# Labor Disputes and the Economics of Firm Geography: A Study of Domestic Investment in India

PAROMA SANYAL and NIDHIYA MENON
Brandeis University

## I. Introduction

Rapid economic growth is perceived as a panacea for developing nations. Hence, in the interest of increasing the pace of development, countries have begun to reexamine the way they do business. Governments in developing countries talk about reforming laws and removing roadblocks in order to usher in a golden age of domestic and foreign investment. Reforms in various spheres, including the financial sector, taxation, agriculture, industrial policy, pollution regulation, infrastructure, intellectual property rights, and labor laws, are needed to enhance global competitiveness. A detailed study of this issue is important in order to get a clear view of the link between regulations and investments. In this article, we study the effect of labor conflict and formal labor laws on new investment in the various states of India. We find that labor disputes and pro-worker legislations inhibit location choice and new investments.

With the initiation of liberalization policies and economic reforms in India in 1991, the role of private investment in economic growth has gained significant importance.[1] States now compete with one another to attract new investment. In such interstate competition, environmental and labor regulations are key. In the context of developed economies, there is a large theoretical and empirical literature on the effect of regulations on a firm's location and investment decisions. However, there is a paucity of research on this topic in the context of developing countries. One of the few exceptions is Besley and

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[1] India started major economic reforms and nationwide liberalization in 1991 in response to a fiscal and balance-of-payments crisis. These reforms encompassed all major areas—industrial policy, trade and exchange rate policy, tax reforms, and public sector policies.

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Burgess (2002), which found that movements toward pro-worker policies were associated with lower levels of investment, employment, and output for Indian manufacturing industries. However, to the best of our knowledge, no study has considered how labor conditions in a state affect firm incentives at a micro level. By analyzing the impact of amendments to the Industrial Disputes Act of 1947 (our measure of formal labor legislation) and the influence of labor conflict on new investment, we address this gap in the literature.

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 is aimed at ensuring the rights of both workers and employers. Laws in this category deal mainly with the rights of workers to unionize, collective bargaining processes, layoff policies, mechanisms for resolving disputes, and policies on strikes and lockouts. The focus of the current analysis is on how the latter set of factors affects the input costs of firms, and hence, the choice of the Indian state in which to locate a new project.

Our analysis of firm location choice provides striking results. We find that measures of labor conflict such as the state-wise number of lockouts, the percentage of unionized workers, and the number of man-days lost in disputes resulting in work stoppages all have strong negative impacts on new investment. Our results are robust to the inclusion of such variables as a Gini inequality measure and other measures of input costs and state infrastructure. Results are also unaffected when we condition on institutional labor legislation and account for project characteristics. Finally, we estimate a more flexible specification that allows us to model the fact that certain industries are constrained by their need for proximity to sources of raw materials and minerals. We find that such considerations are particularly important for new projects in the mining and agricultural industries.

The remainder of this article consists of five main sections. Section II provides a literature review. Section III gives an overview of the data, while Section IV discusses our empirical methodology. Section V reports our results, and Section VI concludes.

## II. Literature Review

### *A. Investment and Location Choice*

We start by focusing on the body of literature on determinants of location decisions. While none of these studies considers labor conflict per se, several do provide useful insights into factors that may retard or encourage new

investment. Most employ conditional logit models to study a firm's location choice. The explanatory variables include institutional and regulatory factors, economic parameters, and indicators of the existing industrial environment—all of which affect the firm's operating costs. In general, environmental regulations, wages, energy costs, property value, and unemployment all have negative impacts on location probabilities, while population and better infrastructure have positive impacts (McConnell and Schwab 1990; Levinson 1996; List and Co 2000; Wolverton 2002). In addition, recent work (Keller and Levinson 2002) has found that pollution abatement costs have deterring effects on foreign direct investment in the states of the United States.

In terms of labor measures specifically, the results are mixed. For example, the presence of unions increases the collective bargaining power of workers and raises wages—this factor should negatively affect location decisions. However, evidence for the United States ranges from a positive and significant relationship between the percentage of unionized workers and location choice probabilities (List and Co 2000) to no relationship (McConnell and Schwab 1990) to significant negative impacts of unionization (Bartik 1985). However, differences in right-to-work laws across U.S. states are found to have strong effects, with more "pro-business" states attracting the lion's share of manufacturing activity (Holmes 1998).

In the case of developing countries, Kuncoro (2000) has found similar effects of wages and infrastructure on the location decisions of firms in Indonesia. For India, Mani, Pargal, and Huq (1997) fail to find evidence that environmental policies affect a polluting firm's location decision. They explain the nonsignificance of their results by arguing that other factors may be important determinants of project location choice. One such factor is labor laws.

### *B. State-Level Regulatory Environment in India*

Labor laws in India are all encompassing and have far-reaching impacts on the industrial climate of the country.[2] Heterogeneity in labor regulations at

[2] 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.

the state level arises from two sources. First, depending on the nature of the government in power, states pass amendments to labor laws that are more pro-worker or more pro-employer than the central government law. Our discussion of such amendments is based on Besley and Burgess (2002), who rate state labor law amendments (to the Industrial Disputes Act of 1947) from 1958 to 1990 and code each as neutral, pro-worker, or anti-worker.[3] Second, the implementation of laws may be affected by other considerations. For example, in a state like West Bengal, the Communist Party has been in power for the past 20 years. The pro-worker bias of the party may affect outcomes of collective bargaining, disputes, and strikes, even without any formal changes in labor policies at the level of the state government occurring.

Although recent work has shown that stringent pro-worker regulations have negative impacts on the economic performance of states in India (Bajpai and Sachs 2000; Aghion, Burgess, and Redding 2002; Besley and Burgess 2002), no study has considered how labor conflict at the state level influences the location decisions of new projects in India. By analyzing this question using a fixed-effects conditional logit methodology, this article contributes to the research on the economics of firm geography in developing countries.

## III. Data

The data used in this study are from two primary sources—the Center for Monitoring the Indian Economy (CMIE) and Indiastat. The CMIE data set tracks every major new investment made in India since July 1995, as well as other project characteristics such as status (proposed, under implementation, completed), ownership (private Indian, private foreign, state government, central government, joint sector, cooperative sector), type (new unit, substantial expansion, renovation/modernization, rehabilitation), and industrial classification.[4]

Our study focuses on the time period from 1997 to 1999. The estimation sample in our research is composed only of private domestic projects, either under implementation or completed. We exclude projects in the service and irrigation sectors, and we include those in the manufacturing; mining; agriculture; and electricity, gas, and water sectors. See tables 1 and 2 for further details regarding the sample. Our sample thus consists of 637 projects over our time span of interest. In our data, the mean investment (for the 1997–99 time period) is 158 crore rupees (approximately US$32 million).[5]

[3] A complete summary of all the amendments and the coding is available at http://econ.lse.ac.uk/rburgess. A pro-worker amendment is coded as one, a neutral amendment as zero, and an anti-worker amendment as negative one.

[4] The CMIE tracks all new investments that are 40 lakhs (approximately US$80,000) and above.

[5] One crore = 10,000,000 rupees.

**TABLE 1**
**INDUSTRIAL CLASSIFICATION**

| Classification | Industry Subcategories |
|---|---|
| Manufacturing | Base Metals, Chemicals, Electric Machinery, Electronics, Fats and Oils, Leather, Miscellaneous Manufacturing, Nonelectrical Machinery, Plastics, Pulp and Paper, Textiles, Transport Machinery, Wood |
| Mining and Quarrying | Minerals, Nonmetal Minerals |
| Agriculture, Forestry, and Fishing | Agriculture, Animals, Foods |
| Electricity, Gas, and Water | Electricity |

**TABLE 2**
**PROJECT CHARACTERISTICS BY SECTOR (1997–99)**

| Characteristics | Agriculture | Mining | Manufacturing | Electricity, Gas, and Water |
|---|---|---|---|---|
| Number of projects | 58 | 61 | 409 | 109 |
| Average investment (rs. crore) | 56.87 | 176.52 | 96.23 | 404.26 |
| Project type: | | | | |
| New unit/article | 41 | 37 | 290 | 104 |
| Renovation/modernization, rehabilitation, substantial expansion | 17 | 24 | 119 | 5 |

Our independent state-level variables, which were obtained from the Indiastat database, vary by state and year.[6] Indiastat is an online data service that contains time-series data on labor regulation variables, as well as information on economic, social, demographic, and political variables, at both the all-India level and the state level. Appendix A provides the summary statistics used for the count and fixed-effects models and the conditional logit models of this study. Appendix B provides the original data sources for the variables used in our panel estimations.

### *A. Location Choice*

Since the period we consider in this study, the geopolitical map of India has undergone dramatic changes. Three new states have been carved out of the old ones—Jharkhand was originally a part of Bihar, Chattisgarh was a part of Madhya Pradesh, and Uttaranchal originated from Uttar Pradesh. For our purpose, we classify these new entities under their original states. We also code union territories under the closest (by distance) state. For example, the union territory Dadra and Nagar Haveli is indistinguishable in terms of socioeconomic characteristics from Gujarat; thus projects here are coded as having located in Gujarat. Similarly, Chandigarh is classified under Punjab; Goa,

[6] These data can be found at http://www.indiastat.com.

