - 2\bar{C}) + \bar{C}.
\]

In other words, the size of intergenerational transfers consists of subsistence consumption \( \bar{C} \), along with a fraction \( \rho/(1 + \rho) \) of the disposable harvest season income.

Thus, child labor, savings, and bequest decisions depend directly on the tightness of the labor market in the harvest season. In particular, both \( 1 - \ell^k_s \) and \( B_s \) rise and fall with \( \omega \). Summarizing these observations, we have \( \ell^k_s = 0 \) (= 1) if \( \omega \geq \bar{\omega} \) (\( \leq \underline{\omega} \)). In addition,

**Proposition 1** For \( \omega \in (\underline{\omega}, \bar{\omega}) \), and \( B_{s-1} - \bar{C} < (\omega (1 + a) - 2\bar{C})/(\rho (1 + \rho)) \), child labor supply of households free from debt bondage is given by

\[
1 - \frac{(1 - \alpha)(\omega (1 + a) - 2\bar{C})}{a\omega}.
\]

The discounted indirect lifetime utility of a generation \( \tau \) household at the beginning of \( s = \tau T + t \) is given by:

\[
V^\alpha (B_{s-1}) = \log (B_{s-1} - \bar{C}) + \rho \left( (1 + \rho) \log (\frac{\omega (1 + a) - 2\bar{C}}{1 + \rho}) + \log K \right) + \rho^2 \bar{V}^\alpha,
\]

where \( K = (\alpha)^{\alpha}((1 - \alpha)/(a\omega))^{1-\alpha} \) is a constant.

### 4 Households Engaged in Debt Bondage

Each landlord \( i \) has the option of providing lean season consumption loans to \( n_s^i \) number of households during any year \( s \), with \( \sum_{i=1}^N n_s^i = n \). We envisage debt bondage between
a landlord and a household as an implicit contract based on the following terms. In exchange for a loan of $D_s$ amount to supplement lean season consumption, the household repays the landlord $\bar{\ell}_s$ amount of effective labor during the harvest season of year $s$. $\bar{\ell}_s$ can be made up of child labor, adult labor, or a combination of both. Unless $\bar{\ell}_s$ amount of effective labor services is repaid in full, the household may not search for harvest season employment elsewhere.

Thus, debt bondage alters the household decision problem directly via the lean and harvest period budget constraints:

$$c_s^l = B_{s-1} + D_s, \quad c_s^h = \omega(1 - \bar{\ell}_s + a\ell_s^k) - B_s. \quad (7)$$

The discounted utility maximization problem of the household can thus be written as:

$$V_s^d(B_{s-1}) = \max_{\ell_s^k, B_s} \{ \log(B_{s-1} + D_s - \bar{\ell}_s) + \rho\alpha \log(\omega(1 - \bar{\ell}_s + a\ell_s^k) - B_s)$$

$$+ \rho(1 - \alpha) \log(1 - \ell_s^k) \} + \rho^2 \log(B_s - \bar{\ell}_s) + \rho^3 V_{s+1}^d$$

where $V_{s+1}^d$ is independent of $B_{s-1}, D_s, \bar{\ell}_s$, and the choice variables $\ell_s^k$ and $B_s$.\textsuperscript{14}

For a household that is engaged in debt bondage, the utility maximizing level of child labor supply is therefore:

$$\ell_s^{kd} = \min \{1, \max \{0, 1 - \frac{(1 - \alpha)(\omega(1 + a - \bar{\ell}_s) - 2\bar{\ell}_s)}{(1 + \rho)a\omega} \} \}. \quad (9)$$

Clearly, $\ell_s^{kd} \geq \ell_s^{ko}$ as long as the landlord demands positive amounts of labor service in exchange for the lean season consumption loan ($\bar{\ell}_s \geq 0$). In addition, as $\omega\bar{\ell}_s$ tends to the maximal disposable income of the household $\omega(1 + a) - 2\bar{\ell}_s$, the household devotes all of the child’s time to work. The dashed and solid lines in Figure 6 respectively plot the labor supply schedules of households engaged in and households free from debt bondage.

Intuitively, the degree of indebtedness determined in the lean season depletes maximal household income in the harvest season, and has the effect of tipping the balance between the dis-utility of child labor and consumption in the harvest season in favor of the latter. As should be apparent, the incidence of child labor in households engaged in

\textsuperscript{14}Details of this result is relegated to Appendix B.
debt bondage ($\ell^{kd}$ in figure 6) is never lower than that in households free from bondage. In addition, so long as $\ell^{kd}_s$ is not at a corner, the utility maximizing level of transfers is

$$B^d_s = \frac{\rho}{1+\rho}(\omega(1+a-\bar{\ell}_s)-2\bar{C}) + \bar{C} < B^o_s$$

(10)

where $\omega(1+a-\bar{\ell}_s)-2\bar{C}$ is the full disposable income of the household in the presence of debt bondage. Finally,

$$c^{hd}_s - \bar{C} = \frac{\alpha}{1+\rho}(\omega(1+a-\bar{\ell}_s)-2\bar{C}) < c^{ho}_s - \bar{C}. $$

(11)

Thus, as long as $\bar{\ell}_s > 0$, debt obligations to be met during the end of the harvest season adversely affect the size of current harvest season consumption, savings, and bequests. We have,

**Proposition 2** For $\omega \in (\underline{\omega}, \overline{\omega})$, and $B_{s-1} - \bar{C} < (\omega(1+a)-2\bar{C})/(\rho(1+\rho))$, households engaged in debt bondage have higher incidence of child labor, with $\ell^{kd}_s \geq \ell^{ho}_s$.

