NBER WORKING PAPERS SERIES

THE IMPACT OF COLLECTIVE BARGAINING LEGISLATION ON DISPUTES IN THE U.S. PUBLIC SECTOR: NO POLICY MAY BE THE WORST POLICY

Janet Currie

Sheena McConnell

Working Paper No. 3978

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 1992

We would like to thank Scott Newlon, Duncan Thomas, Joseph Tracy, Larry Katz, and workshop participants at Northwestern University, Queens University, the University of Michigan, and the 1991 NBER Summer Labor Workshop for helpful comments. Carlos Diaz, Tom Johnston, and Lina Takla provided excellent research assistance. This research was supported by a grant from the Fund for Research on Dispute Resolution. This paper is part of NBER's research program in Labor Studies. Any opinions expressed are those of the authors and not those of the Fund or of the National Bureau of Economic Research.

NBER Working Paper #3978
January 1992

THE IMPACT OF COLLECTIVE BARGAINING LEGISLATION ON DISPUTES IN THE U.S. PUBLIC SECTOR: NO POLICY MAY BE THE WORST POLICY

ABSTRACT

This paper estimates the impact of collective bargaining legislation on disputes during labor negotiations in the U.S. public sector. We use a large national sample of U.S. state and local government contracts to compare the incidence and intensity of disputes by similar workers under different forms of collective bargaining legislation. The breadth of our data allows us to examine the impact of five different forms of legislation. Our principal finding is that strike costs, measured by strike duration and the number of working days lost, are highest in jurisdictions that provide no explicit framework for bargaining or dispute resolution.

Janet Currie
Department of Economics
M.I.T.
77 Massachusetts Avenue
Cambridge, MA 02139
and NBER

Sheena McConnell
Mathematica Policy Research
600 Maryland Avenue, SW
Suite 550
Washington, DC 20024

I. Introduction

Disputes during labor negotiations can be extremely costly. This is especially true in the public sector where the government may be the sole supplier of an essential service. Yet, despite concerns about the costs of disputes, legislators have not reached a consensus on the best form of policy to minimize disputes. As a result, public sector negotiations are governed by a diverse set of laws that vary by state and occupation of the employees. This paper contributes to the debate over the best form of collective bargaining legislation in the public sector by estimating the impact of the legal structure on the form, frequency, and intensity of disputes.

We consider two main aspects of the legislation: the laws regarding the employees' bargaining rights and the provision of procedures to resolve disputes. In the U.S. private sector, most employees have the right to strike and all employers are required to bargain in "good faith" with a legally-constituted union. In contrast, in the U.S. public sector, employers are not required to bargain with a union in many jurisdictions and in the majority of jurisdictions, strikes are illegal. Many of the jurisdictions that prohibit strikes provide no institutional procedures to resolve disputes. Some jurisdictions that prohibit strikes, however, require that public sector disputes be resolved by a neutral third-party -- an arbitrator. Some jurisdictions in the public sector grant workers the right to strike.

Ideally, we would like to examine the impact of collective bargaining legislation on the cost of disputes. However, in the absence of data on dispute costs we examine the impact on the incidence of strikes, the length of strikes, and the number of working days lost due to strikes. We also examine the impact of collective bargaining legislation on the incidence of negotiations ended by an arbitrator imposing an award.

Previous studies of the impact of collective bargaining legislation on disputes have suffered from a lack of a large data set of disputes in the U.S. public sector. This limits both the forms

of legal structure that they were able to examine and the ability to generalize the results from these studies to other jurisdictions. For example, Ichniowski's (1982) study of police disputes and Wheeler's (1975) study of firefighters examined the impact of legislation on disputes by workers in only one occupation. And while Olson (1986) examined the impact of legislation on workers in four different occupations, his data only covered strikes in six states. Currie and McConnell (1991) examined the impact of legislation on disputes using a large data set of Canadian contracts. However, because of the major differences in both the industrial relations environment and the existing forms of collective bargaining legislation between Canada and the United States, the results of Currie and McConnell (1991) should not be generalized to the U.S. public sector.

In this study, we use a large data set of U.S. state and local government contracts negotiated between 1971 and 1986. This data set has four advantages over data sets used in previous studies of the impact of collective bargaining legislation on disputes in the U.S. public sector. First, the data set covers contracts from a wide variety of different types of workers under different forms of legislation. These contracts were negotiated by workers in 8 different occupations and 40 states. The breadth of the data set allows us to estimate the impact of five mutually-exclusive categories of collective bargaining legislation.

Second, because the data span 16 years we are able to observe changes in legislation over time. We exploit this variation by controlling in our models for the state in which the negotiations took place and the occupation of the workers.

Third, unlike all previous studies of disputes in the U.S. public sector, the unit of observation is a contract negotiation. Contract data allow us to calculate the proportion of contract negotiations that end in a strike or an arbitration: the probability of a dispute. This measure of dispute incidence controls for changes in the opportunities for a dispute afforded by changes in the number of contract negotiations. No dispute rates for a nationally-based sample of public sector contracts were previously available. Contract data also allow us to control for

contract-specific determinants of disputes, such as the number of workers in the bargaining unit.

Fourth, we examine two alternative forms of disputes, strikes and arbitrations, within the same framework. And, unlike previous studies, we model three measures of strike activity: the incidence of strikes, the length of strikes, and the total number of working days lost due to strikes. It is important to examine a range of measures of strike activity because strike incidence alone may not fully capture the cost of disputes.

The rest of the paper is organized as follows. Section II discusses the forms of collective bargaining legislation that exist in the U.S. public sector. Section III describes the data used in this study. In Section IV, we present estimates of the impact of bargaining legislation on the incidence of strikes and arbitration. In Section V, we present estimates of the impact of bargaining legislation on the length of strikes and the number of working days lost due to strikes. A discussion of our results follows in Section VI.

II. Collective Bargaining Legislation

Collective bargaining legislation in the U.S. public sector varies considerably by state and by the occupation of the workers. Similar types of workers are often covered by different legislation in different states and different types of workers within a state are often covered by different legislation. Legislation varies in terms of both the requirements for employers to bargain collectively and the provision of procedures to resolve disputes. Some public-sector employees are prohibited from striking, while others are given the right to strike or provided with some form of arbitration.

As collective bargaining law is developed at the state rather than the federal level, and has historically developed in a piece-meal fashion, legislation is rarely exactly the same in any two jurisdictions. Hence, almost as many forms of legal structure exist as there are groups of workers defined by occupation and state. For the purposes of this study, however, we lump together

similar forms of legislation into five categories. For shorthand, we call these categories: (1) no duty to bargain, (2) duty to bargain, (3) voluntary arbitration, (4) compulsory arbitration, and (5) right to strike. All of the contracts in our data set fall into one, and only one, of these five categories.

