

The Relationship between Labor Unionization and the Number of Working Children in India*

Nidhiya Menon**

First version: December 2005

This version: March 2007

Abstract:

This paper analyzes the link between labor unions and child work in India. We investigate how measures of unionization such as the number and membership of worker's unions, as well as education indicators, credit constraints, and other variables that capture a state's "economic health", influence the number of working children across the states of India. We account for the possible endogeneity of labor union variables in modeling the determinants of child labor. This is accomplished by using a state-specific fixed effects framework that captures the presence of unobservables, which may influence child labor and unionization simultaneously. Results indicate that there is a strong positive association between the unionization of labor and child work. Controlling for other variables, more children work in states characterized by relatively large amounts of unionization. This may be because "unionized" states have a higher incidence of labor unrest, which leads to disruptions in household earnings. Poor households in such states thus need to rely on their children's labor to supplement family income and consumption.

Keywords: Child Labor, Labor Unions, Union Membership, India.

J.E.L. Classification: J5, J13, O12

*We thank Rachel McCulloch and Narayanan Subramanian for helpful comments and suggestions on earlier drafts of this paper. Financial support provided by the Department of Economics & the International Business School of Brandeis University is gratefully acknowledged. We are indebted to Indiastat for providing access to their data. We are responsible for all errors that remain.

**Assistant Professor, Department of Economics & IBS, MS 021, Brandeis University, Waltham, MA 02454, USA. Tel. no. 1.781.736.2230. Email: nmenon@brandeis.edu.

Section 1: Introduction

That child labor is widespread in India is well-recognized. The National Sample Survey Organization's (NSSO) fifty-fifth round of the national sample survey indicates that in 1999-2000, there were 10.4 million working children between the ages of 5-14 years in India.¹ Given total population estimates, this number indicates that children in this age-group constituted approximately 4% of the total labor force in 2000.² Although most of them were employed in traditional agricultural activities on family farms, a significant proportion (approximately 9%) was also involved in manufacturing and factory work.³ India has the dubious distinction of having the largest number of child workers in South Asia, a region of the world which includes Bangladesh, Nepal, Sri Lanka, and Pakistan, where child labor levels are already very high.⁴

Poverty, restricted access to credit, lack of education and skills, low rates of return to education, negative shocks to household income and earnings, and widespread adult unemployment are the various reasons that are put forth to explain why child labor persists in developing countries. Among these, this research focuses on disruptions to household earnings which result from inordinately high levels of labor disputes as captured by measures of labor unionization. In our data, the pair-wise correlation coefficient between the number of registered workers' unions in a state and work-stoppages in that state is 0.3737.⁵ We hypothesize that by fueling labor unrest, which, in turn, causes uncertainty in household income, measures of unionization directly increase child labor. Hence, controlling for other factors that exert an influence, child work will be high in states marked by a relatively unionized work-force. To the best of our

¹ <http://www.ilo.org/public/english/region/asro/newdelhi/ipec/responses/india/#1>. November 21, 2005.

² http://www.photius.com/wfb2000/countries/india/india_people.html. November 21, 2005.

³ http://www.indianembassy.org/policy/Child_Labor/childlabor.htm. November 21, 2005.

⁴ <http://lnweb18.worldbank.org/sar/sa.nsf/0/6114c3934c4776238525696000487390?OpenDocument>. November 21, 2005.

⁵ This positive correlation coefficient is significant at the 5% level.

knowledge, our study is the first to document such a relationship between unions and child labor in India. Our data substantiate our hypothesis; we find that the number and membership of registered workers' unions significantly increase state-level numbers of working children between 5-14 years of age.

In order to paint a comprehensive picture of the relationship between child work and the organization of labor, a brief discussion of labor laws in India is warranted. In India, labor regulations encompass a wide variety of laws ranging from those formulated to ensure the health and safety of workers to those aimed at resolving industrial disputes. The former category includes policies on minimum wages, work hours, and health and safety standards for factories. The second broad category of labor laws aims at ensuring the rights of both workers and employers. These deal mainly with the rights of workers to unionize, collective bargaining processes, layoff policies, mechanisms to resolve disputes, and policies on strikes and lockouts. Hence, labor laws in India⁶ are all-encompassing, and have far-reaching impacts on the industrial climate of the country.

In this context, the main labor law that affects child work in India is the Child Labor (Prohibition and Regulation) Act of 1986. Under this, children below 14 years of age are prohibited from being employed in hazardous occupations, in factories and in mines. Furthermore, this Act regulates the conditions under which children are employed in other occupations. In 1993, subsequent legislation was enacted to prevent the employment of children in occupations such as printing, soldering, and cashew de-scaling and processing. In 1994, the

⁶ The Factories Act of 1948 and the Industrial Disputes Act of 1947 are the two most important acts that govern working conditions in factories and provide a mechanism for the settlement of industrial disputes. The former seeks to set standards for safe working conditions; mandates working hours and vacation and overtime policy; and sets health and safety standards. This Act, along with the Equal Remuneration Act of 1976, the Minimum Wages Act, the Payment of Bonus Act, and the Maternity Benefits Act; constitute the backbone of the labor laws in India today. The Industrial Disputes Act of 1947 and the Trade Unions Act seek to protect the worker from being exploited by the employer. The former provides guidelines for settling disputes, and also lays out conditions under which a worker may be laid off and the various ways of redressing the situation. The latter grants workers the right to unionize and outlines certain protections and privileges that union members would enjoy. Although these acts apply to all states in India, their efficacy depends on the political will of each state government.