The discounted lifetime utility of a generation $\tau$ household at the beginning of year $s$ is given by:

$$V^d_s(B_{s-1}, D_s, \bar{\ell}_s) = \log(B_{s-1} + D_s - \bar{C}) + \rho((1+\rho)\log(\omega(1+a-\bar{\ell}_s)-2\bar{C}) + \log K) + \rho^3 V^d_{s+1}.$$ 

### 4.1 Voluntary Participation in Debt Bondage

With the option of participating in debt bondage open to individual households, employers offering lean season consumption loans face a participation constraint at the beginning $t=1, ..., T$ of each generation $\tau$, in such a way that $V^d_s(B_{s-1}, D_s, \bar{\ell}_s)$ must be no less than the discounted lifetime utility of a household that receives no consumption loans, and as such faces no labor service obligations at year $s$\textsuperscript{15}

$$V^d_s(B_{s-1}, D_s, \bar{\ell}_s) \geq V^d_s(B_{s-1}, 0, 0)$$

$$\Leftrightarrow D_s \geq (B_{s-1} - \bar{C}) \left[ \left( \frac{\omega(1+a) - \bar{C}}{\omega(1+a-\bar{\ell}_s) - 2\bar{C}} \right)^{\rho(1+\rho)} - 1 \right]$$

$$\equiv D(\bar{\ell}_s, B_{s-1}).$$

(12)

\textsuperscript{15}The discounted lifetime utility of a household at year $s$ ($V^d_s$) should in general include the discounted maximal welfare of the household starting from subsequent years $s' = s+1, s+2, ...$ ($V^d_s$). The latter in turn depends on anticipated debt bondage contract terms in subsequent periods $\{D_{s'}, \bar{\ell}_{s'}\}$. See Appendix B for details of how these additional considerations in the participation constraint nevertheless simplify to yield the minimal loan requirement as displayed in equation (12).
$D(\bar{\ell}_s, B_{s-1})$ should be interpreted as the minimum loan required for households to agree to participate in debt bondage, given $\bar{\ell}_s, B_{s-1}$. As should be expected, $D(\cdot)$ is increasing and strictly convex in $\bar{\ell}_s$, implying therefore that the cost that a landlord must incur in the form of a lean season consumption loan increases with the amount of labor services that he will obtain at no cost in the harvest season. In particular, $\lim_{\bar{\ell}_s \to 0} (\partial D / \partial \bar{\ell}_s) = \rho(1 + \rho)B_{s-1} \omega > 0$ and $\lim_{\omega \bar{\ell}_s - \omega(1 + a) - 2C} (\partial D / \partial \bar{\ell}_s) = \infty$ for $B_{s-1} - C > 0$. Put another way, the marginal (loan) cost of raising the size of the labor service requirement in the debt contract is always strictly positive, and approaches infinity as $\omega \bar{\ell}_s$ tends to a level that exhausts the maximal disposable income of the household $\omega(1 + a) - 2C$. Meanwhile, as the need for consumption smoothing declines with higher levels of transfers available from the previous generation, the loan cost of debt bondage accordingly increases.

### 4.2 Determinants of the Incidence of Debt Bondage

Subject to the loan requirement schedule, the decision problem of the landlord in the lean season involves the selection an amount of effective labor service to be demanded from each borrowing household $\bar{\ell}_s$, and a level of lean season consumption loan. In addition, in the harvest season, the landlord hires any additional workers $(L_s^i - n_s^i \bar{\ell}_s)$ from the spot labor market at wage $\omega$ to maximize profits given the effective labor input already available at no additional cost, $n_s^i \bar{\ell}_s$. Beginning with the harvest season decision making problem, and taking $\{D_s, \bar{\ell}_s\}$ as given, we have

$$\Pi_s = \max_{D_s, \bar{\ell}_s} X_s^i(L_s^i - \omega(L_s^i - n_s^i \bar{\ell}_s)) - n_s^i(1 + i)D_s$$

subject to the participation constraint $D_s \geq D(\bar{\ell}_s, B_{s-1})$. Equivalently, we have

$$\Pi_s = \max_{\bar{\ell}_s} n_s^i \left[ \omega \bar{\ell}_s - (1 + i)D(\bar{\ell}_s, B_{s-1}) \right]. \quad (13)$$

The landlord’s lean season decision problem thus simply calls for the maximization of wage savings net of interest plus principal costs of the consumption loan in the lean season by choice of $\bar{\ell}_s$. Since $D_s$ is increasing and strictly convex, the maximization problem in equation (13) has a unique solution, with

$$\omega \leq (1 + i) \frac{\partial D}{\partial \bar{\ell}_s}, \quad \left( \omega - (1 + i) \frac{\partial D}{\partial \bar{\ell}_s} \right) \bar{\ell}_s = 0. \quad (14)$$

Equation (14) simply requires that marginal wage savings from debt bondage be equal to the marginal costs of the lean season consumption loan at an interior maximum. In
figure 7, the upward sloping DD schedules plot a family of marginal loan requirement schedule \((1 + i)\partial D(\cdot)/\partial \tilde{\ell}_s\), with successively decreasing values of \(B_{s-1}\) from \(DD\) to \(D_2D_2\).

Thus, debt bondage is an equilibrium phenomenon when the size of available transfers from the previous year \(B_{s-1}\) is sufficiently small. From equation (12), this requires

\[
\omega \leq (1 + i) \frac{\partial D}{\partial \tilde{\ell}_s} \bigg|_{\tilde{\ell}_s=0} \iff B_{s-1} - \tilde{C} \leq (\omega(1 + a) - 2\tilde{C})/\rho(1 + \rho)(1 + i) \equiv \bar{B} - \tilde{C}.
\]

In other words, debt bondage is all the more likely when the degree of credit market imperfection \(1/(\rho(1 + i)) = (1 + r)/(1 + i)\) is large enough, and when the need for consumption smoothing \((\omega(1 + a) - 2\tilde{C})/(B_{s-1} - \tilde{C})\) is sufficiently acute. Note in particular that since households that are free from linkage allocate \(\rho(\omega(1 + a) - 2\tilde{C})/(1 + \rho) + \bar{C}\) amount of disposable household full income towards intergenerational transfers \(B_s\), each of the \(n\) households must be vulnerable to bondage eventually if and only if

\[
B_s - \tilde{C} \leq \frac{\omega(1 + a) - 2\tilde{C}}{\rho(1 + \rho)(1 + i)} \iff 1 > \rho^2(1 + i)
\] (15)

given \(B_{s-1}\).\(^{16}\)

5 Debt Bondage as a Steady State Phenomenon

Embodied in the landlords’ maximization problem (equation (14)) and the agrarian households’ participation response and savings / bequests decisions (equations (10) and (12)), is a sequence of intergenerational transfers that evolve according to:

\[
B_s = B(B_{(s-1)T} - \tilde{C}) = (B_{(s-1)T} - \tilde{C})^{(1 + \rho(1 + \rho))^{-s}} \left(\kappa(\omega(1 + a) - 2\tilde{C})\right)^{1/(1 + \rho(1 + \rho))},
\]

for given initial \(B_0\) and if and only if \(B_0 - \tilde{C} \leq (\omega(1 + a) - 2\tilde{C})/\rho(1 + \rho)(1 + i)\) so that equilibrium incidence of debt bondage at time period \(s > 0\) is strictly positive. In addition, \(\kappa = \rho(\rho^2(1 + i))^{1/(\rho(1 + \rho))}/(1 + \rho)\).