We identified the collective bargaining legislation in effect during the negotiation of each of the contracts in our data set using the National Bureau of Economic Research (NBER) Collective Bargaining Law Data Set. We updated the data set to 1986 using the annual descriptions of changes in labor laws published by the U.S. Department of Labor, Bureau of Labor Statistics (BLS) in the Monthly Labor Review. This is the best available source of information on collective bargaining legislation in the U.S. public sector and is described in detail in Valletta and Freeman (1988). Table 1 shows the relationships between our five categories of legislation and the categories of legislation as defined in the NBER data set.

A clear relationship exists between the provision of collective bargaining rights and the provision of dispute-resolution procedures. For example, it is rare for a jurisdiction that does not require employers to bargain with their employees to provide the right to strike or to provide institutions to facilitate the arbitration of disputes. Hence, we do not study the impact of the provision of collective bargaining rights and dispute resolution procedures as two unrelated aspects of the legislation. Instead, each of our five categories of legislation is defined in terms of both the provision of collective bargaining rights and the provision of dispute-resolution procedures.

The first category of legislation--no duty to bargain--covers legal structures in which employers are not required to bargain, employees do not have the right to strike, and no provision is provided for arbitration. It includes jurisdictions in which there is no law that discusses collective bargaining ("no provision" in the NBER data set), jurisdictions in which collective bargaining is explicitly prohibited, and jurisdictions in which the employer is authorized

to bargain or the union has the right to present proposals or "meet and confer" but the employer is not required to bargain.

Contracts are still negotiated even in jurisdictions in which employers are not required to bargain. In our sample of 1,005 contracts, 175 contracts (17 percent) were negotiated in no-duty-to-bargain jurisdictions (see Table 1). Eight contracts were even negotiated in jurisdictions which explicitly prohibited collective bargaining.

Employees in the public sector do not have the right to strike unless legislation explicitly gives them the right to do so. In our sample, slightly more than half of the contracts in the no-duty-to-bargain category were negotiated in jurisdictions in which strikes were explicitly prohibited. We do not observe any jurisdictions in which strikes were permitted but employers were not required to bargain with a union.

The second category of legislation -- duty to bargain -- covers legislation that explicitly or implicitly requires employers to bargain with employees in "good faith" but does not provide employees the right to strike or any binding dispute-resolution procedures. The legislation may, however, require that the bargaining parties take a dispute to mediation or fact-finding. In mediation and fact-finding, a neutral third-party recommends a settlement but the parties are not bound to act on this recommendation. In our sample, 344 contracts (34 percent) fall into the duty-to-bargain category.

In some jurisdictions, legislation explicitly requires the employer to bargain in good faith. In others, the legislation implies that employers must bargain in good faith but does not explicitly require them to do so. For example, the legislation may specify ratification procedures or list a failure to negotiate under "unfair practices." Both types of legislation are included in the duty-to-bargain category. We have also included 31 contracts in this category that were not coded as either "implied" or "explicit" duty to bargain in the NBER database. These contracts were negotiated under legislation that required mediation or fact-finding in the event of a dispute. We

took the view that this type of legislation implicitly required the employers to bargain in good faith. Placing these contracts into the no-duty-to-bargain category instead of the duty-to-bargain category did not change any of the conclusions of this study.

The third category of legislation -- voluntary arbitration -- includes all legislation that requires (either explicitly or implicitly) the employer to bargain with the union, does not give employees the right to strike, and provides for binding voluntary arbitration. Under voluntary arbitration both parties must agree to take their dispute to an arbitrator and the bargaining pair is bound by his or her decision. Because under arbitration the parties are bound by the decision of the third party, it differs from mediation and fact-finding under which the parties are free to reject the suggested settlement. The legislation may specify some form of mediation in addition to voluntary arbitration. In our sample, 208 contracts (21 percent) fall into the voluntary arbitration category.

The fourth form of legislation -- compulsory arbitration -- includes all legislation that does not provide employees the right to strike and provides for some form of binding compulsory arbitration. Under compulsory arbitration, any unresolved dispute must go to arbitration. In contrast to voluntary arbitration, either party can take the dispute to arbitration even against the wishes of the other party. As under voluntary arbitration, both parties are bound by the arbitrator's decision. In our sample, all jurisdictions that provide compulsory arbitration explicitly prohibit strikes.

Our compulsory-arbitration category includes legislation that both mandates arbitration by law and legislation that falls under the category "discretionary" in the NBER data set. Under discretionary arbitration, arbitration may be initiated by an administrative agency "either unilaterally or upon request of a party" (Valletta and Freeman, 1988, page 403). We classify this as compulsory arbitration because either party may take the negotiations to an arbitrator.[1]

Compulsory arbitration procedures can be divided into two main categories -- conventional and final-offer arbitration. Under conventional arbitration the arbitrator can choose any award he or she wishes. Under final-offer arbitration, the parties prepare "final offers" and the arbitrator must choose one of the final offers on the negotiating table.[2] In our sample, 105 contracts (10 percent) are negotiated under some form of compulsory arbitration. Of these 105 contracts, 38 are negotiated under conventional arbitration and 67 are negotiated under final-offer arbitration.[3]

Finally, the fifth category of legislation -- right to strike -- includes legislation that explicitly permits strikes. In our sample, all jurisdictions that provide the right to strike also require employers (either explicitly or implicitly) to bargain in good faith with their employees. In our data, 173 contracts (17 percent) fall into this category.

Seventeen contracts in our sample were negotiated in jurisdictions that provided the right to strike and also legislated compulsory arbitration (in either the NBER "discretionary" or "required by statute" categories). We interpret the provision of compulsory arbitration as an attempt to limit the employees' right to strike. The legislation provides for a means -- arbitration -- to end a strike viewed as too lengthy or disruptive. We have included these contracts in the right-to-strike category because a public sector employee's right to strike is nearly always limited by the potential for *ad hoc* legislative intervention and so we interpret the provision of compulsory arbitration as a formalization of this type of intervention. Including the 17 contracts in the compulsory-arbitration category rather than the right-to-strike category does not alter our results.

It is important to note that many jurisdictions that grant employees the right to strike also provide institutions to encourage voluntary arbitration. Over 80 percent of the contracts (140 contracts) in the right-to-strike category were negotiated in jurisdictions that provided for voluntary arbitration. In these cases, employees have the choice of settling a dispute by

arbitration or a strike. In our voluntary-arbitration category, bargaining parties have no alternative but to take any impasse to arbitration.

The importance of each of our legislation categories changed over time. The trend towards more pro-bargaining legislation noted by Freeman and Valletta (1988) is reflected in our sample: 23 percent of all contracts were signed in no-duty-to-bargain jurisdictions between 1971 and 1978 compared with 15 percent between 1979 and 1986. In contrast the right-to-strike category has become more important over time. While 13 percent of all contracts in our sample were negotiated under the right to strike between 1971 and 1978, 19 percent of all contracts were negotiated under the right to strike between 1979 and 1986.

III. A Description of the Data

The basis of our data set is a list of 1,005 contract negotiations that occurred between 1971 and 1986. We constructed the list of contract negotiations from the Current Wage Developments (CWD), a monthly publication of the BLS that lists major contracts recently negotiated in the private and public sector that involved 1,000 or more workers.