National Authority for the Elimination of Child Labor was established under the aegis of the Government, to provide an umbrella organization that would oversee efforts to enforce the conditions of the Child Labor Act of 1986.⁷ Hence, both the central and state governments have been committed in their intention to reduce the numbers of working children in India.

In addition to legislation that directly affects child work, other factors that exert influences on state-level estimates of working children include the number and membership of unions, as well as indicators of a state's "economic health" (for example, education levels, unemployment rates, and income inequality measures). However, it is unlikely that such influences are exogenous. In particular, labor laws in India fall under the purview of state governments. While this introduces variation in labor statutes across the different states, it is also a possible cause for the endogeneity of state-level labor organization measures. For example, states may manipulate labor laws and make them more pro-employer in order to induce additional domestic and overseas investment (Menon & Sanyal, 2005). One way to accomplish this would be to suppress the number and membership of registered workers' unions. Since such manipulations are unobserved by researchers, their effects cannot be directly proxied for in the estimations (there are no variables to measure these effects directly). Such unobserved manipulations may lead to the endogeneity of the labor variables, which, if left uncorrected, result in biased and inefficient estimates. We correct for such endogeneity by implementing an approach that allows us to control for the possible non-random nature of the labor variables. With this correction, we find significant evidence that child labor increases with the total number and membership of registered workers' unions in India.

The paper is organized as follows. Section 2 discusses previous literature in the area. Section 3 provides details on the technique used in the paper, and section 4

⁷ http://www.indianembassy.org/policy/Child_Labor/childlabor.htm. Accessed on March 16, 2007.

discusses our data. The results of our estimations are also presented in Section 4.

Section 5 concludes with policy implications. The appendix, tables, and figures are presented at the end of the paper.

Section 2: Literature Review

Child Labor

Although the causes and consequences of child labor are well documented, to the best of our knowledge, no study has made the connection between the nature of the workforce in a state and the number of working children in that state. Limited indirect evidence is present in studies that consider the effect of imperfect labor markets in developing countries. For example, Bhalotra and Heady (2003) argue that the “wealth paradox” of relatively more children working in land-rich households may be explained by the incompleteness of adult labor markets in the developing world. Some evidence on the relationship between child work and the nature of the workforce is also provided in studies that consider the link between credit market imperfections and child labor. In particular, there is evidence that negative shocks to income (such as temporary unemployment) force the poorest households to depend on the earnings of their children. For example, Jacoby and Skoufias (1997) find that the incidence of child labor in rural India worsens with increases in the uncertainty of household income. One factor that may contribute to such uncertainty is adult unemployment caused by labor unrest. Basu (1999) argues that “...a typical reason for a child to drop out of school is ...a temporary mishap for the household, such as the father losing a job ...”⁸ If such “mishaps” occur frequently as a consequence of labor unrest, then there is an increased likelihood that children will work.

⁸ Basu (1999). p. 1108.

Other studies that emphasize that child work decreases as income becomes less-constrained include Jacoby (1994), Beegle et al. (2003), Edmonds and Pavcnik (2004), and Edmonds (2004). These studies underline the close link between shocks to household income and child labor. However, another channel which may explain why children work is disruptions to household income caused by labor unrest. If unemployment and other outcomes of labor unionization (such as lock-outs and work-stoppages) cause income uncertainty, then children may be forced to work in order to secure household earnings and consumption. This is the focus of our study.

Labor in India

In terms of previous work on labor laws and regulations in India, Sanyal and Menon (2005) and Menon and Sanyal (2005) have noted that new private and foreign investment shies away from states that have an overly militant work-force. This is primarily because states that have a pro-worker stance entail potentially high input costs for prospective employers. Aghion, Burgess, Redding and Zilibotti (2005), Besley and Burgess (2004), and Bajpai and Sachs (2000), confirm that stringent pro-worker regulations have negative effects on the economic performance of states in India. In sum, these studies suggest that states marked by labor conflict suffer from low levels of domestic and foreign investment, and consequently, experience slow economic growth. These are exactly the conditions in which child labor flourishes.

This paper contributes to the literature by presenting empirical evidence that the unionization of labor directly increases the total number of working children in a state. This result is robust to inclusion of input costs, measures of state infrastructure, measures of literacy and enrolment in primary school, information on credit availability, and information on unemployment rates. Given the debate on child labor and appropriate

methods to eradicate it, the results of this paper indicate that the extent of labor unionization is another dimension that needs to be taken into account.