---

\(^{16}\)Equation (15) reiterates the arguments laid out in Section Section 3.1. In particular, even at minimal interest cost of loans \(i = 0\), landlords will not benefit from offering lean season consumption loans if \(B_{s-1} > (\omega(1 + a) - 2\tilde{C})/(\rho(1 + \rho))\).
However, if \( B_0 - \bar{C} > (\omega(1+a) - 2\bar{C})/(\rho(1+\rho)(1+i)) \) and \( B_0 - \bar{C} < (\omega(1+a) - 2\bar{C})/(\rho(1+\rho)) \), debt bondage ceases to benefit landlords even though the lean season budget constraint of the household continues to be strictly binding. Here, intergenerational transfers evolves according to

\[
B_{rT} - \bar{C} = \frac{\rho}{1+\rho}(\omega(1+a) - 2\bar{C}),
\]

as shown in Section 3.

These two schedules are illustrated as the \( BB \) curves in Figure 8. First, and as should be apparent, the interior steady state \( \bar{B} = \{B\mid B(B) = B\} \) is uniquely determined and dynamically stable. Second, figure 8 illustrates two separate regimes. Figure 8a is one in which interlinked credit and labor contracts and the incidence of child labor in debt bondage are purely transitional. From the geometry of the left panel of figure 8a, this requires that the 45° line lies below the \( BB \) schedule when evaluated at point \( B_{(r-1)T} - \bar{C} = \bar{B} - \bar{C} \), or equivalently, if the degree of credit market imperfection is not too severe, that is:

\[
1 < \rho^2(1+i).
\]

As such, the steady state incidence of child labor \( \bar{\kappa} \), along with the discounted lifetime utility of any generation of households \( V^0 \) depend only on the tightness of the labor market, with

\[
\bar{\kappa} = 1 - \frac{(1-\alpha)(\omega(1+a) - 2\bar{C})}{(1+\rho)\omega}, \tag{18}
\]

\[
V^0 = \frac{\rho}{1-\rho^2} (\log(\omega(1+a) - 2\bar{C}) + K) + \log\left(\frac{\rho}{1+\rho}\right). \tag{19}
\]

Clearly, as the spot market wage increases, the steady state incidence of child labor decreases. Meanwhile, since the disposable full income of the household in the harvest season is \( \omega(1+a) - 2\bar{C} \), a small increase in the productivity of agricultural laborers \( \omega \) increases the full income (and accordingly welfare) of individual households by the full amount \( 1 + a \).

Figure 8b illustrates the case wherein household participation in debt bondage, once set in motion, cannot be stopped. The inability for generations of households to
rise above the need to engage in debt bondage occurs when the degree of credit market imperfection is sufficiently high, or when
\[ 1 > \rho^2(1 + i). \]
In addition, the steady state incidence of child labor \( \tilde{k}^{kd} \) rises with the degree of credit market imperfection, while the welfare of individual households \( \tilde{V}^d \) decreases with the degree of credit market imperfections:
\[
\tilde{k}^{kd} = 1 - \frac{(1 - \alpha)(\omega(1 + a) - 2\tilde{C})}{(1 + \rho)aw}(\rho^2(1 + i))^{1/(\rho(1 + \rho))} > \tilde{k}^o, \tag{20}
\]
\[
\tilde{V}^d = \tilde{V}^o + \frac{1}{(1 - \rho^2)} \log(\rho^2(1 + i)) < \tilde{V}^o, \tag{21}
\]
where the inequalities follows since \( 1 > \rho^2(1 + i) \). Thus, even though participation in bondage is strictly voluntary, the steady state level of household welfare is always less than if the possibility of borrowing does not exist. Indeed, a small increase in the productivity of agricultural laborers \( \omega \) increases the full income (and accordingly welfare) of individual households by only a fraction \( (\rho^2(1 + i))^{1/(\rho(1 + \rho))} \) of the full amount \( (1 + a) \).

Note also that the steady state utility of each household strictly increases with the interest rate that landlords face in formal credit markets. To see the intuition behind this finding, let the implicit interest rate \( \tilde{i}^d \) that each household pays in exchange for the consumption loan \( \tilde{D} \) in a steady state:
\[ 1 + \tilde{i}^d = \frac{\omega\tilde{\ell}_s}{D_s} \bigg|_{B_{s-1}=B} = \frac{1 + \rho}{\rho} \left( \frac{1}{\Omega^{1/(\rho(1 + \rho))}} - 1 \right) \frac{\Omega}{1 - \Omega}, \quad \Omega \equiv \rho^2(1 + i) < 1. \]
It is straightforward to verify that \( \tilde{i}^d \) exceeds the interest rate faced by each landlord \( i \) whenever \( \Omega < 1 \). In addition, as rising interest cost impinges on landlords’ ability to use consumption loans to extract labor services, the steady state labor service obligations \( (\omega\tilde{\ell}_s) \) embodied in the debt bondage contract is accordingly monotonically decreasing with respect to \( i \), so long as \( \Omega < 1 \). We have therefore the following analogue of Proposition 1 in the presence of interlinkage:

**Proposition 3** There exists a unique and dynamically stable steady level of intergenerational transfers, \( \tilde{B} \). Debt bondage emerges as a steady state phenomenon if and only if
\[ \rho^2(1 + i) < 1. \]
In addition, the steady state utility of the typical household is strictly lower than the steady state utility of otherwise identical households that do not have access to credits from landlords.