TABLE 3
STATE/UNION TERRITORY CLASSIFICATIONS

| Class Number | State/Union Territory |
|---|---|
| 1 | Andhra Pradesh |
| 2 | Bihar, Jharkhand |
| 3 | Gujarat, Dadra and Nagar Haveli |
| 4 | Haryana |
| 5 | Karnataka |
| 6 | Kerala |
| 7 | Madhya Pradesh, Chattisgarh |
| 8 | Maharashtra, Goa, Daman, and Diu |
| 9 | Orissa |
| 10 | Punjab, Chandigarh |
| 11 | Rajasthan |
| 12 | Tamil Nadu, Pondicherry |
| 13 | Uttar Pradesh, Uttaranchal |
| 14 | West Bengal |
| 15 | Arunachal Pradesh, Assam, Himachal Pradesh, Jammu and Kashmir, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura |
| 16 | Delhi |

Daman, and Diu are coded under Maharashtra; and Pondicherry is coded under Tamil Nadu. A detailed list of the coding is reported in table 3.table 3

In our estimation, each project has the option of choosing among 16 different locations. These include the 14 states in India that have a substantial industrial presence, the union territory of Delhi, and a catchall category that includes other states (see table 3). Our choice of these locations is motivated by the Besley and Burgess (2002) study. We assume that, for a new project, the site location address is the most relevant.[7]

Figure 1 shows the distribution of projects among the various states, where the number of projects is normalized by gross state product (GSP) attributable to the industrial sector. As is evident from figure 1, Maharashtra is at the forefront of receiving new investments, followed by Karnataka, Haryana, Tamil Nadu, and Gujarat.[8]

### *B. Labor Regulation Variables*

We consider two categories of labor variables: (i) indicators of labor conflict, such as the number of strikes and lockouts, as well as the percentage of

[7] The registered office address is usually the location of the central office, which is often predetermined in India. When large conglomerates and private business houses like the Tatas and Ambujas started in the early postindependence era, they generally located the central offices in the home states of the entrepreneurs. But for profit-maximizing firms, the location decisions of new projects should be influenced by political, regulatory, and economic considerations in the local siting area. Thus, our location variable is derived from the site address of the project.

[8] The "Other" state category appears to be unusually large in fig. 1. This is because the industrial gross state product for these states is comparatively low.

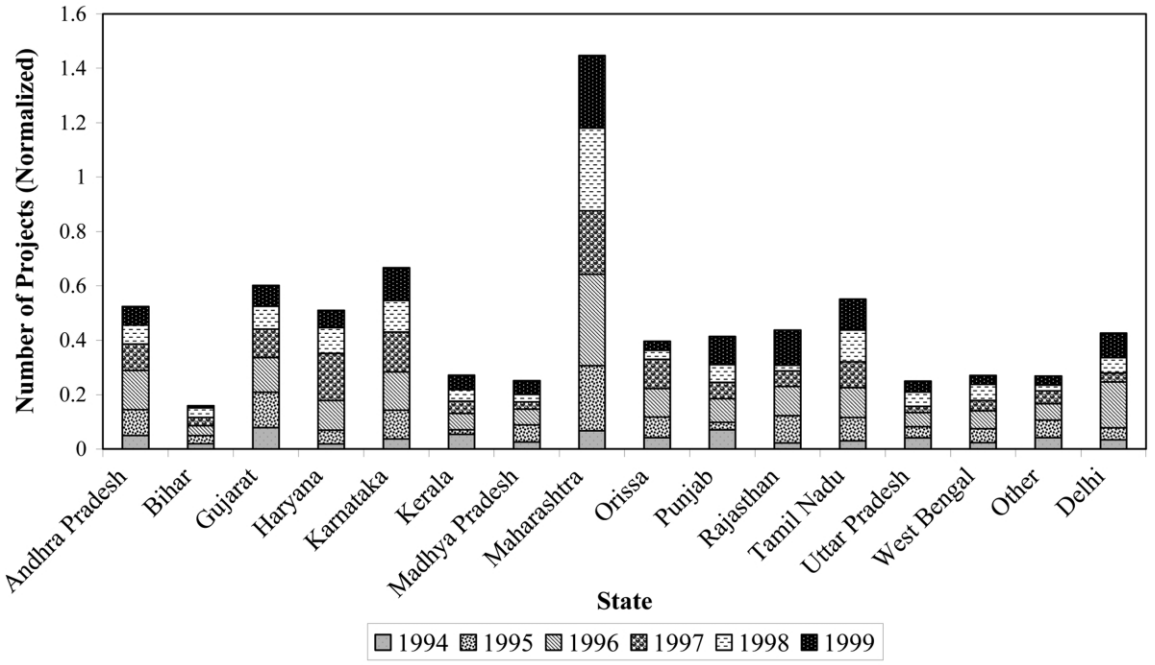


**Figure 1.** Number of projects (normalized), 1994–99

unionized workers, and (ii) state-level amendments to the Industrial Disputes Act (IDA) of 1947. For the first set of labor measures, we create dummies for whether the value of the variable exceeds the median value in a particular year. This is done to capture the idea that, when locating a project, a firm is interested in whether a particular state lies above or below the median value in terms of various measures of labor unrest rather than the absolute level of conflict. Figure 2 shows the number of lockouts and man-days lost due to disputes, normalized by size of the labor force in a state. A comparison of figures 1 and 2 reveals a negative relationship between new investment and labor conflict.

The second category of labor variables includes formal amendments to labor laws at the state level. These amendment classifications are based on coding developed by Besley and Burgess (2002), where each amendment is categorized as pro-worker, pro-employer, or neutral. Instead of using the authors' categorization, we first use the share of pro-worker amendments (from 1949 to 1990) per state. Adopting this method allows us to control for the amount of labor-related legislative activity in a state, particularly activity that is anti-employer. We believe, for example, that a state that passes six pro-worker amendments among a total of 25 amendments is viewed in a different light as compared to a state that passes six pro-worker amendments among a total of 10 amendments. Second, we study two particular characteristics of such amendments—the right to strike and the provision of severance pay.[9] Once again, we use information on amendments to the Industrial Disputes Act of 1947 to create these variables.[10] These dummies take the value of one if a particular state has passed the related amendment in question and a value of zero otherwise.

### *C. Other Variables of Interest*

In addition to labor indicators, other factors could potentially influence location choice. Important among these are input costs, since wages and power tariffs compose a large part of the daily operating costs of most projects. Wages are measured by the average daily wage rate for urban unskilled workers lagged

[9] States that have passed a right to strike amendment include Andhra Pradesh, Karnataka, Rajasthan, and West Bengal. States that have passed a severance pay provision amendment include Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, and West Bengal.

[10] We note that each state amendment is passed at a different point in time. Therefore, if a state passes a right to strike law, say in 1960, and has not repealed it by 1990, then it gets a one throughout the sample period. Similarly, a state passing such a law in 1990 still gets a one for the entire period.

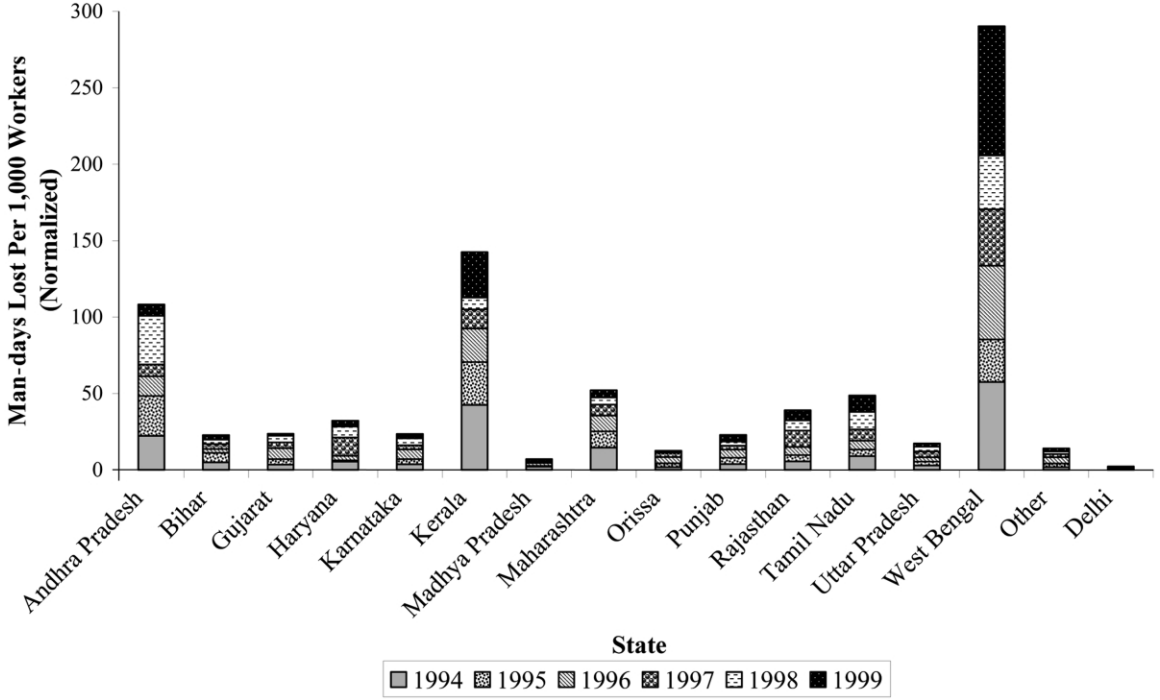


**Figure 2.** Labor conflict variables, 1994–99

by 3 years.[11] In India, power rates vary by the size of the industry and also by the usage—the so-called declining block tariff. We use the average tariff for medium and large industries (lagged by 1 year) for estimation purposes. The choice is dictated by the observation that most projects in our sample fall under these two industrial categories when classified in terms of power consumption.[12]

Other economic explanatory variables include the growth rate of the industrial GSP, the urban Gini coefficient (lagged by 1 year), and EXIM Bank funding. We believe that, for India, the growth rate of the industrial GSP serves more as an indicator of the overall health of the state than as a gauge of market size. For most products, firms consider their market to be the all-India market. The urban Gini coefficient (for per capita consumption expenditure) measures income inequality in the state. Investors may choose to move to states with a low inequality index since this may signal a better overall "economic" climate.