The CWD includes information on the date the contract was effective, the date the contract was negotiated, the length of the contract, the names of the employer and union involved in the negotiations, the state in which the contract was negotiated, and the number of workers covered by the contract. The CWD also states whether a strike or arbitration occurred at the negotiation and whether the settlement was imposed by legislation. Unfortunately, the CWD does not include information on the wage level negotiated in the new contract.

The BLS does not publish information on all large public sector contracts.[4] Hence we were unable to construct a full panel of contracts for each bargaining pair over the sample period. The data include contracts negotiated by 584 different employer-union bargaining pairs; we have more than two contracts for only 98 of these bargaining pairs. The CWD lists more contracts in

the later years of our sample: 64 percent of the contracts in the sample were negotiated in the last 5 years of the 16-year sample period.

A striking feature of collective bargaining legislation is its variation across workers within an occupation group. From the name of the employer and the name of the union we could identify eight occupation groups of workers covered by the contracts in the sample: teachers, police, fire-fighters, hospital workers, city white-collar workers, other city workers, university faculty, and other state employees. The distribution of contracts by law category for each occupation group of workers is shown in Appendix Table 1. No one occupation group negotiates under a single type of legislation. Teachers, university faculty, and hospital workers are the groups most likely to negotiate in jurisdictions with neither arbitration nor the right to strike. Essential workers -- police and fire-fighters -- rarely have the right to strike and are the groups most likely to be provided with some form of arbitration.

The Industrial Relations Facts (IRF), a weekly BLS internal publication, records information on all strikes that involved 1,000 or more workers. From this publication, we constructed a list of all strikes that occurred between 1971 and 1986 in the public sector. The IRF includes information on the name of the employer, the name of the union, the state in which the strike occurred, the beginning and ending date of the strike, and the number of workers involved in the strike. For each strike we checked to see whether it occurred at a contract negotiation in our sample. If it did, we supplemented information on the strike from the CWD with information from the IRF.

It is important to note that we only include in our sample disputes over contract negotiations. Unlike previous studies using more aggregated data, (for example, Ichniowski, 1982), we can distinguish between strikes that occur at the negotiation of a new contract and strikes that occur at other times over other issues, such as grievance resolution or union recognition. As the determinants of strikes probably vary by the cause of the strike, it is

important to limit the scope of the study in this way.[5] Disputes over the terms of a new contract are the most frequent cause of the strikes involving 1,000 or more workers reported in the IRF: nearly 72 percent of all strikes reported in the IRF were matched to a contract negotiation in our sample.

In our sample, over 17 percent of all negotiations end in a dispute. Strikes occurred at about 7 percent of contract negotiations. Compared to the private sector the probability of a strike in the public sector is low -- between 12 and 15 percent of contract negotiations in the U.S. private sector end in a strike (McConnell, 1990). Five percent of the contract negotiations in our sample were settled by arbitration and 5.5 percent of the settlements were imposed by legislation. The incidence of all disputes--resolved by either a strike, an arbitration, or a legislated settlement--fluctuated from year to year. However, there was a general decline throughout the 1980s in the incidence of all three types of dispute. Although no aggregate public sector strike or arbitration rates are available, this decline mirrors the decline in the aggregate number of strikes in the United States during the 1980s.[6]

IV. The Incidence of Strikes and Arbitrations

The goal of most collective bargaining laws is to reduce the frequency of disputes. A dispute can be resolved in three ways: by a strike, by an award made by an arbitrator, or by a settlement imposed by legislation. Table 2 shows the number of contract negotiations in our sample that were settled without a dispute, by a strike, by an arbitration, and by a legislated settlement. It also shows the average strike length and the average number of working days lost due to strikes under each type of law.

Strikes occurred under each of our five categories of legislation even though strikes are illegal under all of our legislation categories except the right-to-strike category. Strike incidence is highest when the parties have neither a duty to bargain nor dispute resolution procedures --

over 13 percent of all contracts negotiated in jurisdictions with no-duty-to-bargain legislation end in a strike.[7] In our sample, a strike occurred in just under 10 percent of all contract negotiations in jurisdictions where strikes are legal.

Arbitrations also occurred under every category of legislation including legislation that did not require the state to set up any institution to facilitate arbitration. Even under right-to-strike legislation, an arbitrator settled about 2 percent of contract negotiations. But, not surprisingly, most arbitrations took place under compulsory arbitration legislation -- an arbitrator settled just under 30 percent of contracts negotiated under compulsory arbitration. The frequency of arbitration did not vary greatly between different types of compulsory arbitration -- the incidence of arbitration is just under 4 percentage points higher under final-offer compulsory arbitration than under conventional compulsory arbitration.

A legislated settlement was imposed most frequently in jurisdictions without arbitration or the right to strike -- our no-duty-to-bargain and duty-to-bargain categories. More than one in nine contracts negotiated in jurisdictions with no-duty-to-bargain law were settled by a legislator imposing an award. Legislated settlements were rare under compulsory arbitration -- in our sample only one legislated settlement occurred under compulsory arbitration.

Disputes -- strikes, arbitrations, and legislated settlements -- were most frequent under compulsory arbitration legislation. Only 66 percent of contracts were negotiated without a dispute under final-offer compulsory arbitration. Disputes were least frequent in jurisdictions with duty-to-bargain legislation but without arbitration or the right to strike. Over 88 percent of contracts were negotiated without a dispute under duty-to-bargain legislation compared to an average of 83 percent for the whole sample.

If factors other than the form of collective bargaining legislation are important determinants of dispute rates, the pattern of "raw" strike and arbitration rates by collective bargaining law shown in Table 2 may be misleading. To control for the effects of other

determinants of the incidence of strikes and arbitrations, we estimate models of whether the negotiation was settled by a strike and whether the negotiation was settled by an arbitration. The strike models are presented in columns 1 through 3 of Table 3; the arbitration models are presented in columns 4 through 6.[8] We do not estimate models of legislated settlements as the parties to the negotiations may not have direct control over whether a legislator imposes an award.

Each of our models contains a dummy variable for each of our main categories of legislation (except no-duty-to-bargain legislation). We only present the results of models that include one dummy variable to capture the effect of both conventional and final-offer arbitration because there was never a significant difference between the impact of the two forms of compulsory arbitration in any model we estimated.

To control for variation across states in the economy, the industrial relations environment, and the political climate, we include state dummies in columns 1, 2, 4, and 5 of Table 3.[9] Columns 3 and 6 of Table 3 present estimates of models that do not include state dummies. In each model, we also include the state unemployment rate, the average hourly earnings in manufacturing in the state, and the size of the state's labor force.[10] We estimate the models presented in Table 3 using ordinary least squares.[11]

To control for variation in strike and arbitration incidence across different types of workers, we include dummy variables for the occupation of the workers in each model. As the size of the collective bargaining unit may affect both the benefit from and the cost of a dispute, we also include the number of workers in the bargaining unit in each model.[12] To capture changes over time that occurred nationwide, we include year dummies in each model. These year dummies should pick up any general macroeconomic impacts on the incidence of disputes in addition to the impact on public sector contract negotiations of events such as the 1981 strike by the Professional Air Traffic Controllers Organization.