The profits of the representative landlord \((w\bar{Y}_s - (1+i)D_s)|_{B_{s-1}=\bar{B}}\) is strictly positive, and decreasing in \(i\).

6 Policy Implications

We now turn to examine the effectiveness of a number of policy options aimed at targeting child labor in the presence of debt bondage. Our discussion will be arranged in the context of four policy categories: legislative solutions that target the demand side of the labor market; direct transfers that aims at addressing the supply of child labor; the provision of alternative sources of consumption loan in the face of credit market imperfections, and finally, the provision of alternative source of employment opportunities.

6.1 Legislative Solutions

Putting aside the practical difficulties of enforcing a ban on the use of child labor in agrarian economies, it bears emphasis that a priori, the effect of a ban can have two opposing effects on the incidence of child labor in debt bondage. To begin with, as the probability of getting caught and penalized for hiring child laborers increases, enforcing a ban on child labor in agriculture has a direct and negative effect on the demand for child labor. However, if the adverse demand effect of the ban translates to a reduction in the size of intergenerational transfers, enforcing the ban on child labor may in fact reinforce the incentives for households to engage in debt bondage.

Let \(0 \leq q < 1\) denote the probability that a landlord is caught hiring child labor. \(q\) parameterizes the strength of the enforcement of the ban on child labor. Thus, with probability \(q\) \((1-q)\), hiring a child laborer yields zero \((a\omega\) amount of\) additional output, and the spot harvest wage of a child laborer is just \((1-q)a\omega \leq a\omega\). An increase in the probability of discovery \(q\) thus directly translate to a reduction in the spot harvest wage of child laborers.

In addition, the disposable harvest season income of a household that does not
engage in bondage is just $\omega(1 + a(1 - q)\ell^k) - 2\bar{C}$. Meanwhile, $\omega(1 + a(1 - q)\ell^k - \bar{\ell}_s) - 2\bar{C}$ denotes the harvest season income of an indebted household.

Accounting for these changes, equations (1) - (17) can be readily adapted to yield a steady state level of intergenerational transfers and child labor supply:

\[
\begin{align*}
\tilde{B}^d - \bar{C} & = \frac{\rho}{1 + \rho} \left( \rho^2 (1 + i) \right)^{1/(\rho(1+\rho))} (\omega(1 + a(1 - q)) - 2\bar{C}) \\
\tilde{\ell}^k & = 1 - \frac{(1 - a)(\omega(1 + a(1 - q) - 2\bar{C})}{(1 + \rho)a\omega(1 - q)}.
\end{align*}
\]

Clearly, an increase in the probability of discovery $q$ decreases the disposable income of every household during the harvest season. As such, the size of the intergenerational transfer $\tilde{B}$ strictly decreases with $q$. Making use of equation (23) above, it is straightforward to verify that an increase in $q$ increases (decreases) child labor supply $\tilde{\ell}^k$ if and only if $\omega < (\geq)2\bar{C}$. In other words, if adult wage income alone is not sufficient to cover all subsistence consumption needs, a reduction in the spot wage of child labor can in fact encourage households to put children to work.\(^{17}\)

**Proposition 4** An increase in the intensity of enforcement of minimum wage legislations in agriculture strictly increases the incidence of child labor in debt bondage in a steady state if and only if adult harvest income alone is not sufficient to cover all subsistence consumption needs.

### 6.2 Credit-Market Solutions

Since the lack of alternative sources of consumption loans is the root cause of debt bondage, the provision of alternative sources of credit would seem to be a natural course of policy action. For one thing, the mere *option* of borrowing from a source other than the landlord may tip the balance of the principal-agent relationship between landlords and agrarian households in latter’s favor.

In order to adequately address the question of whether the provision of alternative sources of credit may indeed be effective, it is key to scrutinize the underlying reasons

\(^{17}\)To see this, note that $\partial \tilde{\ell}^k / \partial q > (\leq)0$ if and only if $2\bar{C} > (\leq)\omega$. 

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why landless agrarian households have limited access to credit to begin with. A number of possibilities have been examined to date,\(^\text{18}\) including the risk of default, the cost of monitoring loan payments, the lack of collateral, and information asymmetries that give rise to the possibilities of strategic default and / or adverse selection. Thus, employers of indebted households are in a unique position to evade these risks, precisely since refusal to repay outstanding debt can be credibly avoided, for instance, by suspending wage payment.

To incorporate the asymmetry in the ability of employers and alternative credit agencies to elicit payment incentives in the simplest possible way, let the \(p(B_{s-1}) \in [0, 1]\) be the perceived probability of default on a lean season consumption loan offered by a credit agency to an agrarian household with \(B_{s-1}\) amount of transfers available from the previous time period. With otherwise identical agrarian households in our setup, \(B_{s-1}\) is taken as a proxy for the size of loan demand, and accordingly, the ability to fully repay by the end of the harvest season. Let the probability of default is non-increasing with respect to \(B_{s-1}\).\(^\text{19}\) Landlords, on the other hand, provide consumption loans by engaging in debt bondage.

Let \(i^A\) be the minimal interest rate that the credit agency needs to charge individual borrowing households in order to break even. Recall that \(i\) is the opportunity cost of the consumption loan for individuals with access to formal credit markets\(^\text{20}\), we have

\[
(1 - p(B_{s-1}))(1 + i^A) = (1 + i), \quad \iff i^A = \frac{i + p(B_{s-1})}{1 - p(B_{s-1})} > i.
\]

Meanwhile, in order that credit agencies out-compete landlords in providing loans to households, \(i^A\) must be no larger than the implicit interest rate that landlords engaged in debt contract specify. Given the steady state implicit interest rate \(i^D\), and the steady


\(^{19}\)Clearly, if there are other identifiable characteristics that distinguish the ability of debt repayment from one household to the next, a number of interesting questions arise. For one thing, will the number of children in a household signal the ability to repay outstanding debt? Does the provision of credit based on these signals according increase the incidence of child labor? See Basu, A. and Chau (2002) for an analysis variable child labor supply in the presence of pure credit arrangements.

