PUBLIC POLICY AND THE DURATION OF PUBLIC EMPLOYEE STRIKE ACTIVITY

By

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A DISSERTATION

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

Labor and Industrial Relations School

1981

ABSTRACT

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Long strikes by public employees arouse public concern because of a potential threat to the health and safety of a community. High political (and possibly economic) costs accrue to employers when essential services are interrupted. Costs also are incurred by workers as a result of foregone income. The determinants of the duration of all nonrecognition strikes occurring in local government bargaining units in the United States between January, 1977 and October, 1978 were thus examined in this study. Factors expected to affect strike duration included economic considerations (the expectations of the union membership and the economic constraints on the public employer's ability to make concessions) as well as noneconomic considerations (bargaining unit structures and the local labor relations environment). In addition, the impact on duration of various impasse resolution mechanisms were

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examined.

Results for the impasse resolution factors, controlling for other relevant considerations in a regression, indicated that states with compulsory mediation provisions tended to have slightly shorter strikes. Mandatory penalty requirements were not, however, related to duration. An injunction reduced the length of strikes in the smaller bargaining units, but in the larger units, this effect was reversed. An unexpected and also inconclusive result was a positive association between mediation and strike duration. Results for other determinants indicated that strikes were longer when (1) the labor costs of the striking bargaining unit were a large component of total labor costs, (2) the union supported the strike, (3) the issue concerned economic matters, and (4) noneducational personnel were involved.

ACKNOWLEDGMENTS

This study benefited greatly from the many comments and suggestions from Professors Richard Block, Jack Stieber and Cheryl Maranto from the School of Labor and Industrial Relations, Jack Hunter from the Psychology department, and Terry Moe from the Political Science department. I am deeply indebted to each of these individuals for their many hours of thoughtful review and evaluation of many drafts of this manuscript. As Chairman of the Dissertation Committee, I am also deeply indebted to Rich Block for his work with me on this and many previous research projects.

Acquisition of the data required the cooperation of many individuals at the federal level of government. Alan Stevens, Chief of the Governments Division, Bureau of the Census, made it possible to match the Bureau of Labor Statistics (BLS) case numbers identifying each public employee strike with the correspondent Census jurisdiction identification number. This enabled an identification of the characteristics of the labor organization calling the strike with the actual jurisdiction taking the strike. Assistance from Larry Curran of the Governments Division was also particularly helpful in this regard.

From the Department of Labor, Division of Industrial Relations, Gene Becker assisted with the acquisition of machine readable data files containing responses to the 1975-1978 Work Stoppage Questionnaire. Evelyn Traylor from this Division was responsible for constructing a coding book for this data. In addition, she spent many hours clarifying for me the meaning and source of these data. John Bonner, Chief, Division of Public Sector Labor Relations, Department of Labor, also provided considerable insight into relevant issues from a public policy point of view. The direction of this project was influenced greatly by these recommendations.

This study required the acquisition of many large machine readable data sets. Generous research support from the National Association of Schools of Public Affairs and Administration/National Association of Counties Personnel Dissertation Fellowship made acquisition of these data possible. Alma Beals from NASPAA was particularly instrumental in facilitating completion of this project. In exchange for a copy of some of the data purchased from this fellowship grant, Craig Olson from Purdue University kindly provided a copy of the 1977 annual employment data.

At the state level of government, helpful comments and reactions were received from Robert Pejorsky from the Michigan Employment Relations Commission, Mr. Queen from Pennsylvania's Bureau of Mediation, and Steve Hunter from

New Jersey's Public Employment Relations Commission.

Endless hours of complicated computer programming assistance far beyond the technical capability of the principal investigator were provided by Christopher Brown and Harriet Dhanak of the MSU Politometric Laboratory. Merger of a multitude of large data sets would not have been possible had it not been for their skilled and relentless assistance. Einar Hardin also provided helpful suggestions which facilitated construction of the master data set.

I am deeply indebted also to Henry Ng of the Univeristy of Texas, Austin for typing the final manuscript and for his many hours of additional work preparing the tables and figures for inclusion in the final manuscript.