The introduction of collective bargaining legislation is unlikely to be completely random. In particular, it may be affected by the recent incidence of disputes. For example, a change in legislation may be triggered by a particularly large strike in the public sector. If the introduction of collective bargaining law is correlated with the incidence of strikes or arbitrations, our estimates may be biased. This is a problem with all existing models of the impact of collective bargaining law on disputes and cannot be solved until an adequate model of the determinants of the introduction of collective bargaining legislation has been developed (Ehrenberg and Schwarz, 1986). As yet, such a model does not exist (see Farber, 1988, for an example of an attempt at this type of model). However, most changes in collective bargaining legislation occurred before 1979 (Farber, 1988). To reduce the likelihood of an endogeneity bias, we estimate our models in columns 2 and 5 of Table 3 on the sample of contracts that were negotiated in 1979 or later.[13]

The results presented in Table 3 suggest that introducing duty-to-bargain legislation, without granting workers the right to strike or providing for arbitration, would decrease the incidence of strikes by between 7 and 11 percentage points. When the model is estimated on the whole sample (in columns 1 and 3), the hypothesis that the form of legislation has no impact on strike incidence is rejected by an F-test at a 10 percent level of significance. This confirms results of earlier studies which looked only at specific occupation groups. For example, Stern and Olson (1982) found strikes highest in jurisdictions with no-duty-to-bargain legislation in a study of disputes by police, teachers, and fire-fighters. Also, Ichniowski (1982) in a study of police strikes found that a switch from no-duty-to-bargain legislation to duty-to-bargain legislation reduced strikes. However, Currie and McConnell (1991) found no significant difference in the strike incidence in jurisdictions with and without duty-to-bargain legislation in the Canadian public sector. But, in Canada nearly all jurisdictions require employers to bargain in good faith with a union.

Our estimates suggest that, given that employers are required to bargain in good faith, strikes are more frequent if they are legal. In column 1 of Table 3, the coefficients on all legislation variables except the right-to-strike dummy are significantly negative. An F-test rejects the hypothesis that all forms of duty-to-bargain legislation have the same impact at a 10 percent level of significance when the model is estimated on the full sample. However, there is no statistically significant difference between the incidence of strikes under the right to strike and the incidence of strikes under no-duty-to-bargain legislation.

The incidence of strikes in our sample is lowest under compulsory arbitration. The results in Table 3 show that the incidence of strikes is between 5 and 13 percentage points lower under compulsory arbitration than under the right to strike. This result is also similar to findings reported previously for specific occupation groups. In the U.S. public sector, Ichniowski (1982) found that arbitration reduced strikes by police and Wheeler (1975) found that arbitration reduced strikes by fire-fighters. Currie and McConnell (1991) found that in the Canadian public sector strikes are about 5 percentage points more frequent under the right to strike than under compulsory arbitration.

A striking, although not surprising, result in Table 3 is that arbitrations are used most frequently under compulsory arbitration. Conventional compulsory arbitration is often criticized for discouraging or "chilling" negotiations (Stevens, 1966). For example, some argue that arbitrators under conventional arbitration "split the difference" between the final-offers of the negotiating parties. If negotiating parties anticipate this behavior, they may take extreme positions that discourage negotiations and increase the probability of a dispute. Our estimates suggest that the introduction of compulsory arbitration into a jurisdiction with no-duty-to-bargain legislation increases the incidence of arbitration by between 22 and 39 percentage points.

Our estimates also suggest that replacing voluntary arbitration with compulsory arbitration increases the probability of an arbitration by between 15 and 23 percentage points. F-tests

overwhelmingly reject the hypothesis that the introduction of the duty to bargain, with or without dispute resolution procedures, into a jurisdiction with no-duty-to-bargain legislation has no impact on the incidence of arbitration.

The estimates in Table 3 suggest that making strikes legal significantly reduces the probability of an arbitrated settlement. We predict that switching from voluntary arbitration to the right to strike decreases the incidence of arbitration by between 26 and 28 percentage points (if we include state dummies in the model). As most jurisdictions with the right to strike also provide for voluntary arbitration, the finding that a switch from voluntary arbitration to the right to strike increases strike incidence and decreases arbitration incidence suggests that bargaining pairs prefer to settle a dispute with a strike rather than an arbitration when they have the choice between the two.

The results presented in columns 3 and 6 of Table 3 underline the importance of controlling for the state in which the negotiations take place. When state dummies are excluded from the strike model (in column 3), the coefficients on all the legislation variables show a positive bias. This suggests that, for some reason not captured by the variables in the model, states with frequent strikes are more likely to have legislation that requires employers to bargain. When state dummies are excluded from the arbitration model (in column 6), the coefficient on the right to strike dummy exhibits a large positive bias, while the coefficients on the other legislation variables show a negative bias. This suggests that states with frequent arbitrations are more likely to have either no-duty-to-bargain legislation or duty-to-bargain legislation and the right to strike.

Restricting the sample to include only those contracts negotiated after most of the law changes have taken place (1979 through 1986) does not have a significant impact on the estimates in Table 3. However, estimates of the impact of legislation on strike incidence in the period 1979 to 1986 are slightly lower (in absolute terms) than those made using the whole sample (compare

columns 1 and 2 of Table 3). Restricting the sample to those contracts negotiated during the period 1979 to 1986 has little impact on the estimates of the impact of legislation on the incidence of arbitration (compare columns 4 and 5 of Table 3).

Turning to the impact of the other explanatory variables on the incidence of strikes and arbitrations, we find that an increase in the state unemployment rate has no impact on the probability of a strike but increases the probability of an arbitration by between 1 and 2 percentage points. The negative correlation between strike incidence and unemployment in the private sector is well documented (Vroman, 1989). So it is surprising that the inverse relationship between strike incidence and unemployment does not hold in the public sector.[14] This may be because the ability of the state government to pay for wage increases falls in a recession. And, while in the private sector the cost of a strike to the employees rises in a recession as it becomes easier for them to be replaced, in the public sector the cost of a strike to the employee probably does not rise much in a recession because public sector strikers are unlikely to lose their jobs and be replaced by other workers. None of the other explanatory variables have a consistent and significant impact on the incidence of strikes or arbitrations.