\(^{20}\)The opportunity cost of the consumption loan need not be the same for landlords and the credit agency in order for the following findings to hold. Indeed, the only requirement is that landlords and credit agencies both have better access to formal credit channels than households.
state level of intergenerational transfers $\bar{B} = (\rho/(1 + \rho))\Omega^{1/(\rho(1 + \rho))}(\omega(1 + a) - 2\bar{C})$, we have

$$i + p(\bar{B}) = 1 - p(B) + 1 \leq i^D + 1 = \frac{1 + \rho}{\rho}(\frac{1}{\Omega^{1/\rho(1 + \rho)}} - 1)\frac{\Omega}{1 - \Omega}.$$ 

Thus, if the probability of default is decreasing with respect to $B_{a-1}$, we have the following result:

**Proposition 5** *Unless the risk of default perceived by the credit agency with respect to the poorest agrarian household is small enough such that $i^A(0) < i^D$, there are two possibilities.*

1. Credit agencies never out-compete landlords in providing consumption loans, or
2. There exists a critical level of agrarian full household disposable income $\bar{Y} \equiv \omega(1 + a) - \bar{C} > 0$, such that for agrarian economies that are sufficiently poor, with $\omega(1 + a) - \bar{C} < \bar{Y}$, $i^D < i^A(\bar{B})$.

It follows, therefore, that either the risk of default is really not a binding constraint, or credit agencies will fail to compete with landlords in providing consumption loans in relatively poor economies where the incidence of child labor is relatively severe.

Proposition 5 reiterates the inherent advantage that landlords have in providing consumption loans to agrarian households. In particular, in economies where child labor in debt bondage is an outcome both of poverty and of credit market imperfections, simply providing an alternative source of credit need not be sufficient to address the issue. In the two remaining policy options, we examine direct actions that respectively involve public assistance with loan repayment, and the provision of public works programs in rural areas in the lean season.

### 6.3 Direct Transfers to Indebted Households

For sure, a one-time (unanticipated) direct transfers made available to indebted households can have an important contemporaneous impact on the incidence of child labor. For one thing, such transfers have the direct effect of removing / reducing the size of the outstanding debt, and hence, the need to put children to work in order to supplement household consumption.
However, the limits to such one-time transfers in achieving sustainable liberation of households from debt bondage should be equally apparent. Consider a one-time transfer that pushes the transfers of indebted agrarian households at time $t$ from $\bar{B} - \bar{C}$, for example, to a point like $B^1 - \bar{C} = (\omega(1 + a) - \bar{C})/\rho(1 + \rho)(1 + i) \equiv \bar{B} - \bar{C}$ in Figure 8b, where debt bondage should no longer be an issue.

Note in particular from the global stability of the steady state $\bar{B} - \bar{C}$, $B^1$ cannot be sustained for more than one generation. Indeed, from Proposition 3, if the degree of credit market imperfect is severe enough, with $\rho^2(1 + i) < 1$, households in debt bondage re-emerges in all succeeding generations, and intergenerational transfers continue to decrease for each successive future generations (from $B_T$ to $B_{2T}$ and so on) until $\bar{B}$ is reached.

If a one-time transfer cannot achieve the long term liberation of households in bondage, we consider here, for completeness and for comparison, the prospect of using long-term public assistance for households in bondage. Let $\delta$ be the amount of direct transfers that indebted households at any time period can anticipate in the harvest season. The objective of such a transfer is similarly to assist households in paying off outstanding debts.

By its very nature, such direct transfers discriminate between indebted households, and reservation households that do not engage in debt bondage. To see this, the analogue of the participation constraint in equation (12) above can be written as:

$$V^d(B_{s-1}, D_s, \bar{\ell}_s, \delta) \geq V^d(B_{s-1}, 0, 0, 0)$$

$$\Leftrightarrow D_s \geq (B_{s-1} - \bar{C}) \left[ \frac{\omega(1 + a) - 2\bar{C}}{\omega(1 + a - \bar{\ell}_s + \delta - 2\bar{C})} \rho^{(1+\rho)} - 1 \right]$$

$$\equiv D(\bar{\ell}_s, B_{s-1}, \delta).$$  \hfill (24)

Maximizing landlords’ profits subject to the participation constraint, we obtain:

$$\omega = (1 + i) \frac{\partial D(\bar{\ell}_s, B_{s-1}, \delta)}{\partial \bar{\ell}_s}$$

---

$^{21}$Indeed, depending on the timing of the transfers, bondage re-emerges within a generation.
at an interior optimum. Equivalently, the net of labor service obligations harvest season income of an indebted household is given by:

$$\omega(1 + a - \bar{\ell}_s) + \delta - 2C = \left(\rho(1 + \rho)(1 + i)(B_{s-1} - C)\right)(\omega(1 + a) - 2C)^{(1+\rho)}$$

which is independent of $\delta$. As such, as long as the availability of public assistance if fully expected by landlords and households alike, the size of the transfer will likewise be fully incorporated into the interlinked contract. Thus, any increase in $\delta$, in the absence of compensating increases in the lean / harvest season income of the reservation household, will be offset by a corresponding increase in the labor service demanded by the landlord $\bar{\ell}_s$, and the welfare of an indebted household is exactly equal to the welfare the reservation household given $B_{s-1}$.

In effect, landlords’ profits increase one to one with the amount of transfers to indebted household. All the while, the incidence of child labor remain strictly unaffected. These arguments are summarized as follows:

**Proposition 6** A one-time unanticipated direct transfer to indebted household temporarily decreases the incidence of child labor in debt bondage, and leaves the long run incidence of child labor in debt bondage unaltered.

A long term program of direct transfers to indebted household that is fully anticipated by landlords and households has no impact on the incidence of child labor in debt bondage in any time period. Landlords are the sole beneficiaries of the transfer.