Section 3: Econometric Methodology

Summary

We begin by providing a summary of our econometric methodology. The aim is to study the effect of union measures on the total number of working children (aged 5-14 years) by state. This aim underlies equations (1) and (2) of the paper. Equation (1) is the exogenous model, equation (2) is the model that corrects for endogeneity of the labor variables. This endogeneity arises due to two reasons. First, even though equation (1) controls for the effects of labor unionization, credit variables, input cost variables, unemployment, education, and other measures of state infrastructure, there could be other determinants of child work over and above these variables. Second, as noted before, state governments may manipulate labor laws in ways that are unknown to the researcher. Since data required for implementing a correction are absent in both these cases, spurious correlations between the unionization variables and the error term in (1) could arise. Thus, a technique such as ordinary least squares (OLS) which treats the union variables exogenously may indicate that unionization influences child labor purely because of spurious correlations that arise due to omitted variables. We use a state-fixed effects method to correct for the effect of such correlations (equation (2)); the state-fixed effects method treats union variables endogenously. We find that with the correction for spurious correlations (equation (2)), measures of labor unrest significantly increase child labor, net of credit, input costs, and other market variables mentioned above. Indeed, we find that the number and membership of worker's unions increase child labor net of

everything which is state specific and time invariant, and absent from our model due to data constraints.

The following section presents equations to explain our econometric technique in greater detail.

The State-Fixed Effects Model

Where c_{jt} denotes the total number of working children in state j at time t , X_{ijt} are exogenous variables where i denotes a particular variable, $L_{i'jt}$ are labor unionization variables where i' denotes a particular variable, and ν_{jt} is an idiosyncratic error term,

$$c_{jt} = \gamma_{i'}L_{i'jt} + \beta_i X_{ijt} + \nu_{jt} \text{ --- (1)}$$

Equation (1) relates total number of working children in state j at time t to unionization measures and variables in X_{ijt} , under the assumption that the right hand side variables in (1) are exogenous.

For reasons outlined above in the summary section, we hypothesize that ν_{jt} consists of a state specific component μ_j and an idiosyncratic component ε_{jt} . To reiterate, this is done to correct for the effect of correlations (at the state level) that may arise due to omitted variables. Equation (1) is modified to account for such state-specific heterogeneity. This leads to the following:

$$c_{jt} = \gamma_{i'}L_{i'jt} + \beta_i X_{ijt} + \mu_j + \varepsilon_{jt} \text{ --- (2)}$$

Equation (2) is a state fixed-effects regression that controls for state-specific unobservables (μ_j). As seen below, when the endogeneity of unionization variables is taken into account, measures of labor unrest significantly increase the incidence of child labor (net of other variables listed above) at the state level.

Section 4: Data and Results

Data

Table 1 reports the means and standard deviations of the variables used in the estimations, and table 1(b) provides sources.⁹ Variables related to unionization, credit availability, planned outlay, and research and development (R & D) expenditures are scaled by a measure of gross state product. This is done in order to control for differences across states in terms of size of manufacturing and other activities. To some extent, this normalization also controls for differences in size of state economies (we address this question more fully later on in the paper). We use three years of data (from 1996, 1999, and 2000) for each of the sixteen states of India, where these sixteen states are the same as in Besley & Burgess (2004)¹⁰.

As evident from table 1, the average number of working children (at the state level) between 5-14 years of age for the three years that we consider was approximately 800,000. To measure unionization at the state level, we use the number of registered unions in the state divided by industrial gross state product (GSP), and membership of registered unions submitting returns normalized by industrial GSP. Means and standard deviations for these variables are as presented in table 1. Other variables for which means and standard deviations are presented in table 1 include normalized measures of ICICI bank disbursements, planned outlay on manufacturing and mining, and state expenditures on research and development. We measure input costs using information on average daily wages for unskilled workers and average power tariffs. Inequality is

⁹We mention the original sources for the majority of our data, even though we use the electronic versions put together by Indiastat, a web based data vendor specializing in Indian data.

¹⁰ In particular, the states that we focus on are Andhra Pradesh, Bihar (includes Jharkhand), Gujarat (includes Dadra & Nagar Haveli), Haryana, Karnataka, Kerala, Madhya Pradesh (includes Chhattisgarh), Maharashtra (includes Goa, Daman & Diu), Orissa, Punjab (includes Chandigarh), Rajasthan, Tamil Nadu (includes Pondicherry), Uttar Pradesh (includes Uttaranchal), West Bengal, Delhi, and a “other” states category which includes Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Lakshadweep and the Andaman and Nicobar Islands are not a contiguous part of India and are thus excluded from our study.

measured by a state level Gini coefficient, and infrastructure, by kilometers of surfaced roads in a state. Table 1 presents means and standard deviations for these variables as well as for our measures of literacy, unemployment, and credit availability.