V. Strike Duration and Working Days Lost Due to Strikes

Perhaps more important than the impact of collective bargaining legislation on the incidence of strikes is its impact on the cost of disputes. Disputes are not all equally costly. For example, although strikes are more frequent in jurisdictions with no-duty-to-bargain legislation, it may be that the strikes that do occur are so short that the total cost of strikes in these jurisdictions is negligible. It is beyond the scope of this paper to evaluate the impact of legislation on the cost of disputes. Instead, we examine the impact of legislation on two variables that are highly correlated with the cost of a strike: the length of the strike and the number of working days lost because of the strike. We do not estimate the cost of arbitration hearings. But

as an arbitration hearing is typically so much less costly than a strike, in most jurisdictions the cost of arbitrations constitutes only a small fraction of the total cost of disputes.[15]

The average strike length and the average number of working days lost due to strikes under each type of legislation are shown in Table 2. The number of working days lost due to a strike is the product of the strike length and the number of workers involved in the strike.[16] Strikes are, on average, longer and involve more working days lost when they are legal. In our sample, the average strike under the right to strike lasted 18 days and involved the loss of 184,000 working days compared to an average strike length of 14 days and a loss of 107,000 working days in the sample as a whole. In contrast, under all forms of arbitration, strikes tend to be short and involve the loss of fewer working days.[17] When employers are not required to bargain -- our no-duty-to-bargain legislation -- strikes are about 4 days longer and involve the loss of about the same number of working days as the average strike in our sample.

On the basis of sample averages of strike duration and the number of working days lost due to strikes, Currie and McConnell (1991) conclude that in the Canadian public sector strikes are longer and involve the loss of more working days when they are legal. But strikes may be longer when they are legal because workers who rarely strike for long, such as police and fire-fighters, are more likely to be covered by legislation that prohibits strikes. In this study, we estimate models of strike duration and days lost due to strikes and control for other determinants of the intensity of the strike.

We present the results of the estimation of models of strike duration and the number of days lost due to strikes in Table 4. In each column, the dependent variables is "unconditional" on a strike occurring -- if no strike occurred at a contract negotiation the dependent variable is set equal to zero.[18] Thus, we interpret the estimates of the coefficients in Table 4 as measuring the impact of the explanatory variables on the product of the probability of a strike occurring and the intensity of a strike if one occurs -- the expected strike length or the expected

number of working days lost. In our sample, the average unconditional strike duration is 1 day[19] and the average unconditional number of days lost due to strikes is 7,769 days. The models of strike duration and working days lost presented in Table 4 include the same explanatory variables as the models of strike and arbitration incidence presented in Table 3.

The results presented in Table 4 suggest that strikes are most costly in jurisdictions in which employers are not required to bargain in good faith with the union. Both unconditional strike duration and the unconditional number of days lost due to strikes are higher in jurisdictions with no-duty-to-bargain law. (Except in column 2 of Table 4, F-tests reject the hypothesis that the coefficients on the four main legislation variables are equal to zero at the 90 percent level of confidence.) The point estimates suggest that switching from no-duty-to-bargain legislation to duty-to-bargain legislation would reduce the unconditional strike duration by about 1.7 days and reduce the unconditional number of working days lost due to strikes by between 10 and 22 days.

The average strike in our sample is as long when strikes are legal as when there is no-duty-to-bargain legislation (see Table 2). However, once we control for the state in which the strike took place (see columns 1 and 2 of Table 4), we find that switching from no-duty-to-bargain legislation to the right to strike decreases the expected length of strikes by nearly 2 days. Our point estimates also suggest that switching from the right to strike to compulsory arbitration would decrease the expected length of a strike by about 1 day and decrease the expected number of working days lost by between 15 and 20 days, although these differences are not statistically significant.

As in our models of strike incidence, we find that omitting state dummies from the model of strike duration and working days lost due to strikes biases upwards the coefficients on the legislation variables. Thus states with many, long, and costly strikes are more likely to introduce some form of collective bargaining legislation.

VI. Discussion

The most striking conclusion from this study is that those jurisdictions that have neither legislation requiring employers to bargain in good faith nor legislation that provides some form of procedure for dispute resolution experience the most costly strikes measured in terms of the expected length of the strike and the number of working days lost due to strikes. While most of these jurisdictions do not explicitly prohibit bargaining, they do not have legislation that provides employees with the right to engage in collective bargaining. Granting workers both the right to bargain and the right to strike does not seem to increase the incidence of strikes but may decrease the expected length of a strike and working days lost because of strikes. Requiring employers to bargain and providing some form of arbitration reduces all three measures of strike activity. Hence, our results suggest that providing no explicit framework for bargaining or dispute resolution is the *worst* industrial relations policy.

Our results are less conclusive about the *best* form of industrial relations policy. While our point estimates suggest that the expected duration and number of working days lost due to strikes is lowest under compulsory arbitration, these differences are not statistically significant. The incidence of strikes is lowest under compulsory arbitration, but the incidence of arbitrations is highest under compulsory arbitration. However, an arbitration is so much less costly than a typical strike that the incidence of arbitrations is much less important than the incidence of strikes from a policy perspective

While our results provide useful information for assessing the effectiveness of different types of collective bargaining legislation, these results alone are not sufficient to make policy recommendations. Future research should aim to measure more directly the cost of disputes. This would involve collecting data about the cost of arbitration hearings and estimating the value of output or services lost during a strike. As emphasized by our study, these data should cover

a wide variety of types of workers and states. We look at only one aspect of the outcome of contract negotiations: disputes. Future research should also examine the impact of legislation on other important outcomes, such as the wage level, the level of employment, the benefit package, the degree of indexation specified in the contract, and the length of the contract.

Endnotes

1. Five contracts in our sample were negotiated in jurisdictions in which the legislation authorizes, but does not require, the employer to bargain but *also* requires any dispute to go to compulsory arbitration. We interpreted the compulsory arbitration clause as implicitly requiring the employer to bargain in good faith.

2. When the dispute is over multiple issues, some jurisdictions require arbitrators to decide on each negotiating issue separately, while other jurisdictions require arbitrators to choose between the employer's and union's packages of offers. We do not make a distinction between these forms of final-offer arbitration.

3. Iowa operates a tri-offer arbitration system. In this system a fact-finder first recommends an award and the arbitrator must then choose between the two final offers of the negotiating parties and the fact-finder's recommended award. Only seven contracts in our sample were negotiated under this tri-offer system so we place them in the category of final-offer arbitration. Two contracts in the sample -- both covering police in Boston -- were negotiated in jurisdictions that give the bargaining parties the choice of settling their disputes with either conventional or final-offer arbitration. These two contracts were classified into the final-offer arbitration category.

4. The contracts included in the CWD are those viewed as "significant" by the BLS. The BLS are more likely to include in the listings contracts that cover many workers. We do not rule out the possibility of some sample selection bias.

5. See Ichniowski (1986) for a study of the impact of legislation on recognition strikes.

6. The BLS publishes a series of the aggregate number of strikes in the United States in the Monthly Labor Review.

7. Olson (1988) argues that strikes are under-reported in jurisdictions with no collective bargaining law. If this is the case, 13 percent may be an underestimate of the strike frequency in jurisdictions with no-duty-to-bargain legislation.

8. Two contracts involved both a strike and an arbitration and four contracts involved both a strike and a legislated settlement. In our strike models, we count the disputes at all six contracts as a strike and in our arbitration models, we count the disputes at the two contracts with both a strike and an arbitration as an arbitration.