Location decisions may also be influenced by the availability of skilled labor and the level of infrastructure in a state. Thus we include measures of state literacy, urban workforce participation rates (lagged by 1 year), and road length (lagged by 1 year) in our estimations. Literacy measures are important because they proxy for labor efficiency and productivity. The workforce participation variable is an indicator of the size of the labor force. This variable should affect location choice probabilities positively, as labor availability eases pressure on wages and thus decreases input costs. The next section discusses our methodology and provides the intuition for the models we use.

## IV. Empirical Strategy

We begin by obtaining a preliminary understanding of the relationship between new investments and labor conflict. In order to do this, we estimate two sets of panel data models. The first set evaluates the determinants of the total number of new projects in a state, where one of the determinants is a measure of labor disputes. The second set considers determinants of the total value of new investments within a state; again, one of the determinants is a measure of labor disputes. State-fixed effects are present in both sets of panel data models to control for other state-level factors that may influence the dependent variable but on which we have no information. These omitted variables may lead to spurious correlations between our labor disputes measure

[11] This is the average daily wage for males and females combined. The choice of the lag is dictated by data availability. We did not use contemporaneous data because of endogeneity concerns.

[12] Our main results remain unchanged when we alternatively control for the tariff rates of small and large industries in our specifications.

**TABLE 4**
**STATE-WISE DETERMINANTS OF NUMBER OF PROJECTS AND INVESTMENT**

| | Number of Projects in State | | Total Investment in State | |
|---|---|---|---|---|
| Variable | (1) | (2) | (3) | (4) |
| Number of lockouts (normalized by industrial GSP) | −12.8898** | −10.5252** | −633.1823* | −706.9533** |
| | (4.5994) | (2.8570) | (309.6274) | (204.1828) |
| Number of strikes (normalized by industrial GSP) | .2361 | | −1.3396 | |
| | (.2631) | | (24.3518) | |
| ICICI Bank disbursement (normalized by industrial GSP) | .0008 | | −.0927 | |
| | (.0008) | | (.0675) | |
| EXIM Bank disbursement (normalized by industrial GSP) | −.0218 | | 1.7105 | |
| | (.3069) | | (28.4658) | |
| Planned outlay for manufacturing (normalized by industrial GSP) | .0029* | .0025* | .1537 | .1649+ |
| | (.0012) | (.0010) | (.1013) | (.0980) |
| Percent growth rate of industrial GSP | .0296+ | .0331* | −1.064 | −1.569 |
| | (.0157) | (.0144) | (1.0381) | (.9749) |
| Daily wage for unskilled male workers | −.0300+ | −.0336* | −1.9258 | −1.6805 |
| | (.0160) | (.0153) | (1.3121) | (1.2145) |
| Daily wage for unskilled female workers | .0637** | .0698** | 1.7944 | 1.2719 |
| | (.0178) | (.0170) | (1.4481) | (1.3269) |
| R&D expenditure by state (normalized by industrial GSP) | −.0313 | | −.9693 | |
| | (.0191) | | (1.7243) | |
| Constant | 1.9246** | 1.8767** | 75.1888** | 82.6952** |
| | (.3616) | (.3042) | (26.0000) | (21.7760) |
| No. of observations | 96 | 96 | 96 | 96 |
| Log likelihood | −260.4598 | −261.8175 | | |
| $R^2$ | | | .536 | .518 |

**Note.** Standard errors are in parentheses. Data are from 1994 to 1999. Columns 1 and 2 estimate fixed-effects negative binomial models with robust standard errors. Columns 3 and 4 estimate linear fixed-effects models. The state fixed-effects estimates of cols. 1–4 are not reported.
+ Significant at the 10% level.
* Significant at the 5% level.
** Significant at the 1% level.

and the error term; that is, our labor disputes variable may be endogenous. In the absence of a correction, this endogeneity would bias our results. The use of state fixed effects helps us control for the influence of other state-level time-invariant factors absent from our specification. State fixed effects thus correct for the endogeneity of our labor disputes variables that arises due to missing data. Moreover, the states of India differ dramatically in terms of resource availability, cultural heritage, population characteristics, and infrastructure. Our use of fixed effects helps us account for state-level differences that do not vary over time. Hence, we estimate two sets of state fixed-effects models in our preliminary investigation of the relationship between new investment and labor conflict. The first set utilizes state fixed-effects negative binomial (count) models (with robust standard errors); the second set estimates linear state fixed-effects models. These results are presented in table 4.

After our preliminary study, we analyze project location decisions in greater detail. We employ conditional logit models in order to accomplish this. The

intuition behind our use of the conditional logit model is as follows. We hypothesize that a firm makes a single decision (the state in which the project should be located) among several alternatives (the 16 locations noted in table 3). In making this decision, firms consider the attributes of each location. They then formulate implicit equations that correspond to each of the 16 locations. Each of these location-specific equations measures the net profit of situating the project in that location. Firms choose to situate the project in the location (state) where the net profit is the largest. Following McFadden (1973), we arrive at the conditional logit model by making two assumptions regarding the error terms of the implicit profit equations.[13] Most other studies on location choice have also used conditional logit specifications. Our use of this category of models is thus in keeping with the literature.

As detailed above, we use a conditional logit framework to study project location decisions. The conditioning is at the project level as each project in our data is given the choice of locating in one of 16 states. We hypothesize that one major factor that determines project location is the incidence of labor disputes in a state. As noted above, unobservables (and state-level heterogeneity) may lead to the endogeneity of this labor disputes variable. We control for this by using state fixed effects. Thus, we study project location decisions in a state fixed-effects conditional logit framework using data from 1998–99. Since there may be multiple projects located in a state, the standard errors of our point estimates are adjusted for clustering at the state level. These results will later be reported in tables 5–9. The next section reports and discusses the results of our various specifications.

## V. Results

### *A. Preliminary Analysis*

As noted above, in order to obtain a preliminary sense of the relation between new investment and state-level labor regulations, we estimate two sets of panel data models for the period 1994–99. Results are as reported in table 4. The first two columns depict estimates for fixed-effects negative binomial (count) models. The dependent variable in columns 1 and 2 is the total number of new projects in a state. Columns 3 and 4 report results for linear fixed-effects models, where the dependent variable is the value of total new investment in a state. As is clear from columns 1–4, the

[13] As noted in Greene (2003), these assumptions are that the error terms are independent and identically distributed and that they follow the type I extreme value (Gumbel) distribution. This is not a repeated choice model where we observe the same entity making choices across different years. In our case, the decision is made at the project level, and each project enters the sample only once.

(normalized) number of lockouts has a strong negative effect on new projects and new investment within states. Hence, there is preliminary evidence that labor conflict has deterring effects on new investment.

From column 1 of table 4, we observe that percent growth rate of industrial GSP has a positive and significant effect on the total number of new projects. The male wage variable has expected effects, but, contrary to intuition, a rise in female wages increases the number of new projects. This may be partly explained by the fact that wages proxy for workforce efficiency and equality. Column 2 is a parsimonious form of the model in column 1. As is clear, expected results obtain.

In the linear fixed-effects model of column 3, we find that credit availability and the growth rate are not significant factors in explaining the magnitude of new investment in a state. Column 4 is a parsimonious form of the linear fixed-effects model with variables that correspond to those in column 2. Again, expected results obtain. In summary, results of table 4 confirm our hypothesis that labor conflict has negative effects on new investments. Next, we investigate the firm's location decision at the micro level.

### *B. Conditional Logit Estimation*

Following the literature on location choice theory, a conditional logit model is estimated for the 1998–99 time period.[14] As discussed above, a firm is given the choice of locating its project among 16 alternative states. Project location choice is influenced by state-level labor regulation and conflict variables, costs of inputs, socioeconomic variables such as an urban Gini coefficient, and other variables that include measures of credit availability in the state. These variables are believed to affect the net profits of projects and will thus influence location decisions. Our use of the conditional logit model presumes that a project is sited in the state where net profits are the highest. The total number of projects over the 1998–99 time period is 437, and, as noted above, the total number of location choices is 16. We include both state- and year-specific, as well as project-specific, variables in our estimations.

The conditional logit is modeled on the assumption of independence of irrelevant alternatives (IIA). This assumption does not allow for correlation across the unobservables of the 16 net profit equations. This assumption is clearly a strong one to make, since profits may be correlated across states and regions. The conventional technique to relax the IIA assumption is to introduce regional dummies (see Bartik 1985). However, since regional dummies do not

[14] The choice of the sample period is dictated by data availability. The majority of the variables of interest were available for mainly these 2 years.

vary over years, they are not identified in our state fixed-effects framework. We account for correlations in location decisions by introducing dummies and their interactions in our framework.

Before discussing our results, we note that the conditional logit estimations are likely to be affected by two main sets of selection issues. First, our data consist of only those projects that were located in the various states of India. If labor conflict deters new investment, a large set of projects may not have been undertaken. Thus, we have a non-randomly-selected sample, and our estimates may reflect sample selection bias. However, this is a conservative bias since our estimates do not capture the negative impact of labor conflict on those projects that were never implemented. Our results thus underestimate the overall deterring effects of labor problems; eliminating the bias should only strengthen the results of our study.

Second, our estimates may be affected by bias resulting from selection on unobservables. Consider two scenarios. First, a firm that has extensive previous experience dealing with labor conflict issues decides the location of a project. The firm may locate the project in a state with relatively more labor problems solely because it is confident of being able to handle future conflicts, given its past experience. We can think of this firm (or project) as being more "able" to cope with labor problems. Since we do not have data on firm's past experience, this variable is unobserved from our perspective. However, the lack of such data may not be too problematic. This is because such unobserved variables lead to an underestimation of the true negative impact of labor conflict. If we included information on the firm's past experience in dealing with labor issues (i.e., if we had this information), our results should become stronger.