In terms of the effects of the variables in table 1, we consider economic characteristics like gross state domestic product, measures of ICICI bank disbursements, planned outlay by the state on manufacturing and mining, the average Gini coefficient, enrolment in literacy programs, enrolment in primary school, and measures of R & D expenditures by the state government, as indicators of a state's "economic health" and prosperity. We believe that on average, child labor should be low in states with relatively high levels of social, political, and economic development. In terms of the input cost indicators, we hypothesize that states with relatively high adult wages should experience low levels of child labor. This is because in regions where adults earn sufficient wages, children would not need to work in order to supplement family income. The effect of power tariffs is, however, ambiguous. Low power tariffs may induce more child labor by fueling the start-up of industries that employ children. However, low power tariffs could also lead to the set-up of industries that employ adult labor, thus decreasing the monetary incentive for children to work. Unemployment and access to credit (as measured by outstanding credit of commercial banks) have clear expected effects. In states where adult unemployment is high, more children are likely to work in order to buttress family income. Similarly, child labor is expected to be high in states with restricted access to credit.

Figures 1 and 2 depict the relationship between membership of unions and the total number of working children by state in 1996 (the first year that we consider in our

study) and 2000 (the last year we consider in our study).¹¹ The figures provide concrete evidence of a positive correlation between union membership and child labor at the state level.¹² That is, children are more likely to work in regions where labor is relatively more organized.

Estimation Issues

Before discussing our results, we note that our estimations are likely to be affected by certain issues. First, given data availability and the nature of this study, we cannot control for household characteristics that may strongly influence child labor. This research focuses only on correlations between the organization of labor and numbers of working children at the state level. Although we control for aggregate state-level indicators of education, credit availability, unemployment, and inequality in our estimations, clearly, a more disaggregate household-specific analysis could shed additional light on the effect of labor organization on child labor.

Second, a household-specific analysis would also be of use in deciphering problems related to selection on observables (measurable characteristics of children who work) and unobservables (tastes and preferences of households in which children work). Our use of state fixed-effects helps us circumvent selection problems due to all unobservables that are state-specific and time-invariant. However, unobservables that are not state-specific and time-invariant may still affect our estimates. Given lack of data at the household level, we cannot adequately address these concerns in our present work. However, as seen below, our state fixed-effects estimations provide significant evidence that child work is high in states that are relatively more unionized. We expect that with household data, these results will only get stronger.

¹¹ A similar pattern is evident when we consider the relationship between the total number of unions and the total number of working children in a state, for 1996 and 2000. These figures are not presented.

¹² The units of measurement for variables on the two axes of figures 1 and 2 are different. That is why it appears as if there is no membership in unions in states 1 and 2 of figure 1 and states 2 and 3 of figure 2.

Results

In order to demonstrate the extent of the bias that results when we do not control for state-specific unobservable effects, we estimate equation (1) for the basic relationship between child work and the labor unionization variables. This table is presented in the appendix of the paper. As evident from column (1), the number of unions has a weekly significant effect on child labor at the state-level. Columns (2) and (3) report some significance for the unionization measures, but as seen by the results in the more appropriate models of table 2 below, the parameters in the naïve models of the appendix are under-estimated and less efficient.

Table 2 reports the results of a state-fixed effects estimation that controls for the endogeneity of the unionization variables (equation (2)). The dependent variable is the same as in the table in the appendix, and is a scaled version of the total number of working children between 5-14 years of age. Similar to the table in the appendix, columns (1) and (2) present results when unionization variables are included individually in the specification; column (3) reports results for a specification that includes both variables. As evident, all three columns of table 2 confirm that the number and membership of unions significantly increase child labor. Furthermore, the estimates for the unionization variables in table 2 are larger in magnitude and relatively more significant as compared to the estimates in the biased models of the table in the appendix.

Table 2 also reports results for the state-fixed effects. Focusing on the specification in column (3), it is evident that seven of the sixteen state-fixed effects are significantly different from zero. A test that these state-level effects are jointly zero is strongly rejected ($F[16, 30]=7.47$, Probability $> F = 0.0000$).¹³ This emphasizes the

¹³ A similar test was conducted for the specifications in columns (1) and (2) of table 2. These tests also strongly rejected the null hypothesis that the state-level effects are jointly zero.

importance of controlling for state-specific unobservables in the estimation; a model that does not account for state specific effects (such as equation (1)) would lead to incorrect conclusions.

Table 3 presents results for state-specific fixed effects regressions that include other variables in addition to measures of labor unionization.¹⁴ The dependent variable is the same as before. As noted above, state-sponsored R & D expenditures and infrastructure measures such as the length of surfaced roads serve as indicators of economic prosperity. As evident, these variables have the expected effects on child labor, although these effects are not significant. The effect of the input cost variables is unclear, and there is some (weak) evidence across the specifications that income inequality worsens child labor. The measure of enrolment in primary school appears to have a significant positive effect on child work; this is probably because this variable is strongly correlated to the total number of children in the 5-10 age group, which, in turn, is correlated to the dependent variable. However, even with controls for GSDP, R & D expenditures, input cost variables, income inequality, indicators of state infrastructure, education, and credit availability, the unionization variables remain significant in all specifications. Net of the other variables, results in table 3 indicate that child work is more prevalent in states that are relatively more unionized.

Table 4 reports results for state-fixed effects regressions that add unemployment and access to credit measures to the specifications in table 3.¹⁵ The variable that measures unemployment in our models is positively correlated to the number of registered unions at the 18% level of significance, and positively correlated to the membership of registered unions at the 5% level of significance. This implies that across

¹⁴ In the interests of brevity, estimates for state-fixed effects are not reported in table 3.