9. We include a dummy variable for all but two states that are represented in our sample. Only one contract in our sample was negotiated in each of these two states.

10. We describe the sources of the explanatory variables in an Appendix.

11. Nonlinear models corresponding to the models shown in columns 1 and 4 of Tables 3 and 4 are shown in Appendix Table 2. These models yield conclusions that are qualitatively similar to those discussed in the text. However, compared to the estimates made from the linear models, the estimates from the nonlinear models are much less precise and are sensitive to the specification of the model. Hence, we regard the point estimates from the linear models as more reliable.

12.We do not control for other contract-specific variables, such as the length of the contract or the degree of indexation, because of the potential for endogeneity bias. Including such variables in the models did not alter our conclusions from the study.

13. In our whole sample, only 43 contracts were negotiated in the same year as a law change that affected workers in the same occupation and state, and only 15 of these occurred after 1979.

14. Although Nelson, Stone, and Swint (1981) argue that strikes are not pro-cyclical in the public sector.

15. See Currie and McConnell (1991) for a comparison of the cost of strikes and arbitration hearings in the Canadian public sector.

16. The number of workers involved in a strike is missing for 17 strikes. In these cases, we use the number of workers covered by the contract as an estimate of the number of workers involved in a strike.

17. We also found these differences in strike duration and working days lost in a larger sample of all 346 public sector strikes that were reported in the IRF over the sample period.

18. We do not have a sufficient number of strikes to estimate models of conditional strike duration.

19. This is much shorter than the average unconditional strike duration of just under 6 days found in the U.S. private sector (McConnell, 1990).

References

Currie, Janet, and Sheena McConnell. "Collective Bargaining in the Public Sector: The Effect of Legal Structure on Dispute Costs and Wages." American Economic Review, vol. 81, no. 4, September 1991, pp 693-718.

Ehrenberg, Ronald G., and Joshua L. Schwarz. "Public Sector Labor Markets." In Handbook of Labor Economics, vol. II, edited by Orley Ashenfelter and Richard Layard. Amsterdam: North Holland, 1986.

Farber, Henry S.. "The Evolution of Public Sector Bargaining Laws." In When Public Employees Unionize, edited by Richard B. Freeman and Casey Ichniowski. Chicago and London. The University of Chicago Press, 1988.

Freeman, Richard B., and Robert G. Valletta. "The Effect of Public Sector Labor Laws on Collective Bargaining, Wages, and Employment." In When Public Employees Unionize, edited by Richard B. Freeman and Casey Ichniowski. Chicago and London. The University of Chicago Press, 1988.

Ichniowski, Casey. "Arbitration and Police Bargaining: Prescriptions for the Blue Flu." Industrial Relations, vol. 21, no. 2, Spring 1982, pp 149-166.

Ichniowski, Casey. "Public Sector Recognition Strikes: Illegal and Ill-Fated." NBER Working Paper No. 1808, January 1986.

McConnell, Sheena. "Cyclical Fluctuations in Strike Activity." Industrial and Labor Relations Review, vol. 44, no. 1, October 1990, pp 130-143.

Nelson, William B., Gerald W. Stone, Jr., and Michael J. Swint. "An Economic Analysis of Public Sector Collective Bargaining and Strike Activity." Journal of Labor Research, vol. 2, no. 1, 1981, pp 77-98.

Olson, Craig A.. "Strikes, Strike Penalties, and Arbitration in Six States." Industrial and Labor Relations Review, vol. 39, no. 4, July 1986, pp 539-552.

Olson, Craig A.. "Dispute Resolution in the Public Sector." In Public Sector Bargaining, edited by Benjamin Aaron, Joyce M. Najita, and James L. Stern. Washington, D.C.: The Bureau of National Affairs, 1988.

Stern, James. L., and Craig A. Olson. "The Propensity to Strike of Local Government Employees." Journal of Collective Negotiations, vol. 11, no. 3, 1982, pp 201-214.

Stevens, Carl M.. "Is Compulsory Arbitration Compatible With Bargaining?" Industrial Relations, vol. 5, no. 1, February 1966, pp 38-52.

U.S. Department of Commerce, Bureau of the Census. Statistical Abstract of the United States. Washington, D.C.: U.S. Government Printing Office, various issues.

U.S. Department of Labor, Bureau of Labor Statistics. Current Wage Developments. Washington, D.C.: U.S. Government Printing Office, various issues.

U.S. Department of Labor, Bureau of Labor Statistics. Employment and Earnings. Washington, D.C.: U.S. Government Printing Office, various issues.

U.S. Department of Labor, Bureau of Labor Statistics. Industrial Relations Facts. Washington, D.C.: U.S. Government Printing Office, various issues.

U.S. Department of Labor, Bureau of Labor Statistics. Monthly Labor Review. Washington, D.C.: U.S. Government Printing Office, various issues.

Valletta, Robert G., and Richard B. Freeman. "The NBER Public Sector Collective Bargaining Law Data Set." In When Public Employees Unionize, edited by Richard B. Freeman and Casey Ichniowski. Chicago and London. The University of Chicago Press, 1988.

Vroman, Susan B., "A Longitudinal Analysis of Strike Activity in U.S. Manufacturing: 1957-1984." American Economic Review, vol. 79, no. 4, September 1989, pp 816-826.

Wheeler, Hoyt N.. "An Analysis of Firefighters Strikes." Labor Law Journal, vol. 26, no. 1, January 1975, pp 17-20.

Appendix: Data Sources

Variable	Source
Average hourly earnings in manufacturing by state	U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings
Size of labor force, by state	U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States
Unemployment rate, by state	U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States

Table 1

Number of Contracts by Legislation Category

Legislation as Defined by the NBER Collective Bargaining Law Data Set	Categories of Legislation Used in This Study				
	No Duty to Bargain	Duty to Bargain	Voluntary Arbitration	Compulsory Arbitration	Right to Strike
Collective Bargaining Rights					
No Provision	83	4			
Bargaining Prohibited	8				
Employer Authorized but not Required to Bargain	64	2		5	
Union has the Right to Present Proposals	5				
Union has the Right to "Meet and Confer"	15	25			
Duty to Bargain (Implied)		235	208	75	102
Duty to Bargain (Explicit)		78		25	71
Strike Laws					
None	79	38	5		
Strikes Prohibited	96	306	203	105	
Strikes Permitted					173
Arbitration Laws					
No Provision	175	343			16
Arbitration Prohibited		1			
Arbitration Voluntary			208		140
Arbitration Discretionary				76	14
Arbitration Required by Statute				29	3
Total	175	344	208	105	173

Table 2

Frequency of Disputes, Average Strike Length, and Average Days Lost Due to Strikes by Legislation Category