Alternatively, consider a scenario in which a state has a pro-worker reputation. That is, regardless of the true nature of labor laws, the local government has traditionally favored the worker in labor disputes. Firms may shy away from locating projects in such states even if labor problems are relatively infrequent. Since we do not have information on the "local enforcement history" of states, the results of this study may overestimate the negative impact of labor conflict. However, our use of state fixed effects controls for the influence of all such unobservables that are state specific and time invariant. Hence, lack of data on state-specific information that is constant over time should not bias the results of this research. We acknowledge that overestimation of labor conflict's negative effect may still be an issue in the case of unobservables that are not state specific and time invariant. Given the paucity of data for correcting this in the present study, we hope to account for such concerns in future work.

### C. Basic Model and Sensitivity Analysis

#### *Labor Conflict Results*

Table 5 shows the results from the basic model, while table 6 provides robustness checks. As hypothesized, the number of lockouts (normalized by workforce in a state in that year), the lockout dummy, the work-stoppage dummy, and the percentage of unionized workers all have significant negative effects on location choice probabilities. All tables report coefficients and not elasticities, unless specified otherwise. As discussed earlier, the labor conflict dummies in table 6 are constructed such that the dummy takes a value of one if the conflict variable exceeds its median value across all states for that year. The negative coefficients on these dummies in table 6 imply that projects are less likely to be located in states that lie in the upper half of the labor conflict distribution.

To get a better idea of the magnitude of the effects of the variables in the basic model of table 5, we calculate own and cross elasticities.[15] The elasticities enable us to judge to what extent and by how much each of these variables affects location choice probabilities. The interpretation of own and cross elasticities is similar to the interpretation of elasticities in the standard price elasticity framework. Own elasticity measures the responsiveness of an individual's choice probability to a change in the value of some attribute (Ben-Akiva and Lerman 1985). Similarly, cross elasticity shows the responsiveness of an individual's probability of choosing location $i$ when the value of some attribute changes in location $j$. Column 2 of table 5 reports results for own elasticities, whereas column 3 of table 5 reports results for cross elasticities. The calculations show that for a 1% increase in the normalized number of lockouts within a state, the probability that a project will be located in that state decreases by approximately 0.0033%. The signs and magnitudes of the cross elasticities are also as expected. For example, for a 1% increase in the

[15] To calculate the own and cross elasticities, we proceed in the following manner. We first calculate individual elasticities and then calculate their weighted average using choice probabilities as weights. Suppose there are $i$ locations to choose from, $n$ projects that are choosing between these locations, and $k$ regressors or attributes. Then disaggregate own elasticity is given by

$$E_{x_{ink}}^{P_n(i)} = [1 - P_n(i)]x_{ink}\beta_k,$$

where $P_n(i)$ is the probability of a particular project $n$ choosing location $i$, $x_{ink}$ is the attribute of interest, and $\beta_k$ is the coefficient on attribute $k$ from the conditional logit model. Therefore, aggregate own elasticity is given by

$$E_{x_{jk}}^{P(i)} = \sum_{n=1}^{N} P_n(i)E_{x_{jnk}}^{P_n(i)} / \sum_{n=1}^{N} P_n(i).$$

Aggregate cross elasticity can be calculated in an analogous manner.

## TABLE 5

BASIC CONDITIONAL LOGIT MODEL

| Variable | (1) | (2) | (3) |
|---|---|---|---|
| Number of lockouts (normalized by workforce) | −7,465.2994** | −.0033 | .0015 |
| | (2,878.5014) | | |
| Normalized EXIM Bank disbursement (normalized by industrial GSP) | 4.6459** | .0094 | −.0025 |
| | (1.6126) | | |
| Urban Gini coefficient (lagged 1 year) | −63.4004** | −.0656 | .0674 |
| | (16.2020) | | |
| Percent growth rate of industrial GSP | .0005 | .0001 | −.0001 |
| | (.0139) | | |
| Average daily wage for unskilled labor (lagged 3 years) | −.0498+ | −.0078 | .0086 |
| | (.0278) | | |
| Power tariff for medium industries (lagged 1 year) | .0007 | .001 | −.0009 |
| | (.0065) | | |
| Average urban workforce participation rate (lagged 1 year) | .0217 | .0024 | −.0024 |
| | (.0578) | | |
| Kilometers of surfaced roads (normalized by area of state; lagged 1 year) | −35.4334** | −.0057 | .1301 |
| | (13.5059) | | |
| Enrollment in literacy program (per 1,000 of population) | −.0001 | −.0001 | .00004 |
| | (.0003) | | |
| Bihar dummy | −.3777 | | |
| | (2.4118) | | |
| Gujarat dummy | −.1122 | | |
| | (1.5393) | | |
| Haryana dummy | −.2667 | | |
| | (1.4717) | | |
| Karnataka dummy | 2.2576 | | |
| | (1.6639) | | |
| Kerala dummy | 7.8501* | | |
| | (3.8228) | | |
| Madhya Pradesh dummy | .266 | | |
| | (1.3278) | | |
| Maharashtra dummy | −.428 | | |
| | (1.5254) | | |
| Orissa dummy | −1.3191 | | |
| | (1.6077) | | |
| Punjab dummy | 4.1886 | | |
| | (2.6109) | | |
| Rajasthan dummy | −2.1133* | | |
| | (1.0635) | | |
| Tamil Nadu dummy | 6.4207* | | |
| | (2.6667) | | |
| Uttar Pradesh dummy | 5.3791* | | |
| | (2.4043) | | |
| West Bengal dummy | 7.8578* | | |
| | (3.2461) | | |
| Other dummy | −4.5454* | | |
| | (2.1827) | | |
| Delhi dummy | 547.0377** | | |
| | (208.5479) | | |

**Note.** Dependent variable is location choice. $N = 6{,}992$. Sample consists of 437 projects over 2 years (1998–99). Standard errors (adjusted for clustering at the state level) are in parentheses. The average daily wage of unskilled labor is for men and women combined. The average urban workforce participation rate is for men and women combined.

+ Significant at the 10% level.

* Significant at the 5% level.

** Significant at the 1% level.

**TABLE 6**
**SENSITIVITY ANALYSIS**

| Variable | (1) | (2) | (3) |
|---|---|---|---|
| Lockout dummy | −1.2792** | | |
| | (.4807) | | |
| Man-days lost due to work stoppage dummy | | −.5071* | |
| | | (.2195) | |
| Percentage of unionized workers | | | −1.0313** |
| | | | (.0222) |
| Normalized EXIM Bank disbursement | 2.7144 | 3.3151* | 7.2697** |
| | (1.6989) | (1.4960) | (.1235) |
| Urban Gini coefficient (lagged 1 year) | −49.7398** | −32.1549 | −93.1800** |
| | (14.9321) | (22.1723) | (.8862) |
| Percent growth rate of industrial GSP | .0082 | −.0006 | |
| | (.0140) | (.0128) | |
| Percent growth rate of industrial GSP − 3-year moving average | | | .0669** |
| | | | (.0052) |
| Average daily wage for unskilled labor (lagged 3 years) | −.0048 | −.018 | −.0884** |
| | (.0330) | (.0262) | (.0021) |
| Power tariff for medium industries (lagged 1 year) | −.0028 | .0088 | |
| | (.0055) | (.0078) | |
| Average urban workforce participation rate (lagged 1 year) | .0107 | −.148 | |
| | (.0381) | (.0983) | |
| Kilometers of surfaced roads (normalized by area of state; lagged 1 year) | −24.2253 | −64.6344* | |
| | (15.0010) | (25.9737) | |
| Enrollment in literacy program (per 1,000 of population) | .0005 | .0004 | .0026** |
| | (.0004) | (.0004) | (.00001) |
| Average power tariff for industries (lagged 1 year) | | | .0567** |
| | | | (.0020) |
| Urban male workforce participation rate (lagged 1 year) | | | −.5118** |
| | | | (.0135) |
| Kilometers of all roads (normalized by area of state; lagged 1 year) | | | −50.6331** |
| | | | (1.0566) |
| No. of observations | 6,992 | 6,717 | 4,374 |

**Note.** Standard errors (adjusted for clustering at the state level) are in parentheses. Models include state fixed effects; these are not reported. The sample consists of 437 projects over 2 years (1998 and 1999). The average daily wage for unskilled labor is for men and women combined. The average urban workforce participation rate is for men and women combined. The average power tariff is for small, medium, and large industries combined.
* Significant at the 5% level.
** Significant at the 1% level.

normalized number of lockouts in other states, the probability that a project will be located in this state increases by approximately 0.0015%. Although these magnitudes are relatively small, the elasticities confirm that states that are perceived to have a pro-worker tilt will attract fewer projects.

*Economic Variables and Input Cost Results*

In terms of the effects of other variables in table 5, the urban Gini coefficient (for per capita consumption expenditure) has a significant negative impact as

is shown in column 1. A negative coefficient implies that firms prefer locating in areas with low inequality. This could be attributed to the fact that such areas may experience less labor unrest. Credit availability, as captured by the EXIM bank disbursement variable, is positive and significant. This implies that capital market considerations play an important role in a project's location decision. The average daily wage of unskilled laborers is seen to have a negative effect, whereas power tariffs have little effect on location choice. The workforce participation rate, state literacy measures, and the state's industrial growth rate are all measured imprecisely in table 5.

As can be seen in table 5, the road length variable (normalized by the area of the state) has a significant negative coefficient. This sign is unexpected as road length serves as a measure of state infrastructure. Greater availability of surfaced roads lowers the cost of transportation, which should increase the probability that a project will be located in that area. However, states with better infrastructure may have higher real estate costs. Such costs may lower location choice probabilities (we have no information on real estate costs in areas where projects locate to test this explicitly).

The fixed effects of table 5 are also of interest. These variables capture state-specific unobservables that may influence location choice. From table 5, we observe that, as compared to Andhra Pradesh (base case), firms have a higher probability of locating in Kerala, Tamil Nadu, Uttar Pradesh, West Bengal, and Delhi. Projects are relatively less likely to locate in Rajasthan and in those states that are in the "other" category.