¹⁵ Estimates for state-fixed effects are not reported in table 4.

the states of India, unemployment increases with labor unrest. However, as seen in table 4, the effects of unemployment are measured imprecisely. This may be due to the fact that unemployment in these data is measured with error. Reduced precision may also be due to the fact that unemployment is strongly correlated to the included measures of labor unrest, in particular, membership of registered unions. Access to credit, as measured by the outstanding credit of commercial banks, also appears to be insignificant in table 4.

The number of registered unions is not significant in the full specification of column (2) in table 4. This is because this variable is highly correlated (a pair-wise correlation coefficient of 0.5548 which is significant at the 5% level) to the membership of registered unions. Given this, columns (3) and (4) present results for regressions that include either of these variables individually. With controls for other variables related to costs, investments, and state infrastructure, the coefficient on the number of unions in column (3) is significant at the 1% level. As is clear from column (4), membership of unions also has an effect that is significant at the 1% level. The estimates imply that increasing numbers of unions and increasing levels of union membership are associated with more child work at the state level.

Finally, we also investigate whether there are any biases that result from the differing size of state economies. For example, if states with larger economies tend to have more working children, then spurious correlations could arise. In order to determine whether such a bias is present, we formulate a 'big state' dummy. This dummy takes the value one if a state's industrial gross state product exceeds the median value (over all states) in a particular year. We interact this dummy with the unionization variables, and introduce these interaction terms into the specifications of columns (3) and (4) of table 4 (these estimates are not reported). If systematic differences by size of the state economy exist, then the interaction terms should be significant. Upon estimating the models, we find that although the interaction term for the

number of unions is significant, we cannot reject that the total effect of this variable on child labor is zero. The interaction term for membership shows a similar pattern. Hence, there is little evidence that our estimates suffer from bias due to the differing size of state economies.

Section 5: Conclusions and Policy Implications

This paper studies the effects of labor organization on child work in India. We find striking evidence in our data that the number of registered unions and membership of registered unions strongly increase the total number of working children across the states of India. This result is robust to inclusion of variables that control for input costs, credit availability at the state level, income inequality, infrastructure, education, unemployment, and access to credit. Furthermore, statistical tests indicate that unobservables at the state level exert strong influences; thus, unionization variables are endogenous in a study of child labor in India. As demonstrated in this research, a failure to correct for such endogeneity would lead to biased and inefficient results.

This research has important policy implications. Although results indicate that child labor increases with unionization, the main recommendation of this study is not that unions must be abolished in order to reduce child labor in India. In fact, in recent times, labor unions have made some effort to join hands with government authorities to reduce the number of working children.¹⁶ To a large extent, the problem is not in the number and membership of unions, it is in the fact that states with large numbers and membership of unions also tend to have large numbers of strikes and work-stoppages (in these data, the correlation between membership of unions and the number of strikes in the state is

¹⁶ www.ilo.org/public/english/region/asro/newdelhi/ipec/download/india.pdf. p. 7. Accessed on October 19, 2006.

0.4753).¹⁷ This leads to disruptions in household earnings, which, in turn, causes the need for children to work. Clearly, the longer a strike, the longer the disruption in household income, and thus, the more urgent the need for a child to work. Hence, one possible strategy to reduce child labor that arises due to such causes may be for state governments (or another third party) to intervene and resolve employer-worker disputes within a relatively short span of time.

Second, the presence of a monetary safety net may reduce the dependence on child labor during times of labor unrest. Workers who are relatively well-off already have access to such safety nets in the form of savings and/or credit. Perhaps a need-based fund to finance consumption could be established for use by workers who are among the absolute poor. Resources from this fund could be borrowed during times when household income is low, the funds could then be repaid once disputes are resolved and income becomes more stable. Although there could be several hurdles associated with the set-up of such a fund (for example, who would pay for it, what strategies would be needed to ensure that such a fund is economically viable in the long-run, and what criteria should determine eligibility to use the resources of such a fund), the establishment of a monetary safety net for use during times of labor unrest could reduce the dependence of poor households on their children's earnings.

Finally, it is important to keep in mind that this research is a partial equilibrium study which focuses on the effects of labor organization on child work. Given its nature, the results of this study may be less strong in a general equilibrium context. That is, it is possible that workers who are unionized have higher levels of welfare (because of better

¹⁷ We do not use the number of strikes and work-stoppages directly in our models since these variables have missing observations for several of the states we consider. The reported correlation takes into account the missing observations for the number of strikes variable.

pay, better healthcare, and so on) as compared to those who are not.¹⁸ These positive benefits may have spillover effects on family members. Hence, the relationship between labor unionization and child work may be different in a study that models all such externalities in every sector of the economy. This research focuses on one of the important links among the various inter-dependencies that exist, and empirically demonstrates that the incidence of child labor is worst in states where labor is relatively more organized.

¹⁸ This could be particularly true of unionized labor in developed economies such as the United States, although not necessarily true in developing countries such as India.