### 6.4 Labor-Market Solutions

Our findings so far highlight the importance of accounting for the institutional context in which debt bondage takes place in search of a policy remedy. In particular, attempts to supply an alternative credit source may fall short of securing the income stability of the relative poor, precisely when debt bondage is a by-product of credit rationing when the risk of default perceived by formal credit agencies is sufficiently high. Meanwhile, unless participation in debt bondage is coerced in some way, discriminatory subsidies that target indebted households fail to recognize that the terms of the interlinked contract is based on the availability of desirable outside options for households that elect to not participate in bondage.
These suggest that a viable policy option should likely target: (i) mitigating seasonal demand for credit, and (ii) inducing households to refrain from participating in bondage by raising the welfare of the reservation households. To this end, consider a rural public works (RPW) program\footnote{Such programs have taken on particular significance in South Asia in recent years. For an analysis, see Basu, A. (2002).} that provide employment opportunities during the lean season of the agricultural year, and through activities such as irrigation, the building of roads, and other rural public goods that improve agricultural productivity in the harvest season.

Let the per worker payment that the RPW program offers during the lean season be $\delta^{rpw}$. Also let $\omega^{rpw} > \omega$ be the productivity of laborers in harvest work in the presence of an RPW program. The basic setup presented in Section 3 can be readily modified to confirm that the lean and harvest seasons budget constraint of agrarian households are respectively:

$$c_s^l = B_{s-1} + \delta^{rpw}, \quad c_s^h = \omega^{rpw}(1 + \alpha^k_s) - B_s$$

for households that are free from bondage, and

$$c_s^l = B_{s-1} + \delta^{rpw} + D_s, \quad c_s^h = \omega^{rpw}(1 + \alpha^k_s - \bar{\ell}_s) - B_s$$

otherwise. It follows, therefore, that households will refrain from participating in debt bondage if and only if

$$D_s \geq (B_{s-1} + \delta^{rpw} - \bar{C}) \left[ \frac{\omega^{rpw}(1 + a) - 2\bar{C}}{\omega^{rpw}(1 + a - \bar{\ell}_s) + \delta^{rpw} - 2\bar{C}} \right]^{\rho(1+\rho)} - 1$$

(25)

Taking the minimum loan requirement above as a participation constraint, landlords maximize profits by refraining from offering an interlinked credit-labor service contract if and only if

$$1 < \rho(1 + \rho)(1 + i)(B_{s-1} + \delta^{rpw} - \bar{C}) \left( \frac{(\omega^{rpw}(1 + a) - \bar{C})^{\rho(1+\rho)}}{(\omega^{rpw}(1 + a - \bar{\ell}_s) - 2\bar{C})^{1+\rho(1+\rho)}} \right) \bigg|_{\bar{\ell}_s=0},$$

or equivalently, for any given $B_{s-1}$,

$$\delta^{rpw} > \frac{(\omega^{rpw} - \omega)(1 + a)(B_{s-1} - \bar{C})}{\omega(1 + a) - 2\bar{C}}.$$  

(26)
Since rural public works program raises labor productivity in the harvest season, any incentives on the part of landlords to offer consumption loans in exchange for labor services at no cost in the harvest season can be offset only when $\delta^{rpw}$ is large enough. In addition, the incidence of child labor is:

$$\ell_{s}^{krpw} = 1 - \frac{(1 - \alpha)(\omega^{rpw}(1 + a) - 2\bar{C})}{(1 + \rho)a\omega^{rpw}} < \ell_{s}^{ko} < \ell_{s}^{kd}.$$  

We have, therefore,$^{23}$

**Proposition 7** A rural public works program that serves the twin purposes of (i) providing lean season employment and (ii) raising agricultural productivity:

1. eliminates both the incentives for households and employers to engage in debt bondage so long as $\delta^{rpw}$ is sufficiently large;

2. decreases the equilibrium incidence of child labor in the harvest season.

7 Conclusion

This paper began with an examination of the available evidence on child labor in debt bondage. An index of bonded child labor is constructed using available reports on the incidence of the phenomenon. Broadly put, bonded child labor is a developing country phenomenon, although low income per se is not a sufficient condition for the incidence of debt bondage. In particular, the dependence on agriculture as a mainstay economic activity, observance of core labor rights, and the development of insurance and financial markets, all figure significantly as distinguishing characteristics of countries in which

---

$^{23}$Note that even if households continue to participate in debt bondage, which occurs when the inequality in equation (26) above is not satisfied, equations (1) to (17) can be adapted to confirm that in a steady state with debt bondage,

$$\hat{B}^{rpw} + \delta^{rpw} - \bar{C} = \frac{\rho}{1 + \rho}(\rho^{2}(1 + i))\frac{\omega^{rpw}(1 + a) - 2\bar{C}}{(1 + \rho)a\omega^{rpw}}$$

$$a\omega(1 - \hat{\rho}^{krpw}) = \frac{1 - \alpha}{1 + \rho}(\rho^{2}(1 + i))\frac{\omega^{rpw}(1 + a) - 2\bar{C}}{\omega^{rpw}(1 + a) - 2\bar{C}}$$

It follows that $\ell_{s}^{krpw} < \hat{\ell}_{s}^{kd} = 1 - \frac{1 - \alpha}{1 + \rho}(\rho^{2}(1 + i))\frac{\omega^{rpw}(1 + a) - 2\bar{C}}{\omega^{rpw}(1 + a) - 2\bar{C}}/a\omega$. In addition $\hat{\ell}_{s}^{krpw} < \hat{\ell}_{s}^{ko}$ if and only if $(\rho^{2}(1 + i))\frac{\omega^{rpw}(1 + a) - 2\bar{C}}{\omega^{rpw}(1 + a) - 2\bar{C}} > \omega(1 + a) - 2\bar{C}$. Thus, the RPW program decreases the child labor incidence when $\omega^{rpw}$ is sufficiently higher than $\omega$.  

---

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incidence of debt bondage is reported.

Based on these observations, the theoretical model set out in this paper seeks to answer a number of questions: Does debt bondage constitute an additional reason why children are put to work? Despite the fact that households “voluntarily” enter into an interlinked contract of debt and labor services, does bondage perpetuate poverty amongst agrarian households? Can debt bondage persist as a stable equilibrium outcome? Our findings indicate that as long as the degree of asymmetry in credit access is large enough, the answer to the all three questions are in the affirmative, and debt bondage turns out to be an important feature in the cycle of poverty and child labor in agrarian economies.