### *D. Sensitivity to Formal Labor Regulation*

The labor variables discussed as of now capture the on-the-ground impact of labor legislations. However, formal labor laws and amendments may also be important determinants of location choice. We introduce these to test for the robustness of our labor conflict variables and also to account for an alternative source of disincentives in choice of locations. As noted above, our information on specific categories of labor legislations is obtained from Besley and Burgess (2002).

We use the share of pro-worker amendments passed by a state and dummies related to severance pay and the right to strike to capture the anti-employer stance of states (table 7). Column 1 of this table shows that, as hypothesized, the coefficient on the share of pro-worker amendments is negative and significant at the 1% level. In column 2, the severance pay dummy is negative and significant. This implies that states with provisions for severance pay will attract fewer projects. This is because such provisions raise labor costs and also introduce inflexibilities in hiring and firing workers. The coefficient on the

## TABLE 7
### FORMAL LABOR REGULATIONS

| Variable | (1) | (2) |
|---|---|---|
| Number of lockouts (normalized by workforce) | −7,465.2994** | −7,465.2994** |
| | (2,878.5014) | (2,878.5014) |
| Share of pro-worker amendments in total number of amendments | −1,094.0754** | |
| | (417.0956) | |
| Severance pay dummy | | −546.7717** |
| | | (208.3610) |
| Right to strike dummy | | −.266 |
| | | (1.3278) |
| Normalized EXIM bank disbursement | 4.6459** | 4.6459** |
| | (1.6126) | (1.6126) |
| Urban Gini coefficient (lagged 1 year) | −63.4004** | −63.4004** |
| | (16.2020) | (16.2020) |
| Average daily wage for unskilled labor (lagged 3 years) | −.0498+ | −.0498+ |
| | (.0278) | (.0278) |
| Power tariff for medium industries (lagged 1 year) | .0007 | .0007 |
| | (.0065) | (.0065) |
| Average urban workforce participation rate (lagged 1 year) | .0217 | .0217 |
| | (.0578) | (.0578) |
| Percent growth rate of industrial GSP | .005 | .005 |
| | (.0139) | (.0139) |
| Kilometers of surfaced roads (normalized by area of state; lagged 1 year) | −35.4334** | −35.4334** |
| | (13.5059) | (13.5059) |
| Enrollment in literacy program (per 1,000 of population) | −.0001 | −.0001 |
| | (.0003) | (.0003) |
| Bihar dummy | −547.4154** | −547.4154** |
| | (207.3302) | (207.3301) |
| Gujarat dummy | −390.8534** | −547.1498** |
| | (148.3923) | (207.9756) |
| Haryana dummy | −547.3044** | −547.3044** |
| | (208.2754) | (208.2755) |
| Karnataka dummy | −232.1871** | 2.2576 |
| | (88.3836) | (1.6639) |
| Kerala dummy | −539.1876** | −539.1876** |
| | (205.3748) | (205.3748) |
| Madhya Pradesh dummy | −546.7717** | |
| | (208.3609) | |
| Maharashtra dummy | 77.7203** | −.694 |
| | (29.6843) | (1.6250) |
| Orissa dummy | −1.3191 | −1.5851 |
| | (1.6077) | (1.6582) |
| Punjab dummy | −542.8491** | −542.8491** |
| | (206.3872) | (206.3872) |
| Rajasthan dummy | −199.0469** | −2.1133* |
| | (74.7718) | (1.0635) |
| Tamil Nadu dummy | −540.6170** | 6.1547* |
| | (206.3966) | (2.5749) |
| Uttar Pradesh dummy | 552.4168** | −541.6586** |
| | (210.5347) | (206.5700) |
| West Bengal dummy | 230.7250** | 7.8578* |
| | (87.6542) | (3.2461) |
| Other dummy | −551.5831** | −551.5831** |
| | (208.5377) | (208.5378) |

**Note.** Dependent variable is location choice. $N = 6{,}992$. Sample consists of 437 projects over 2 years (1998 and 1999). Standard errors (adjusted for clustering at the state level) are in parentheses.
+ Significant at the 10% level.
* Significant at the 5% level.
** Significant at the 1% level.

right-to-strike dummy is insignificant. This may be due to collinearity between this dummy and the lockout variable—it is likely that states with a right-to-strike provision will have higher numbers of strikes and lockouts.

Other explanatory variables in both specifications have the same effects as before. In general, results suggest that, with controls for input costs, economic conditions, and state unobservables, pro-worker states are less likely to attract new investment.

### *E. Project Characteristics and Disaggregate Industry Results*

#### *Influence of Project Characteristics*

In table 8, we investigate the impact of project characteristics on location choice probabilities. We introduce two characteristics—a nontechnology dummy and a project type dummy. The nontechnology dummy takes a value of one if the project belongs to a "non-high-tech" industrial classification ("high-tech" industrial classifications include chemicals, electrical machinery, electronics-computers and software, nonelectrical machinery, and transport machinery). Thus, in column 1 of table 8, all projects are classified as either non–high tech or high tech, based on a nontechnology dummy. We hypothesize that high-tech projects will be attracted to states that spend relatively more on research and development (R&D). In order to test this, we interact the nontechnology dummy with a variable that measures state expenditures on R&D. If high-tech projects are more likely to locate in states that spend on R&D, we expect the interaction term to be insignificant. The first column of table 8 confirms that this is the case. Controlling for other variables that influence location choice, R&D expenditure has positive effects on the location probabilities of high-tech projects only. As is evident from the interaction term and *P*-value in column 1 of table 8, state-sponsored R&D expenditures have little effect on projects that are not technologically advanced.

Column 2 of table 8 shows the effects of a project type dummy. The "not new unit/new article" dummy takes the value of zero if the project is classified as a new unit or new article and has the value of one if the project is a renovation, rehabilitation, modernization, or expansion. We hypothesize that firms are more likely to invest new projects in regions with relatively more growth. In order to test this, we interact the "not new unit/new article" dummy with a variable that measures the percentage growth rate of the industrial GSP. If growing regions are more likely to attract new projects, we expect this interaction term not to be significant. Estimates in column 2 confirm that this is the case; the percentage growth rate of the industrial GSP has strong positive effects on the location probabilities of new projects only. As is evident from the interaction

**TABLE 8**
**INFLUENCE OF PROJECT CHARACTERISTICS**

| Variable | (1) | (2) |
|---|---|---|
| Number of lockouts (normalized by workforce) | −3,603.0913$^{+}$ | −3,590.7339$^{+}$ |
| | (1,930.8483) | (1,942.4139) |
| Normalized EXIM bank disbursement | 3.5548** | 3.4923** |
| | (1.2269) | (1.2460) |
| Urban Gini coefficient (lagged 1 year) | −55.9001** | −55.6190** |
| | (15.2161) | (15.1991) |
| Average daily wage for unskilled labor (lagged 3 years) | −.0185 | −.0181 |
| | (.0163) | (.0164) |
| Power tariff for large industries (lagged 1 year) | −.0023 | −.0024 |
| | (.0048) | (.0048) |
| Kilometers of all roads (normalized by area of state; lagged 1 year) | −23.9776* | −23.5606$^{+}$ |
| | (11.9580) | (12.0519) |
| Planned outlay by state on mining industries (normalized by industrial GSP) | −.0717** | −.0703** |
| | (.0111) | (.0112) |
| R&D expenditure by state (normalized by industrial GSP) | .0400$^{+}$ | .0389$^{+}$ |
| | (.0238) | (.0237) |
| Percent growth rate of industrial GSP | .0242** | .0298** |
| | (.0087) | (.0095) |
| Normalized R&D expenditures × dummy for non-high-tech project | −.0001 | |
| | (.0095) | |
| Percent growth rate of industrial GSP × dummy for not new unit/new article | | −.0245 |
| | | (.0228) |
| Sum of coefficients of normalized R&D expenditure and interaction of normalized R&D expenditure with dummy for non-high-tech project | .0399 | |
| Sum of coefficients of percent growth rate of industrial GSP and interaction of percent growth rate of industrial GSP with dummy for not new unit/new article | | .0053 |
| *P*-value that sum of coefficients = 0 | .1044 | .7928 |
| No. of observations | 6,992 | 6,992 |

**Note.** Dependent variable is location choice. Standard errors (adjusted for clustering at the state level) are in parentheses. Models include state-fixed effects; these are not reported. Sample consists of 437 projects over 2 years (1998 and 1999). The average daily wage for unskilled labor is for men and women combined.

$^{+}$ Significant at the 10% level.

* Significant at the 5% level.

** Significant at the 1% level.

term and *P*-value in column 2 of table 8, the growth rate has little predictive power for projects that are not classified as new units or new articles.

*Analysis by Industrial Classification*

An important consideration is the effect of resource constraints on project siting decisions. For example, projects related to mining or agriculture may not have a large degree of freedom in deciding choice of location, since such projects need to be situated close to sources of raw materials. Hence, no matter how strong labor unrest is in a state, if that state happens

to be a source of important raw materials and minerals, we would expect to see positive location choice probabilities for mining projects in that state (relative to the base case). To account for such considerations, location-specific constants are interacted with two industry dummies—these dummies capture effects specific to (*a*) mining and agriculture and (*b*) manufacturing. Table 9 reports the results of this analysis.

From the first column of table 9, we observe that, despite the negative effects of the labor conflict variables, the interaction of the mining and agriculture dummy with a state dummy is significant and positive in most cases. Consider the interaction term for Orissa. The positive coefficient implies that, as compared with Andhra Pradesh, mining and agricultural projects have a higher probability of locating in Orissa. This is as expected since Orissa has large mineral reserves. Alternatively, from the second column of table 9, we see that manufacturing projects have an especially high probability of locating in Punjab and Delhi (as compared with Andhra Pradesh). This is also as expected since these states lie in the "manufacturing belt" region of India.