References

- Aghion, Philip, Burgess, Robin, Redding, Stephen, and Fabrizio Zilibotti. 2005. "The Unequal Effects of Liberalization: Evidence from Dismantling the License Raj." Mimeo.
- Bajpai, Nirupam and Jeffrey Sachs. 2000. "Foreign Direct Investment in India: Issues and Problems." Harvard Institute for International Development, Discussion Paper No. 759.
- Basu, Kaushik. 1999. "Child Labor: Cause, Consequence, and Cure, with Remarks on International Labor Standards." *Journal of Economic Literature*. 37(3).
- Beegle, Kathleen, Rajeev H. Dehejia, and Roberta Gatti. 2006. "Child Labor, Income Shocks, and Access to Credit." *Journal of Development Economics*. 81.
- Besley, Timothy and Robin Burgess. 2004. "Can Labor Regulation Hinder Economic Performance: Evidence from India." *Quarterly Journal of Economics*. 119(1).
- Bhalotra, Sonia and Christopher Heady. 2003. "Child Farm Labor: The Wealth Paradox." *World Bank Economic Review*. 17(2).
- Dev, S.M, P. Anthony, V. Gayathri, and R.P. Mamgain. Eds. 2002. *Social and Economic Security in India*. New Delhi, India: Institute for Human Development.
- Edmonds, Eric, and Nina Pavcnik. 2005. "The Effect of Trade Liberalization on Child Labor." *Journal of International Economics*. 65(2).
- Edmonds, Eric. 2004. "Child Labor and Schooling Responses to Anticipated Income in South Africa." *Journal of Development Economics*. Forthcoming.
- Jacoby, Hanan G. 1994. "Borrowing Constraints and Progress Through School: Evidence from Peru." *The Review of Economics and Statistics*. 76(1).
- Jacoby, Hanan, and Emmanuel Skoufias. 1997. "Risk, Financial Markets, and Human Capital in a Developing Country." *The Review of Economic Studies*. 64(3).
- Menon, Nidhiya and Paroma Sanyal. 2005. "Labor Conflict and Foreign Investments: An Analysis of FDI in India." *Review of Development Economics*. Forthcoming.
- Sanyal, Paroma and Nidhiya Menon. 2005. "Labor Disputes and the Economics of Firm Geography: A Study of Domestic Investment in India." *Economic Development and Cultural Change*. 53(4).

Appendix: Naïve Models

Dependent variable is the total number of working children between 5-14 years of age (in hundred thousands)

Variable	(1)	(2)	(3)
Number of registered unions norm. by industrial GSP	0.1157# (0.0639)		0.0515* (0.0250)
Membership of registered unions norm. by industrial GSP		0.5030** (0.1355)	0.4230** (0.1396)
Constant	6.0092** (1.1090)	6.2694** (0.9502)	5.6858** (1.0567)
Observations	48	48	48
R-squared	0.177	0.327	0.354

Robust standard errors in parenthesis.

Significant at 10%; *significant at 5%; **significant at 1%.

Table 1: Means and standard deviations

Variable	Mean	Std. Dev.
Number of working children between 5-14 years (in '00000s)*	7.902598	7.619184
Number of registered unions normalized by industrial gross state product (GSP)	16.37128	27.73751
Membership of registered unions submitting returns normalized by industrial gross state product (GSP)	3.24695	8.667462
ICICI disbursement normalized by industrial gross state product	85.46047	115.4508
Planned outlay on manufacturing and mining norm. by real gross state domestic product (GSDP)	23.0688	19.36294
Real gross state domestic product	629.2709	417.132
State expenditures on R&D norm. by real gross state domestic product (GSDP)	11.23523	6.361381
Average (of male and female) daily wage for unskilled workers	49.5261	15.27499
Average (of small, medium, and large industries) power tariff	377.6058	61.92152
Average (of rural and urban) Gini coefficient	0.268717	0.015846
Average (of rural and urban) workforce participation rate	31.08689	3.27191
Kilometers of surfaced roads	1.1355	3.68114
Enrolment in literacy programs	174.8615	178.244
Enrolment in primary (grades 1-5) school (in '000000s)	7.158358	4.407683
Unemployment rate as a proportion of the total labor force	10.52917	12.67965
Outstanding credit of commercial banks (in '00000s rupees)	51.92	53.99275

*Denotes dependent variable.

Total number of state-year observations is 48.