Law Category	Number of Contracts Settled by:				Average Strike Length (Days)[c]	Average Number of Days Lost Due to a Strike (1,000s)[d]	Total
	Bargaining Without a Dispute	Strike[a]	Arbitration	Legislation			
No Duty to Bargain	130 (74.3%)[b]	23 (13.1%)	1 (0.6%)	21 (12.0%)	18	107	175
Duty to Bargain	303 (88.1%)	16 (4.7%)	5 (1.5%)	24 (7.0%)	14	93	344
Voluntary Arbitration	182 (87.5%)	14 (6.7%)	10 (4.8%)	4 (1.9%)	7	64	208
Conventional Compulsory Arbitration	26 (68.4%)	1 (2.6%)	10 (26.3%)	1 (2.6%)	1	1	38
Final-Offer Compulsory Arbitration	44 (65.7%)	3 (4.5%)	20 (29.9%)	0	6	3	67
Right to Strike	147 (85.0%)	17 (9.8%)	4 (2.3%)	5 (2.9%)	18	184	173
Total / Average	832 (82.8%)	74 (7.4%)	50 (5.0%)	55 (5.5%)	14	107	1,005

Notes:

a. Two contracts involved both a strike and an arbitration. Four contracts involved both a strike and a legislated settlement.

b. Percentages of all contracts in each law category are given in parentheses.

c. Strike length is missing for one strike. The strike length is averaged only over those contract negotiations at which a strike occurred.

d. The number of workers involved in a strike is missing for 17 strikes. In these cases, we use the number of workers covered by the contract as an estimate of the number of workers involved in a strike.

Table 3

The Impact of Collective Bargaining Law on the Incidence of Strikes and Arbitrations

	Incidence of Strikes			Incidence of Arbitrations		
	(1) State Dummies Included	(2) Year=1979 or Later State Dummies Included	(3) No State Dummies	(4) State Dummies Included	(5) Year=1979 or Later State Dummies Included	(6) No State Dummies
Collective Bargaining Law (omitted category is no duty to bargain)						
1. Duty to Bargain	-0.112* (0.041)[a]	-0.078* (0.039)	-0.067* (0.027)	0.059* (0.029)	0.061* (0.031)	0.034* (0.020)
2. Voluntary Arbitration	-0.140* (0.052)	-0.064 (0.051)	-0.078* (0.029)	0.154* (0.038)	0.176* (0.040)	0.066* (0.022)
3. Compulsory Arbitration	-0.206* (0.060)	-0.115* (0.056)	-0.048 (0.035)	0.383* (0.043)	0.386* (0.044)	0.216* (0.027)
4. Right to Strike	-0.073 (0.050)	-0.047 (0.046)	0.002 (0.030)	-0.105* (0.036)	-0.100* (0.036)	0.049* (0.023)
State Variables						
Unemployment Rate	-0.014 (0.010)	-0.000 (0.012)	0.004 (0.007)	0.023* (0.007)	0.007 (0.009)	0.014* (0.005)
Average Hourly Earnings in Manufacturing	0.015 (0.033)	-0.074 (0.044)	0.007 (0.016)	0.006 (0.024)	0.038 (0.035)	-0.000 (0.008)
Labor Force (millions)	-0.002 (0.017)	0.125* (0.040)	0.005 (0.003)	0.017 (0.012)	0.039 (0.032)	-0.004* (0.002)
Contract Variables						
Number of Workers in Bargaining Unit (millions)	-0.211 (0.449)	-0.162 (0.593)	-0.491 (0.441)	-0.243 (0.322)	0.267 (0.466)	-0.336 (0.337)
Fixed Effects						
Year (15)	yes	yes (7)	yes	yes	yes (7)	yes
State (37)	yes	yes	no	yes	yes	no
Occupation Dummies (7)	yes	yes	yes	yes	yes	yes

(Table 3 to be continued)

(Table 3 continued)

Intercept	0.107 (0.331)	0.545 (0.450)	0.031 (0.096)	-0.288 (0.237)	-0.536 (0.354)	-0.122 (0.074)
R-squared	0.173	0.179	0.110	0.389	0.406	0.251
Number of Contract Negotiations at which a Strike Occurs	74	33	74	50	28	50
Number of Contract Negotiations at which a Strike Does Not Occur[b]	914	697	914	938	702	938
F-Tests[c]						
Duty to Bargain, Voluntary Arbitration, and Compulsory Arbitration have the same impact (coefficients in rows 1-3 are equal)	1.754 (0.186)	0.552 (0.576)	0.364 (0.695)	40.346 (0.001)	39.951 (0.0001)	26.359 (0.0001)
Duty to Bargain, Voluntary Arbitration, Compulsory Arbitration, and the Right to Strike have the same impact (coefficients in rows 1-4 are equal)	2.111 (0.096)	0.718 (0.545)	2.856 (0.036)	54.714 (0.001)	52.729 (0.0001)	18.118 (0.0001)
No collective bargaining laws have an impact (coefficients in rows 1-4 are zero)	3.430 (0.009)	1.445 (0.217)	3.258 (0.012)	41.253 (0.0001)	39.710 (0.0001)	19.918 (0.0001)

Notes:

a. Standard errors are given in parentheses. An asterisk indicates significance at the 95 percent level of confidence.

b. The number of workers in the bargaining unit is missing for 17 contracts. We omit these contracts from our sample.

c. Probability values are given in parentheses.

Table 4

The Impact of Collective Bargaining Law on Strike Length and the Number of Working Days Lost Due to Strikes

	Strike Length[a]			Number of Working Days Lost Due to Strikes[b]		
	(1) State Dummies Included	(2) Year=1979 or Later State Dummies Included	(3) No State Dummies	(4) State Dummies Included	(5) Year=1979 or Later State Dummies Included	(6) No State Dummies
Collective Bargaining Law (omitted category is no duty to bargain)						
1. Duty to Bargain	-1.687* (0.882)[c]	-1.695* (0.869)	-1.694* (0.567)	-17.231* (7.907)	-22.107* (8.097)	-10.246* (5.114)
2. Voluntary Arbitration	-3.027* (1.137)	-1.928 (1.150)	-2.344* (0.627)	-30.350* (10.197)	-27.914* (10.727)	-16.321* (5.655)
3. Compulsory Arbitration	-3.084* (1.302)	-2.691* (1.254)	-1.125 (0.747)	-33.089* (11.681)	-33.263* (11.704)	-6.985 (6.733)
4. Right to Strike	-1.896* (0.094)	-1.969 (1.026)	-0.123 (0.640)	-13.437 (9.808)	-18.247* (9.563)	6.581 (5.783)
State Variables						
Unemployment Rate	-0.248 (0.207)	-0.314 (0.260)	0.038 (0.147)	-0.984 (1.859)	-0.112 (2.242)	0.652 (1.325)
Average Hourly Earnings in Manufacturing	0.341 (0.720)	-0.643 (0.987)	0.185 (0.215)	-0.399 (6.454)	-3.069 (9.205)	0.302 (1.939)
Labor Force (millions)	0.175 (0.376)	2.313* (0.906)	0.129* (0.059)	2.599 (3.375)	14.112 (8.447)	1.024* (0.535)
Contract Variables						
Number of Workers in Bargaining Unit (millions)	-13.967 (9.756)	-14.145 (13.246)	-0.016* (0.009)	61.344 (87.452)	92.211 (123.519)	63.675 (84.865)
Fixed Effects						
Year (15)	yes	yes (7)	yes	yes	yes (7)	yes
State (37)	yes	yes	no	yes	yes	no
Occupation Dummies (7)	yes	yes	yes	yes	yes	yes