As noted before, in both specifications of table 9, the labor conflict variable continues to exert a negative effect on location choice. Credit availability has a positive impact, whereas the Gini inequality measure has a negative impact (this is measured imprecisely in the second column of table 9).

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 larger projects and smaller projects are excluded from our estimations, then spurious correlations between location choice and the labor conflict variables could arise. In order to determine whether such a bias is present, we formulate a "big state" dummy.[16] This dummy takes the value of one if a state's industrial gross state product exceeds the median value (over all states). We interact this dummy with the labor conflict variable (normalized number of lockouts) and introduce this interaction term into the basic model of table 5. The model thus contains the normalized number of lockouts, the interaction of normalized number of lockouts with the "big state" dummy, and the economic factors, input cost variables, and the state fixed effects of the first column of table 5. If systematic differences in labor unrest by size of the state economy exist, then the interaction term should be significant. Upon estimating the model, we find that the interaction term is not significantly different from zero. Hence, our panel conditional logit results are unbiased.

[16] Big state dummy = 1 if state industrial GSP is greater than the median.

## TABLE 9

### ANALYSIS BY INDUSTRIAL CLASSIFICATION

| Variable | Mining and Agriculture | Manufacturing |
|---|---|---|
| Number of lockouts (normalized by workforce) | −7,730.1276** | −6,127.6991+ |
| | (2,883.1202) | (3,420.0389) |
| Normalized EXIM bank disbursement | 4.5800** | 3.6490* |
| | (1.5810) | (1.4185) |
| Urban Gini coefficient (lagged 1 year) | −63.2250** | −17.0214 |
| | (17.1814) | (13.4101) |
| Average daily wage for unskilled labor (lagged 3 years) | −.0503+ | −.0784** |
| | (.0275) | (.0251) |
| Power tariff for medium industries (lagged 1 year) | .0008 | .0153** |
| | (.0067) | (.0046) |
| Average urban workforce participation rate (lagged 1 year) | .0277 | −.0717+ |
| | (.0586) | (.0416) |
| Percent growth rate of industrial GSP | .0049 | .0125 |
| | (.0137) | (.0104) |
| Kilometers of surfaced roads (normalized by area of state; lagged 1 year) | −34.1564** | −19.845 |
| | (12.8832) | (12.7334) |
| Enrollment in literacy program (per 1,000 of population) | −.0001 | −.0001 |
| | (.0003) | (.0005) |
| Industry dummy × Bihar dummy | .1320* | −.6232** |
| | (.0550) | (.0946) |
| Industry dummy × Gujarat dummy | .1567** | .6197** |
| | (.0174) | (.0896) |
| Industry dummy × Haryana dummy | −14.9884** | .1189 |
| | (1.0474) | (.0899) |
| Industry dummy × Karnataka dummy | .6270** | −.5793** |
| | (.0253) | (.0931) |
| Industry dummy × Kerala dummy | 1.4572** | −.8724** |
| | (.0525) | (.0876) |
| Industry dummy × Madhya Pradesh dummy | −.1035** | −.6194** |
| | (.0250) | (.0871) |
| Industry dummy × Maharashtra dummy | .1895** | .4237** |
| | (.0305) | (.0884) |
| Industry dummy × Orissa dummy | 2.8203** | −1.6877** |
| | (.0227) | (.0838) |
| Industry dummy × Punjab dummy | −15.4647** | 1.3714** |
| | (1.0375) | (.0783) |
| Industry dummy × Rajasthan dummy | .9940** | −.7399** |
| | (.0254) | (.0884) |
| Industry dummy × Tamil Nadu dummy | .3391** | −.4902** |
| | (.0218) | (.0894) |
| Industry dummy × Uttar Pradesh dummy | .9208** | −.1068 |
| | (.0326) | (.0814) |
| Industry dummy × West Bengal dummy | .9490** | .2194* |
| | (.0405) | (.0967) |
| Industry dummy × Other dummy | −14.2947** | 1.3889 |
| | (1.0310) | (1.1397) |
| Industry dummy × Delhi dummy | −15.0652** | 18.6274** |
| | (1.0328) | (3.2620) |
| No. of observations | 6,992 | 6,992 |

**Note.** Standard errors (adjusted for clustering at the state level) are in in parentheses. Models include state fixed effects; these are not reported. Sample consists of 437 projects over 2 years (1998 and 1999). The average daily wage for unskilled labor is for men and women combined. The average urban workforce participation rate is for men and women combined.

+ Significant at the 10% level.

* Significant at the 5% level.

** Significant at the 1% level.

## VI. Conclusion

The results of this study strongly support our hypothesis that labor conflict and pro-worker regulations have significant negative effects on new investments and location choice probabilities. As illustrated by a panel conditional logit model, a normalized measure of the number of lockouts, greater number of strikes, and man-days lost due to labor disputes relative to other states, as well as a higher percentage of unionized workers all act as disincentives on new investment. In addition, amendments to the Industrial Disputes Act of 1947 (our measure of formal labor legislations) that favor workers over employers also hinder project siting.

Economic indicators, such as a state-level urban Gini measure and credit availability, have significant effects in most specifications. Firms prefer to locate in states with lower inequality and higher credit availability. Literacy, workforce participation, input costs, and infrastructure (road length) have little impact on location choice once one controls for labor conflict. We disaggregate labor effects by project characteristics and industrial classifications. Our basic results remain robust to these alternative categorizations; labor unrest continues to exert strong negative effects on project location choice.

The results of this research have important policy implications. The strong negative effects of labor conflict and pro-labor rules suggest that states perceived as being more pro-worker may suffer from a lack of industrial investment. This may generate negative repercussions on state output and productivity growth, as well as on employment generation within the region. Such negative effects may reduce welfare and lead to increased poverty and deprivation.

We recognize that these results are conditional in nature—the question that we consider is the particular location of a project, given that a project is going to exist. As noted above, there may be unconditional effects as well since restrictive laws could deter new projects. It is also possible that a firm that is planning to locate multiple projects will react differently to labor unrest as compared to a firm that is planning to locate a single project. Given data constraints, we are unable to address these issues here. We hope to do so in future work.

## Appendix A

**TABLE A1**

**SUMMARY STATISTICS FOR TABLE 4 (1994–99)**

| | Dependent Variables (Means) | | Independent Variables (Means) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Labor Variables | | Economic Measures | | | | | Input Cost Variables | |
| State | Number | Size (Rs. Crore) | Number of Lockouts | Number of Strikes | ICICI Bank Disbursements (Norm) | EXIM Bank Disbursements | % Growth Rate for Indian GSP | R&D Expenditure (Norm) | Planned Outlay for Manufacturing (Norm) | Daily Wage for Unskilled Male | Daily Wage for Unskilled Female |
| Andhra Pradesh | 33.000 | 14.003 | .012 | .173 | 51.700 | .402 | 6.458 | 41.184 | 28.889 | 51.775 | 42.750 |
| | (5.196) | (12.297) | (.020) | (.232) | (17.679) | (.228) | (3.495) | (4.136) | (8.832) | (9.773) | (9.474) |
| Bihar | 3.667 | .213 | .000 | .065 | 22.510 | .000 | 6.526 | 35.867 | 25.749 | 40.500 | 38.250 |
| | (1.528) | (.318) | (.000) | (.081) | (15.767) | (.000) | (15.540) | (2.865) | (8.004) | (3.317) | (3.096) |
| Gujarat | 92.333 | 24.967 | .010 | .198 | 107.903 | .211 | 7.540 | 41.686 | 63.788 | 53.788 | 44.250 |
| | (50.767) | (22.967) | (.014) | (.219) | (41.627) | (.131) | (7.310) | 13.251() | (20.857) | (11.821) | (7.963) |
| Haryana | 27.333 | 3.863 | .024 | .286 | 52.775 | .065 | 7.653 | 76.223 | 49.304 | 53.750 | 46.000 |
| | (25.697) | (3.298) | (.051) | (.332) | (27.931) | (.069) | 1.415) | (10.166) | (29.025) | (8.221) | (7.059) |
| Karnataka | 11.000 | 1.107 | .014 | .088 | 71.316 | .197 | 10.253 | 39.307 | 110.209 | 64.500 | 54.500 |
| | (7.000) | (1.613) | (.032) | (.107) | (25.532) | (.123) | (6.173) | (4.784) | (27.245) | (23.177) | (22.631) |
| Kerala | 8.000 | 2.413 | .018 | .174 | 16.004 | .081 | 5.228 | 81.627 | 327.524 | 80.250 | 72.750 |
| | (1.000) | (3.990) | (.037) | (.195) | (6.810) | (.096) | (3.996) | (13.365) | (44.801) | (16.137) | (15.671) |
| Madhya Pradesh | 27.667 | 7.907 | .011 | .042 | 17.646 | .078 | 10.577 | 23.066 | 50.752 | 55.333 | 43.667 |
| | (6.351) | (6.718) | (.025) | (.049) | (5.234) | (.075) | (5.659) | (1.932) | (31.744) | (7.370) | (7.935) |
| Maharashtra | 64.000 | 16.863 | .037 | .069 | 238.016 | .550 | 4.395 | 57.634 | 95.892 | 56.188 | 49.500 |
| | (17.349) | (13.983) | (.064) | (.084) | (8.215) | (.257) | (2.560) | (10.213) | (59.203) | (8.087) | (6.786) |
| Orissa | 1.667 | .173 | .025 | .156 | 34.635 | .000 | 4.165 | 40.529 | 68.156 | 37.625 | 33.875 |
| | (2.082) | (.205) | (.040) | (.180) | (37.053) | (.000) | (5.020) | (16.191) | (15.059) | (8.320) | (4.289) |
| Punjab | 18.333 | .853 | .104 | .101 | 16.375 | .100 | 5.431 | 66.419 | 46.363 | 63.063 | 49.292 |
| | (12.342) | (1.238) | (.202) | (.120) | (8.315) | (.103) | (3.601) | (8.068) | (17.880) | (6.299) | (7.504) |
| Rajasthan | 29.333 | 2.500 | .055 | .125 | 25.524 | .151 | 5.627 | 16.137 | 119.214 | 43.250 | 38.250 |
| | (22.480) | (2.331) | (.135) | (.140) | (13.717) | (.101) | (13.842) | (1.672) | (30.984) | (4.628) | (4.628) |
| Tamil Nadu | 25.000 | 3.627 | .132 | .334 | 47.548 | .177 | 7.532 | 25.483 | 81.594 | 62.000 | 50.333 |
| | (14.731) | (4.172) | (.261) | (.372) | (20.555) | (.073) | (11.251) | (8.274) | (16.471) | (13.050) | (9.841) |
| Uttar Pradesh | 32.000 | 8.160 | .120 | .033 | 25.352 | .164 | 8.749 | 35.371 | 37.061 | 39.917 | 37.917 |
| | (14.000) | (6.480) | (.187) | (.039) | (7.170) | (.180) | (6.494) | (2.163) | (14.970) | (7.598) | (8.185) |
| West Bengal | 22.000 | 70.830 | .120 | .087 | 55.628 | .048 | 7.344 | 14.395 | 140.702 | 40.500 | 36.875 |
| | (5.568) | (121.21) | (.294) | (.098) | (35.133) | (.034) | (2.534) | (.231) | (56.579) | 2.517() | (3.119) |
| Other | 1.000 | .024 | 9.951 | 1.098 | 11.135 | .000 | 4.921 | 56.239 | 224.059 | 48.405 | 43.991 |
| | (.000) | (.015) | (14.820) | (1.233) | (35.133) | (.000) | (2.602) | (6.375) | (18.613) | (3.548) | (2.851) |
| Delhi | .667 | .033 | .050 | .008 | 153.628 | .183 | 5.344 | .000 | 56.054 | 60.250 | 61.250 |
| | (.577) | (.058) | (.102) | (.013) | (200.72) | (.178) | (11.796) | (.000) | (90.396) | (4.787) | (6.076) |