Table 1(b): Variables and Sources for 1996, 1999, and 2000

Variables	Source
Dependent variable	
Number of working children by state	National Institute of Public Cooperation and Child Development
Labor variables	
Number of registered unions	Statistical Abstract, 2001, Central Statistical Organization.
Membership of registered unions	Statistical Abstract, 2001, Central Statistical Organization
Measures of resource availability	
ICICI bank disbursement	Rajya Sabha Unstarred Question No.1794, dated 8.8.2000
Planned outlay by state on manufacturing and mining	Handbook of Industrial Policy and Statistics, Ministry of Commerce & Industry, Govt. of India, 2000
Real gross state domestic product	Central statistical organization
Expenditures on R&D by state	Research and Development Statistics - Ministry of Science and Technology, Govt. of India
Input cost and infrastructure variables	
Average (of male and female) daily wage for unskilled workers	Building Material Prices and Wages of Labor, Ministry of Urban Development & Poverty Alleviation, Govt. of India.
Average power rate for large, medium, and small industries	Rajya Sabha Unstarred Question No. 845, dated 24.07.2002.
Kilometers of surfaced roads	Basic Road Transport Statistics of India, Ministry of Transport and Highways, Govt. of India
Other variables	
Average (of rural and urban) Gini coefficient	National Human Development Report 2001, Planning Commission, Govt. of India.
Average (of rural and urban) workforce participation rate	India Yearbook 2002, Manpower Profile.
Enrolment in literacy programs	Annual Report 1998-99, Literacy Campaigns in India, Directorate of Adult Education, Ministry of Human Resource Development (MHRD).
Enrolment in primary school	Dept. of Secondary and Higher Education. MHRD.
Unemployment rate	National Human Dev. Report, 2001, Planning Commission
Outstanding credit of commercial banks	Reserve Bank of India.
Normalization variables	
Industrial GSP	Central statistical organization

Table 2: Basic Regressions

Dependent variable is the total number of working children between 5-14 years of age (in hundred thousands)

Variable	(1)	(2)	(3)
Number of registered unions norm. by industrial GSP	0.1441** (0.0481)		0.0787** (0.0211)
Membership of registered unions norm. by industrial GSP		0.6983** (0.1373)	0.5221** (0.1149)
Andhra Pradesh fixed effect	15.5503** (1.6998)	16.0148** (2.6240)	15.4886** (2.2555)
Bihar fixed effect	9.9099** (2.9305)	10.7724** (2.9026)	10.3017** (2.9367)
Gujarat fixed effect	3.5040* (1.4870)	3.8445** (1.1378)	3.6587* (1.3482)
Haryana fixed effect	-0.2767 (0.9561)	-0.353 (0.8420)	-0.7885 (1.0204)
Karnataka fixed effect	3.287 (3.3757)	4.3589 (3.1516)	3.4395 (3.4729)
Kerala fixed effect	-1.8016 (2.8128)	2.7868 (4.5105)	-0.5098 (1.4446)
Madhya Pradesh fixed effect	11.1304** (2.2402)	11.3424** (2.3004)	11.2267** (2.3026)
Maharashtra fixed effect	6.5795** (2.3734)	6.9316** (1.6524)	5.8197** (1.9322)
Orissa fixed effect	5.7776 (4.6226)	6.1075 (3.9479)	5.2018 (4.0515)
Punjab fixed effect	-0.0491 (1.5563)	0.2841 (1.2636)	-0.6481 (1.5652)
Rajasthan fixed effect	6.0988 (4.1162)	8.6868* (3.3792)	7.1884 [#] (3.7686)
Tamil Nadu fixed effect	2.3463 [#] (1.3403)	2.3035 [#] (1.1502)	1.6064 (1.4891)
Uttar Pradesh fixed effect	12.6955** (4.5886)	13.1103** (4.2069)	12.8839** (4.4846)
West Bengal fixed effect	2.4073 (3.3312)	5.2568 [#] (2.6629)	3.7017 (2.7691)
Other states fixed effect	12.4621 [#] (6.6291)	-1.5324 (6.0797)	0.6048 (3.7790)
Delhi fixed effect	-0.935 (1.3947)	0.2485 (0.2762)	-0.4607 (0.7674)
Observations	48	48	48
R-squared	0.834	0.867	0.89

Robust standard errors in parenthesis.

[#] Significant at 10%; * significant at 5%; ** significant at 1%.

Table 3: Regressions Including Other Variables

Dependent variable is the total number of working children between 5-14 years of age (in hundred thousands)

Variable	(1)	(2)	(3)
Number of registered unions norm. by industrial GSP	0.0788* (0.0307)	0.0701* (0.0288)	0.0765# (0.0390)
Membership of registered unions norm. by industrial GSP	0.6164** (0.1315)	0.6037** (0.1451)	0.5805** (0.1774)
Real gross state domestic product	-0.0047 (0.0101)	-0.0042 (0.0085)	-0.0028 (0.0103)
State expenditure on R&D norm. by real GSDP	0.1977 (0.5522)	0.2824 (0.6738)	0.312 (0.7258)
Average daily wage	0.1549 (0.1516)	0.1392 (0.2423)	0.1166 (0.2515)
Average power tariff	-0.0057 (0.0218)	0.009 (0.0257)	0.0098 (0.0270)
Average Gini coefficient	-131.3722 (103.2078)	-69.5522 (123.4299)	-83.7054 (138.0469)
Average workforce participation rate	0.3054 (0.6218)	-0.0968 (0.6783)	0.0562 (0.7531)
Kilometers of surfaced roads	0.5307 (1.1812)	1.1773 (0.9625)	1.1856 (0.9859)
Total planned outlay norm. by real GSDP		0.1014 (0.1188)	0.0895 (0.1336)
Enrolment in literacy programs		0.0022 (0.0108)	-0.002 (0.0170)
Enrolment in primary school		1.2352* (0.5857)	1.1778# (0.5789)
ICICI disbursement norm. by industrial GSP			-0.0079 (0.0268)
Observations	48	48	48
R-squared	0.906	0.925	0.925

Robust standard errors in parentheses.