(Table 4 to be continued)

(Table 4 continued)

Intercept	0.151 (7.193)	4.476 (10.065)	-1.097 (2.054)	25.858 (64.480)	14.912 (93.840)	-5.442 (18.516)
R-squared	0.132	0.149	0.099	0.126	0.128	0.081
Number of Contract Negotiations at which a Strike Occurs	73	32	73	73	32	73
Number of Contract Negotiations at which a Strike Does Not Occur[d]	914	697	914	914	697	914
F-Tests[e]						
Duty to Bargain, Voluntary Arbitration, and Compulsory Arbitration have the same impact (coefficients in rows 1-3 are equal)	1.476 (0.229)	0.459 (0.632)	1.484 (0.227)	1.975 (0.139)	0.732 (0.481)	1.259 (0.284)
Duty to Bargain, Voluntary Arbitration, Compulsory Arbitration, and the Right to Strike have the same impact (coefficients in rows 1-4 are equal)	1.058 (0.366)	0.306 (0.823)	4.225 (0.006)	1.890 (0.128)	0.795 (0.500)	5.537 (0.001)
No collective bargaining laws have an impact (coefficients in rows 1-4 are zero)	2.004 (0.092)	1.446 (0.217)	5.024 (0.005)	2.738 (0.028)	2.536 (0.039)	4.761 (0.001)

Notes:

a. The independent variable is the unconditional strike length (i.e., the length of a strike if one occurred and zero otherwise). The mean unconditional strike length is 1.058.

b. The independent variable is the unconditional number of working days lost due to a strike (i.e., the number of working days lost due to a strike if one occurred and zero otherwise). The mean unconditional number of working days lost due to strikes is 7,769.

c. Standard errors are given in parentheses. An asterisk indicates significance at the 95 percent level of confidence.

d. The number of workers in the bargaining unit is missing for 17 contracts. We omit these contracts from our sample.

e. Probability values are given in parentheses.

Appendix Table 1

Distribution of Contracts by Law Category and Occupation

	Occupation								
	Teachers	Police	Fire-fighters	Hospital workers	City White Collar Workers	Other City Workers	University Faculty	Other State Workers	Total
Law Category									
No Duty to Bargain	61	19	9	9	12	50	0	15	175
	(22)[a]	(20)	(18)	(35)	(2)	(32)	(0)	(7)	(19)
Duty to Bargain	98	18	13	7	30	14	83	81	344
	(35)	(19)	(26)	(27)	(49)	(8)	(81)	(35)	(34)
Voluntary Arbitration	69	16	7	5	13	61	7	30	208
	(25)	(17)	(14)	(19)	(21)	(35)	(7)	(13)	(20)
Conventional Compulsory Arbitration	6	11	9	0	1	1	0	10	38
	(2)	(12)	(18)	(0)	(2)	(1)	(0)	(4)	(4)
Final-Offer Compulsory Arbitration	6	28	12	0	0	2	2	17	67
	(2)	(28)	(24)	(0)	(0)	(1)	(2)	(7)	(7)
Right to Strike	37	3	0	5	5	38	10	75	173
	(13)	(3)	(0)	(19)	(8)	(22)	(10)	(33)	(17)
Total	277	95	50	26	61	166	102	228	1,005

Notes:

a. Percentages of column totals are given in parentheses

Appendix Table 2

The Impact of Collective Bargaining Law on the Incidence of Strikes and Arbitrations, Strike Length, and the Number of Working Days Lost Due to Strikes

(Probits and Tobits)

	(1) Strike Incidence	(2) Arbitration Incidence	(3) Strike Length	(4) Number of Working Days Lost
	Probit	Probit	Tobit	Tobit
Collective Bargaining Law (omitted category is no duty to bargain)				
1. Duty to Bargain	-0.655 (0.367)[a]	2.773 (3.129)	-13.650 (8.729)	-118.957 (73.100)
2. Voluntary Arbitration	-0.254 (0.541)	3.620 (3.157)	-6.568 (13.034)	-56.780 (110.964)
3. Compulsory Arbitration	-1.504* (0.657)	4.111 (3.162)	-33.106* (16.552)	-295.497* (138.607)
4. Right to Strike	-0.064 (0.450)	2.389 (3.149)	-2.663 (10.920)	-23.466 (92.590)
State Variables				
Unemployment Rate	-0.032 (0.087)	0.165 (0.108)	-0.179 (2.156)	2.537 (17.982)
Average Hourly Earnings in Manufacturing	0.394 (0.319)	0.063 (0.390)	9.311 (7.741)	51.683 (63.840)
Labor Force (millions)	-0.129 (0.205)	-0.894 (0.612)	-2.522 (5.008)	-28.597 (43.754)
Contract Variables				
Number of Workers in Bargaining Unit (millions)	-2.387 (4.343)	-0.508 (6.324)	-118.613 (115.817)	-157.314 (814.246)
Fixed Effects				
Year (15)	yes	yes	yes	yes
State (37)	yes	yes	yes	yes
Occupation Dummies (7)	yes	yes	yes	yes

(Appendix Table 2 to be continued)

(Appendix Table 2 continued)

Intercept	-5.108 (3.311)	-5.775 (4.856)	-129.830 (80.991)	-824.038 (663.943)
-2 log likelihood	175.939	227.856	885.396	2,198.384
Number of Contract Negotiations at which a Strike Occurs	74	50	73	73
Number of Contract Negotiations at which a Strike Not Occur[b]	914	938	914	914
Chi-Squared Tests [c]				
Duty to Bargain, Compulsory Arbitration, and Voluntary Arbitration have the same impact (coefficients in rows 1-3 are the same)	3.600 (5.991)	5.628 (5.991)	2.634 (5.991)	3.042 (5.991)
Duty to Bargain, Compulsory Arbitration, Voluntary Arbitration, and the Right to Strike have the same impact (coefficients in rows 1-4 are the same)	8.033 (7.815)	9.734 (7.815)	5.450 (7.815)	6.308 (7.815)
No collective bargaining laws have an impact (coefficients in rows 1-4 are zero)	9.841 (9.488)	12.608 (9.488)	6.996 (9.488)	8.020 (9.488)

Notes:

a. Standard errors are given in parentheses. An asterisk indicates significance at the 95 percent level of confidence.

b. The number of workers in the bargaining unit is missing for 17 contracts. We omit these contracts from our sample.

c. Probability values at the 95 percent level of confidence are given in parentheses.