These findings accordingly form the basis of the analysis of four types of policies aimed at combating child labor arising out of debt bondage in poor agrarian in economies. In each case, we find that the relative merits / drawbacks of policy measures cannot be appropriately ascertained unless the principal-agent relationship between households and landlords, and the dynamics of debt bondage across generations are both accounted for. Specifically, we find that while standard demand side disincentives, such as the enforcement of minimum age laws, can be expected to put checks on child labor on impact, the same demand side disincentives also impinge on household income. The net outcome in the long run is in fact an increase in child labor supply as generations of households fall increasingly into debt, if adult income alone is not sufficient to cover subsistence consumption needs.

Meanwhile, an examination of supply side policies such as a direct transfer to indebted households, spells out the importance of understanding the institution of debt bondage as an implicit contract. Specifically, the welfare of households engaged in debt bondage depend critically on the availability of outside options. As such, discriminatory transfers that solely target indebted households have at best a temporary impact on the equilibrium incidence of child labor.

Thus, while the basic empirical and theoretical conclusions in this paper reiterate popular conceptions about the workings and welfare consequences of child labor arising out of bondage, our findings also caution against wholesale implementation of policy
measures without due consideration of the institutional features specific to debt bondage.

Appendix A

To begin with note that the lifetime discounted utility of the household at \( \tau = T \) can be written as:

\[
U_{\tau T+1} = \sum_{t=1}^{T} \rho^{2(t-1)}u_{\tau T+t} + \rho^{2T}U_{(\tau+1)T+1} = \sum_{s' = 1}^{\infty} \rho^{2(s'-1)}u_{\tau T+s'},
\]

where \( \tau = 0, 1, \ldots, \infty \). The maximization problem of the any generationa \( \tau \) household starting from year \( \tau T + 1 \) is thus equivalent to maximizing the discounted sum of \( u_{\tau T+s'} \) over the infinite horizon, \( s' = 1, \ldots, \infty \).

We now illustrate (i) the circumstances under which the lean season budget constraint binds as in equations (1) and (7) in the face of the infinite horizon decision-making problem of the household, and (ii) the discounted lifetime utility of the household when equations (1) - (7) holds.

To this end, suppose otherwise, and let \( s = \tau T + t \), and \( S_s > 0 \) be the amount of lean season savings out of \( B_{s-1} \), available during the lean season of each year \( s \). The two seasonal budget constraints are:

\[
c'_s = B_{s-1} - S_s, \quad c^h_s = \omega(1 + a t^k_s) + S_s - B_s - \bar{C}
\]

Taking as given the utility maximizing decision-making calculus of the household in each subsequent years \( s' \), \( s' = s + 1, s + 2, \ldots \), along with an amount of bequest \( B_{s-1} \), the household maximizes discounted lifetime utility by choice of \( S_s \), \( t^k_s \) and \( B_s \). By the envelope theorem, the first order conditions require that for every \( s \):

\[
\frac{1}{B_{s-1} - S_s - \bar{C}} = \rho \frac{\omega(1 + a) - 2\bar{C} + S_s - (B_s - \bar{C})}{(1 - \alpha)(\omega(1 + a) - 2\bar{C} + S_s - (B_s - \bar{C}))} \quad (28)
\]

\[
\frac{1}{\omega(1 + a) - 2\bar{C} + S_s - (B_s - \bar{C})} = \rho \frac{B_s - S_{s+1} - \bar{C}}{B_{s-1} - S_s - \bar{C}} \quad (29)
\]

Routine manipulation yields:

\[
\frac{1}{B_{s-1} - S_s - \bar{C}} = \frac{\rho^N}{B_{s+N} - S_{s+N+1} - \bar{C}} \quad (31)
\]
for \( N \) arbitrarily large. This yields a contradiction since the right hand side of equation (31) approaches zero as \( N \) tends to infinity, for any positive levels of lean season consumption \( c_s^l \) and \( c_{s+N+1}^l \). It follows that \( S_s = 0 \) for at least one year, say year \( s_0 + 1 \).

Suppose now that \( S_s > 0 \), for each \( s = 1, \ldots, s_0 \). The seasonal budget constraints for year \( s = 1, \ldots, s_0 \), are as displayed in equations (28) - (30) above. During the lean season of year \( s_0 + 1 \):

\[
c^l_{s_0+1} = B_{s_0}.
\]

The \( s_0 \) pairs of season budget constraints in equation (27) for \( s = 1, \ldots, s_0 \), along with equation (32) above, can be substituted into the first order conditions to yield:

\[
\left(1 + \sum_{s^* = 0}^{s_0-1} (1 + \rho)\rho^2s^* + 1\right) S_1 = \sum_{s^* = 0}^{s_0-1} \left((1 + \rho)\rho^2s^* + 1(B_0 - \bar{C}) - (\omega(1 + a) - 2\bar{C})\right).
\]

Thus, if \( \rho(1 + \rho)(B_0 - \bar{C}) < \omega(1 + a) - 2\bar{C} \) as discussed in Section 3.1, \( (1 + \rho)\rho^2s^* + 1(B_0 - \bar{C}) - (\omega(1 + a) - 2\bar{C}) < 0 \) for any \( s^* \geq 0 \), and \( s_0 \geq 1 \). This yields a contradiction since equation (32) implies negative savings \( (S_1 < 0) \). The rest of the proof involves setting \( S_1 = 0 \) and \( S_{s_0} = 0 \) and showing that \( S'_s \) must be equal to zero, for \( s^* = 2, \ldots, s_0 \), so long as \( \rho(1 + \rho)(B_0 - \bar{C}) < \omega(1 + a) - 2\bar{C} \). The analysis is routine and is therefore omitted.

Finally, substituting equations (28) - (30) above into equation (2) in the text yields the expression for the maximal discounted lifetime utility displayed in Proposition 1 whenever \( S_s = 0 \) for all \( s = 1, \ldots, \infty \). Using similar arguments, the discounted lifetime utility of households in debt bondage as in Proposition 2 can also be obtained.