Significant at 10%; * significant at 5%; ** significant at 1%.

Model includes state-fixed effects.

Table 4: Regressions Including Unemployment and Access to Credit Measures

Dependent variable is the total number of working children between 5-14 years of age (in hundred thousands)

Variable	(1)	(2)	(3)	(4)
Number of registered unions norm. by industrial GSP	0.0838 [#] (0.0447)	0.0803 (0.0517)	0.1660** (0.0448)	
Membership of registered unions norm. by industrial GSP	0.5086* (0.2128)	0.5113* (0.2213)		0.7535** (0.1318)
ICICI disbursement norm. by industrial GSP	-0.0166 (0.0301)	-0.0196 (0.0374)	-0.0555 (0.0357)	-0.0026 (0.0371)
Total planned outlay norm. by real GSP	0.0504 (0.1473)	0.0455 (0.1425)	0.026 (0.1537)	0.0718 (0.1436)
Real gross state domestic Product	0.0111 (0.0203)	0.0079 (0.0315)	0.0261 (0.0317)	-0.0068 (0.0297)
State expenditure on R&D norm. by real GSDP	0.2589 (0.7336)	0.2321 (0.7625)	0.2062 (0.8508)	0.1212 (0.7410)
Average daily wage	0.0271 (0.2923)	0.0106 (0.3046)	-0.2043 (0.2808)	0.06 (0.3204)
Average power tariff	0.0091 (0.0262)	0.008 (0.0279)	0.0167 (0.0234)	0.003 (0.0280)
Average Gini coefficient	-85.8859 (131.4056)	-90.4368 (147.9336)	-84.5446 (134.0705)	-82.2834 (154.4752)
Average workforce participation rate	0.2767 (0.8187)	0.304 (0.8475)	0.8986 (0.7821)	-0.0668 (0.9152)
Kilometers of surfaced Roads	0.9622 (1.0638)	0.9702 (1.0995)	0.2658 (1.3036)	1.2978 (1.1479)
Enrolment in literacy Programs	-0.0077 (0.0201)	-0.0081 (0.0209)	-0.0401 [#] (0.0204)	0.0093 (0.0184)
Enrolment in primary School	0.9932 (0.5871)	0.9951 (0.6087)	0.4591 (0.5524)	1.2978 [#] (0.6659)
Unemployment rate	-0.2969 (0.3126)	-0.3439 (0.3873)	-0.6407 (0.4608)	-0.3682 (0.3957)
Outstanding credit of commercial banks		0.0234 (0.1457)	0.0071 (0.1463)	0.0826 (0.1367)
Observations	48	48	48	48
R-squared	0.927	0.928	0.908	0.919

Robust standard errors in parentheses.

[#] Significant at 10%; * significant at 5%; ** significant at 1%.

Model includes state-fixed effects.

Figure 1: Membership in Unions and Total Number of Working Children by State in 1996

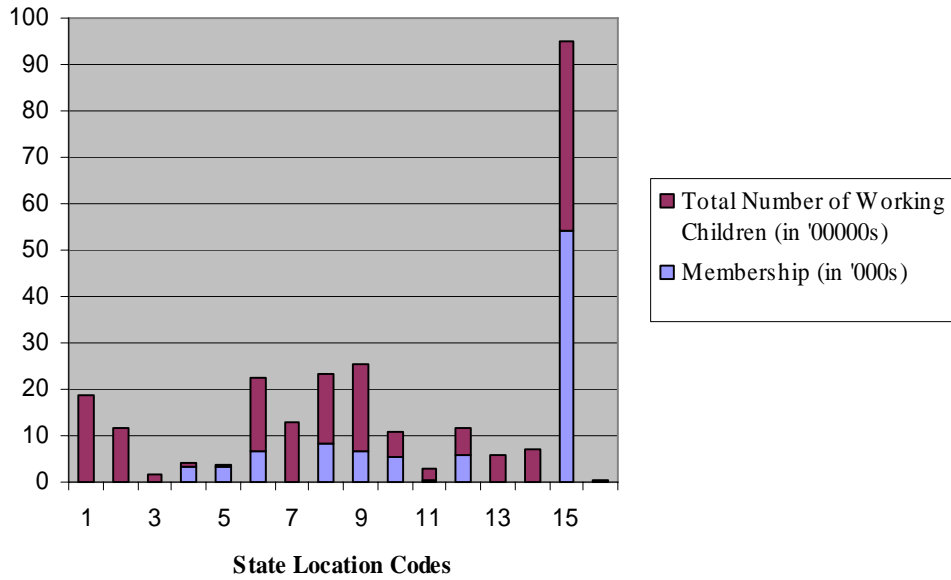


Figure 2: Membership in Unions and Total Number of Working Children by State in 2000