**Note.** The labor conflict variables are normalized by the workforce of the state. Credit availability is normalized by the industrial gross state product. Literacy enrollment is normalized by state population. Road length is normalized by the area of the state. Investments are in hundreds of crores. All other expenditure variables are in crores, where 1 crore = 10,000,000 rupees or US$240,000. Standard deviations are in parentheses.

## TABLE A2

**SUMMARY STATISTICS FOR CONDITIONAL LOGIT MODELS: LABOR VARIABLES (1998–99)**

| | Labor Conflict Variables | | | | | | Formal Labor Regulation | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Man-Days of Work Stoppage Dummy | | | | | |
| State | Number of Strikes (Normalized) | Lockout Dummy | Number of Lockouts (Normalized by Workforce) | 1998 | 1999 | % of Unionized Workers | Share of Pro-Work Amendments in Total Amendments | Right to Strike Dummy | Severance Pay Provision Dummy |
| Andhra Pradesh | .2253 | 1.0000 | .0001 | | | 0 | .5 | 1 | 1 |
| | (.0469) | (.0000) | (.00004) | | | (0) | | | |
| Bihar | .0973 | 1.0000 | .00004 | | | 0 | 0 | 0 | 0 |
| | (.0102) | (.0000) | (.000001) | | | (0) | | | |
| Gujarat | .3853 | .0000 | .00002 | | | 2.167 | .143 | 0 | 0 |
| | (.0382) | (.0000) | (.00001) | | | (1.004) | | | |
| Haryana | .4952 | .0000 | .00001 | 1 | 1 | 1.206 | 0 | 0 | 0 |
| | (.1161) | (.0000) | (.000004) | | | (.239) | | | |
| Karnataka | .1949 | .0000 | .00002 | | | 1.152 | .286 | 1 | 1 |
| | (.0656) | (.0000) | (.000006) | | | (.216) | | | |
| Kerala | .3218 | 1.0000 | .0001 | 1 | 1 | 1.733 | 0 | 0 | 0 |
| | (.0389) | (.0000) | (.00003) | | | (.103) | | | |
| Madhya Pradesh | .0743 | .0000 | .000004 | 0 | 0 | .910 | 0 | 0 | 1 |
| | (.0245) | (.0000) | (.0000001) | | | (.00) | | | |
| Maharashtra | .1080 | .0000 | .00001 | 0 | 0 | .877 | .571 | 0 | 1 |
| | (.0244) | (.0000) | (.000005) | | | (1.177) | | | |
| Orissa | .2602 | .5080 | .00002 | 0 | 0 | 3.509 | .5 | 0 | 1 |
| | (.0300) | (.5005) | (.00001) | | | (.554) | | | |
| Punjab | .1709 | .0000 | .00002 | 0 | 0 | 2.086 | 0 | 0 | 0 |
| | (.0482) | (.0000) | (.000001) | | | (.640) | | | |
| Rajasthan | .2250 | .4920 | .00004 | 1 | 1 | .391 | .391 | 1 | 1 |
| | (.0068) | (.5005) | (.00002) | | | (.022) | | | |
| Tamil Nadu | .6350 | 1.0000 | .00005 | | | 1.354 | 0 | 0 | 1 |
| | (.0854) | (.0000) | (.00001) | | | (.428) | | | |
| Uttar Pradesh | .0631 | 1.0000 | .00004 | | | 0 | 1 | 0 | 0 |
| | (.0237) | (.0000) | (.00001) | | | (0) | | | |
| West Bengal | .1566 | 1.0000 | .0003 | 1 | 1 | 1.103 | .704 | 1 | 1 |
| | (.0144) | (.0000) | (.0001) | | | (.000) | | | |
| Other | .7359 | .0000 | .00002 | 0 | 0 | 3.994 | 0 | 0 | 0 |
| | (.1421) | (.0000) | (.00001) | | | (1.256) | | | |
| Delhi | .0206 | 1.0000 | .0001 | 0 | 0 | 10.303 | 0 | 0 | 0 |
| | (.0078) | (.0000) | (.00003) | | | (1.365) | | | |

**Note.** The labor conflict variables are normalized by the workforce of the state. The investment is the sum of Indian private investment in the state in 1998 and 1999.

## TABLE A3

**SUMMARY STATISTICS FOR CONDITONAL LOGIT MODELS: PROJECT AND INPUT COST VARIABLES (1998–99)**

| | Projects /Investment | | | | Input Cost Measures (Mean) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| State | No. | Size (Rs. Crore) | Mean Non-High-Tech Dummy | Not New Unit/ New Article Dummy | Wage Unskilled Male | Wage Unskilled Female | Average Power Tariff | Power Tariff for Large Industries | Urban Workforce Participation Rate, Male | Kilometers of All Roads | Literacy Program Enrollment |
| Andhra Pradesh | 26 | 2,410 | .0320 | .0092 | 51.138 | 42.294 | 420.330 | 422.428 | 51.911 | .062 | 169.5 |
| | | | (.1763) | (.0953) | (5.555) | (2.752) | (19.008) | (15.993) | (.825) | (.000) | (.896) |
| Bihar | 6 | 1,100 | .0137 | .0046 | 39.524 | 37.556 | 195.028 | 249.516 | 42.655 | .029 | 64.20 |
| | | | (.1165) | (.0676) | (1.501) | (3.503) | (6.227) | (12.455) | (.412) | (.000) | (3.430) |
| Gujarat | 46 | 2,500 | .0595 | .0366 | 51.580 | 44.818 | 384.363 | 400.821 | 59.369 | .065 | 96.91 |
| | | | (.2368) | (.1880) | (5.005) | (4.254) | (42.022) | (39.463) | (.570) | (.002) | (1.032) |
| Haryana | 12 | 733 | .0137 | .0069 | 53.572 | 44.540 | 427.531 | 421.122 | 50.105 | .090 | 72.95 |
| | | | (.1165) | (.0827) | (4.504) | (2.502) | (25.400) | (23.273) | (.595) | (.000) | (6.520) |
| Karnataka | 44 | 2,219 | .0641 | .0160 | 65.422 | 55.652 | 404.822 | 434.554 | 54.132 | .046 | 121.0 |
| | | | (.2452) | (.1257) | (10.760) | (9.509) | (22.205) | (12.305) | (.022) | (.000) | (4.566) |
| Kerala | 7 | 28 | .0137 | .0000 | 79.318 | 72.080 | 243.950 | 245.801 | 52.039 | .243 | 55.98 |
| | | | (.1165) | (.0000) | (4.254) | (5.005) | (22.121) | (20.853) | (1.281) | (.018) | (.376) |
| Madhya Pradesh | 21 | 530 | .0458 | .0183 | 56.693 | 43.376 | 422.295 | 434.350 | 47.624 | .012 | 130 |
| | | | (.2092) | (.1342) | (1.668) | (2.669) | (19.939) | (14.689) | (.173) | (.000) | (1.663) |
| Maharashtra | 119 | 7,178 | .1693 | .0664 | 55.909 | 48.127 | 351.598 | 350.744 | 53.042 | .066 | 63.43 |
| | | | (.3755) | (.2492) | (3.703) | (2.752) | 16.013) | (14.347) | .733) | (.000) | (.491) |
| Orissa | 4 | 339 | .0092 | .0023 | 42.620 | 36.310 | 334.173 | 341.876 | 49.771 | .089 | 124.3 |
| | | | (.0953) | (.0478) | (7.507) | (3.753) | (8.094) | (2.425) | (.407) | (.000) | (5.314) |
| Punjab | 16 | 3,463 | .0229 | .0092 | 60.770 | 46.005 | 314.427 | 332.558 | 55.544 | .192 | 40.45 |
| | | | (.1497) | (.0953) | (1.251) | (.333) | (18.894) | (19.269) | (1.296) | (.000) | (10.10) |
| Rajasthan | 18 | 6,006 | .0320 | .0229 | 41.516 | 36.516 | 404.600 | 418.271 | 47.974 | .018 | 149.1 |
| | | | (.1763) | (.1497) | (1.001) | 1.001() | (28.245) | (29.297) | (.340) | (.000) | (.615) |
| Tamil Nadu | 60 | 8,658 | .0961 | .0366 | 60.965 | 51.064 | 307.392 | 310.774 | 54.617 | .113 | 136.2 |
| | | | (.2951) | (.1880) | (5.630) | (4.004) | (18.474) | (17.157) | (.093) | (.001) | (1.731) |
| Uttar Pradesh | 26 | 1,180 | .0343 | .0229 | 38.703 | 36.868 | 418.597 | 430.637 | 46.790 | .172 | 74.42 |
| | | | (.1823) | (.1497) | (2.335) | (2.168) | (1.624) | (.603) | (.468) | (.000) | (7.415) |
| West Bengal | 16 | 1,445 | .0229 | .0069 | 40.000 | 35.492 | 389.369 | 370.314 | 54.298 | .244 | 147.1 |
| | | | (.1497) | (.0827) | (.000) | (.500) | (15.149) | (12.281) | (.232) | (.008) | (1.451) |
| Other | 5 | 226 | .0069 | .0000 | 46.873 | 43.082 | 237.821 | 241.060 | 49.749 | .018 | 446.4 |
| | | | (.0827) | (.0000) | (1.001) | (.715) | (22.770) | (24.922) | .115() | (.000) | (445.7) |
| Delhi | 11 | 7,985 | .0000 | .0023 | 61.540 | 61.540 | 425.184 | 440.656 | 52.744 | 17.084 | 27 |
| | | | (.0000) | (.0478) | (2.502) | (2.502) | (20.056) | (18.711) | (.350) | (.035) | (11.78) |