**Appendix B**

Equation (8) follows from arguments elaborated in Section 4.1, which require that employers offer debt bondage contracts that satisfy a participation constraint, and households are at least indifferent between participating or not participating in bondage. In particular, the discounted utility of a household in debt bondage at year \( s \) is given by \( V^d(B_{s-1}, D_s, D_{s+1}, \ldots, \bar{\ell}_s, \bar{\ell}_{s+1}, \ldots) \):

\[
\max_{\ell^k_s, \omega, B_s} \log(B_{s-1} + D_s - \bar{C}) + \rho a \log(\omega(1 - \bar{\ell}_s + a\ell^k_s) - B_s) + \rho(1 - a) \log(1 - \ell^k_{s+1}) + \rho^2 \max\{V^d(B_s, D_{s+1}, D_{s+2}, \ldots, \bar{\ell}_{s+1}, \bar{\ell}_{s+2}, \ldots), V'^{od}(B_s, D_{s+2}, D_{s+3}, \ldots, \bar{\ell}_{s+2}, \bar{\ell}_{s+3}, \ldots)\}.
\]
where $V^{od}(B_s, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+2}, \bar{l}_{s+3} ...)$ is given by

$$
\max_{\ell_{s+1} : B_{s+1}} \log(B_s - \bar{C}) + \rho \alpha \log((1 + a \ell_{s+1}^k) - B_{s+1}) + \rho (1 - \alpha) \log(1 - \ell_{s+1}^k) \\
+ \rho^2 \max\{V^d(B_{s+1}, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+2}, \bar{l}_{s+3} ...), V^{od}(B_{s+1}, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+3}, \bar{l}_{s+4} ...)\}.
$$

As should be expected, the discounted lifetime utility of a household currently engaged in bondage is equal to current period utility, plus the maximum discounted utility of subsequent time periods, depending on the household continues to engage in bondage for at least one more year.

From the participation constraint,

$$
\max\{V^d(B_s, D_{s+1}, D_{s+2}, ..., \bar{l}_{s+1}, \bar{l}_{s+2} ...), V^{od}(B_s, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+2}, \bar{l}_{s+3} ...)\} = V^{od}(B_s, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+2}, \bar{l}_{s+3} ...),
$$

and as such, $V^d(B_{s-1}, D_s, D_{s+1}, ..., \bar{l}_s, \bar{l}_{s+1}, ...)$ simplifies to

$$
\max_{\bar{l}_s : B_s} \{\log(B_{s-1} - \bar{C}) + \rho \alpha \log((1 - \bar{l}_s + a \ell_s^k) - B_s) \\
+ \rho (1 - \alpha) \log(1 - \ell_{s+1}^k) + \rho^2 \log(B_s - \bar{C})\} + \rho^3 \bar{V}_s^d
$$

where $\bar{V}_s^d$ in equation (8) is given by:

$$
\max_{\ell_{s+1} : B_{s+1}} \left(\rho \alpha \log((1 + a \ell_{s+1}^k) - B_{s+1}) + \rho (1 - \alpha) \log(1 - \ell_{s+1}^k) \\
+ \rho^2 \max\{V^d(B_{s+1}, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+2}, \bar{l}_{s+3} ...), V^{od}(B_{s+1}, D_{s+2}, D_{s+3}, ..., \bar{l}_{s+3}, \bar{l}_{s+4} ...)\}\right).
$$

is independent of $B_{s-1}$ and $B_{s+1}$.

Reference


### Table 2: Economic Characteristics and Regional Distribution

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
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<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
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<td>41.450</td>
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### Table 3: Export Orientation

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<th>Std. Dev.</th>
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### Table 4: Observance of Core Labor Standards

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### Table 5: Financial Development and Credit Markets

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<th>Std. Dev.</th>
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<td>9.438</td>
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<td>35</td>
<td>21.618</td>
<td>16.700</td>
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</table>
Table 6: Logit Regression
Dependent Variable: Incidence of Child Labor due to Debt Bondage

<table>
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<th>III</th>
<th>IV</th>
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<td>-2.2702 **</td>
<td>-2.0426 ***</td>
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<td></td>
<td>3.3389 *</td>
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<td>(1.79)</td>
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<td>enforce</td>
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<td>20.1275 ***</td>
<td>17.1691 ***</td>
<td>12.8437 ***</td>
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<td>(3.08)</td>
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<tr>
<td>N</td>
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Table 7: Logit Regression
Dependent Variable: Incidence of Child Labor due to Debt Bondage

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<td>19.9649 ***</td>
<td>13.1054 ***</td>
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<td>(3.77)</td>
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<td>(4.30)</td>
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<tr>
<td>N</td>
<td>47</td>
<td>71</td>
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<td>Wald Chi2</td>
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Figure 1: Per capita income, value-added per worker in Agriculture and the Incidence of Child Labor in Debt Bondage

1: Positive Incidence of Debt Bondage
0: No Reported Incidence of Debt Bondage
Figure 2: Per capita income, Economically Active Children, and the Incidence of Child Labor in Debt Bondage

1: Positive Incidence of Debt Bondage
0: No Reported Incidence of Debt Bondage
Figure 3: Per capita income, value-added per worker in Agriculture and Observance of Core Labor Standards

4: Adequate Protection of Freedom of Association Rights (OECD 2001)
1: Serious Violation of Freedom of Association Rights
Figure 4: Per capita income, value-added per worker in Agriculture and Minimum Age Legislations in Agriculture

1: Minimum Age Legislations Grant Exceptions to Child Labor Work in Agriculture
0: Minimum Age Legislation Applies in Agriculture
Figure 5. Child Labor Supply and Subsistence Consumption
Figure 6. Child Labor Supply and Debt Bondage
Figure 7. Harvest Season Spot Market Wage and Interlinkage
Figure 8a. Steady State without Debt Bondage

$B_{\tau T} - C$

$\frac{p(w(1+a) - 2C)}{(1+p)}$

45°

Figure 8b. Steady State with Debt Bondage

$B_{\tau T} - C$

$\frac{p(w(1+a) - 2C)}{(1+p)}$

45°

$B^* - C$

$B^{(\tau-1)} - C$

$B^* - C$

$B^{(\tau-1)} - C$