**Note.** Investment is the the sum of Indian private investment in the state in 1998 and 1999. All expenditure variables are in crores, where 1 crore = 10,000,000 rupees or US$240,000. Standard deviations are in parentheses.

## TABLE A4

**SUMMARY STATISTICS FOR CONDITIONAL LOGIT MODELS: STATE ECONOMIC HEALTH VARIABLES (1998–99)**

| | State Income | | Credit Availability | | Planned Outlay and R&D | | | Inequality: |
|---|---|---|---|---|---|---|---|---|
| State | % Growth Rate of GSP (3-Year Moving Average) | % Growth Rate of Industrial GSP | EXIM Bank Disbursement (Normalized) | ICICI Disbursement (Normalized) | Planned Outlay on Manufacturing | Planned Outlay on Mining | R&D Expenditure by State (Normalized) | Urban Gini Coefficient |
| Andhra Pradesh | 5.059 | 4.193 | .617 | 51.116 | 26.723 | .640 | 45.252 | .313 |
| | (.727) | (3.834) | (.043) | (16,425) | (4.323) | (.261) | (1.686) | (.004) |
| Bihar | 11.099 | 17.98 | 0 | 35.219 | 26.943 | 2,079 | 34.325 | .316 |
| | (.990) | (27.35) | (.000) | (2.094) | (8.849) | (.105) | (.810) | (.003) |
| Gujarat | 5.871 | 3.940 | .250 | 119.636 | 75.493 | 1.472 | 55.903 | .287 |
| | (1.934) | (.655) | (1.004) | (8.317) | 25.243) | (.955) | (3.359) | (.008) |
| Haryana | 7.225 | 6.497 | .075 | 80.623 | 51.470 | .132 | 87.114 | .284 |
| | (.249) | (1.060) | (.092) | (12,954) | (39.382) | (.005) | (.881) | (.002) |
| Karnataka | 11.982 | 8.057 | .212 | 87.897 | 90.465 | .538 | 34.990 | .320 |
| | (1.418) | (1.905) | (.117) | (26.143) | (9.915) | (.155) | (.247) | (.002) |
| Kerala | 4.652 | 5.896 | .028 | 19.998 | 296.953 | 2.337 | 94.868 | .325 |
| | (.344) | (.013) | (.011) | (3.147) | (1.433) | (.479) | (2.844) | (.007) |
| Madhya Pradesh | 11.576 | 10.66 | .061 | 15.573 | 51.665 | 2.509 | 20.960 | .316 |
| | (.728) | (.089) | (.011) | (6.133) | (28.777) | (.713) | (.585) | (.005) |
| Maharashtra | 4.837 | 4.315 | .481 | 322.475 | 57.133 | .794 | 66.638 | .282 |
| | (.356) | (1.550) | (.019) | (18.728) | (3.656) | (.607) | (3.057) | (.004) |
| Orissa | 2.626 | 4.255 | 0 | 74.655 | 56.976 | 6.269 | 53.916 | .295 |
| | (.616) | (.722) | (.000) | (8.441) | (1.044) | (.296) | (5.532) | (.004) |
| Punjab | 6.870 | 8.176 | .155 | 24.448 | 57.593 | .523 | 71.847 | .311 |
| | (.315) | (1.957) | (.174) | (2.828) | (.378) | (.515) | (2.356) | (.013) |
| Rajasthan | 4.446 | −1.45 | .089 | 19.994 | 101.708 | 46.247 | 16.056 | .283 |
| | (4.653) | (23.39) | (.011) | (3.984) | (33.526) | (13.111) | (1.912) | (.003) |
| Tamil Nadu | 2.225 | –2.89 | .177 | 67.419 | 67.083 | .104 | 34.038 | .341 |
| | (3.184) | (9.596) | (.135) | (12.674) | (9.109) | (.003) | (4.402) | (.009) |
| Uttar Pradesh | 7.834 | 7.057 | .111 | 24.979 | 30.896 | .546 | 36.416 | .326 |
| | (1.723) | (10.19) | (.056) | (7.636) | (6.892) | (.123) | (.602) | (.001) |
| West Bengal | 6.984 | 7.321 | .066 | 90.735 | 183.961 | 1.967 | 14.627 | .330 |
| | (.498) | (.590) | (.051) | (4.326) | (20.898) | (.117) | (.200) | (.003) |
| Other | 4.693 | 3.539 | .000 | 13.687 | 231.658 | 11.185 | 64.051 | .255 |
| | (.715) | (3.075) | (.000) | (2.606) | (2.003) | (.061) | (1.158) | (.001) |
| Delhi | 5.518 | 13.22 | .287 | 327.719 | 21.947 | .000 | .000 | .351 |
| | (4.133) | (3.540) | (.335) | (173.354) | (10.396) | (.000) | (.000) | (.012) |

**Note.** Credit availability is normalized by the industrial gross state product. Literacy enrollment is normalized by state population. Road length is normalized by the area of the state. All expenditure variables are in crores, where 1 crore = 10,000,000 rupees or US$240,000.

## Appendix B

**TABLE B1**
VARIABLES WITH YEARS OF AVAILABILITY AND SOURCE

| Variables | Source |
|---|---|
| Labor conflict and regulation variables: | |
| Number of lockouts, strikes (1997–99) | Rajya Sabha starred question no. 196, dated March 8, 2001, http://www/164.100.24.219/rsq/quest.asp ?qref=41741 (Annexure I and II). |
| Man-days lost due to work stoppage (1997–2000) | *Pocket Book of Labour Statistics*, 1998, Labour Bureau, Ministry of Labour, Government of India, New Delhi. |
| Percentage of unionized workers (1996–97) | Statistical Abstract, 2000, Central Statistical Organization, Ministry of Statistics and Programme Evaluation, Government of India, New Delhi. |
| Formal labor regulation (1994–2000) | Besley and Burgess (2002). |
| Economic variables: | |
| EXIM Bank disbursement (1994–2000) | *Report on Development Banking in India, 2000–2001*, Industrial Development Bank of India, http://www.idbi .com/devbnk02.html. |
| ICICI Bank disbursement (1995–2000) | Report on Development Banking in India, 2000–2001, Industrial Development Bank of India, http://www /indiastat.com/india.ShowDataSec .asp?secid=4861&ptid=107697. |
| Urban Gini coefficient (1998–2000) | National Human Development Report, 2001, Planning Commission, Government of India, New Delhi. |
| Industrial GSP, level and growth rate (1994–2000) | Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India, New Delhi, http://www.mospi.nic.in/. |
| Input cost variables: | |
| Power tariffs (1998, 2000) | Rajya Sabha unstarred question no. 845, dated July 24, 2002, http://www.164.100.24.219/annex/196/AU845 .htm. |
| Average daily wage for unskilled male and female workers (1995–2000) | Labor Bureau, 1998. Ministry of Labour, Government of India, New Delhi. |
| Urban workforce participation rate (1998–2000) | *Manpower Profile: India Yearbook, 2002*, Institute of Applied Manpower Research for Concept, New Delhi, 2002. |
| Literacy program enrollment (1998–99) | *Literacy Campaigns in India, Annual Report, 1998–99*, Department of Elementary Education and Literacy, National Literacy Mission, Directorate of Adult Education, Ministry of Human Resource Development, Government of India, New Delhi, 1999. |
| Kilometers of surfaced roads (1994–99) | *Basic Road Transport Statistics of India*, Ministry of Transport and Highways, Government of India, New Delhi, http://morth.nic.in/motorstat/brs_table2.htm. |
| Normalization variables: | |
| Population (1996–2000; thousands) | *Population Projections for India and States, 1996–2016,* Office of the Registrar General, Ministry of Home Affairs, Government of India, New Delhi, 1997. |
| Total workforce (1996–2000) | 2001 Census, Government of India. |
| Area (1996–2000; square kilometers) | 1991 Census, Government of India. |

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