Calculation of the number of days idled as a result of a strike was made possible by countless hours of meticulous calculation by Nanette Rodgers who also commiserated with me after each and every computer run which was unsuccessful. Her encouragement, and the inspiration from our children, Adrienne and Jonathan, were instrumental to the ultimate completion of this project.

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Chapter 1

Toward a Recognition of the Importance of Studying Strike Duration

Over the past decade, industrial relations scholars have just begun to examine the determinants of public employee strike activity.[1] Adopting the methodology of the earlier private sector strike studies, research on public sector strikes has taken into consideration the multi-dimensional character of the work stoppage. These dimensions include frequency (number of strikes occurring), breadth (the number of persons involved), and impact (the duration or length of the strike). In view of the legal sanctions which prohibit or limit strikes in public employment, the identification of the determinants of strike frequency has been of particular interest not only to researchers but to public officials as well.

One dimension of the strike, its duration, has largely been neglected, however. Certainly fifty strikes which last one day would be less likely to cause concern from a public policy point of view than fifty strikes of fifty days duration, especially if the strikes are by essential employee groups such as the firefighters or the police. The economic costs incurred by workers which result from foregone income can be substantial.

High political costs can also be incurred by both management and labor. Long strikes arouse public concern

over a potential threat to the health and safety of the community. With protracted strikes, day to day accommodation between the parties which is critical to the successful administration of a contract is temporarily interrupted. This can result in a weakening of the political support held by the union leadership, especially when little progress is being made at the negotiating table. Thus, an enhanced understanding of the causal factors accociated with the duration of the public employee strike would be welcomed by public administrators, unions and scholars alike.

Prior efforts to explain the duration of public employee strikes have, unfortunately, been inconclusive. This has been attributed by some to the use of state level strike data.[2] Problems of interpretation can result when size deflators are used in studies having states as the primary unit of analysis.[3] This technique is designed to control for the fact that a greater number of strikes (and possibly longer strikes) occur in states which have more public employees. However, when any of the three strike measures (frequency, breadth or duration) is adjusted by dividing it by a size proxy such as employment, the performance of the independent variables in a regression are influenced both by their relationship with the size proxy as well as with the strike measure. This procedure can thus result, to the dismay of the researcher, in the discovery of signs on coefficients which were unexpected.[4]

Cost benefit frameworks are probably better suited

to an explanation of strike occurrences than of strike duration. This is because predictions for many of the variables are a function of whether the vested interests of labor or of management are considered in the assessment of the factor's influence. Theoretically, it remains indeterminate in many instances whose influence would be expected to dominate.

In recognition of these caveats, this study is based on the notion that the duration of the strike is affected by considerations other than environmental conditions such as unemployment levels or inflation rates. Four basic factors are considered. These include: (1) the earnings advantage (or disadvantage) of the employee group which voted to strike; (2) the fiscal and political characteristics of the corresponding jurisdiction taking the strike; (3) the characteristics of the bargaining unit calling the strike; and (4) a vector of variables which characterize the local labor relations environment.

In studying duration, it has been observed that the identification of factors which characterize differences across local strike events is essential.[5] The bargaining unit initiating the strike will thus be the basic unit of analysis. This orientation is useful because of the emphasis on the duration of specific strike events rather than the mean duration of all strikes occuring within broad geographical areas.

Using the 558 strikes in local government

bargaining units which occurred during the negotiation or renegotiation of a collective bargaining agreement between January 1, 1977 and October 15, 1978, this study examines the determinants of their duration. In addition to economic, structural and environmental factors, this research considers whether mediation and the court injunction act to reduce (or possibly increase) strike duration. These findings, moreover, will have important, albeit qualified, implications of the establishment of public policies which encourage the involvement of third parties at impasse.

The Enhanced Visibility of the Public Employee Strike

A central premise of this analysis is that a better understanding of the determinants of strike duration is just as critical at this stage in the emerging development of a public sector strike theory as are studies emphasizing their occurrence or breadth. Aside from the fact that strikes by public employees are a new phenomenon historically, the scarcity of work on duration is due partly to the fact that less working time has been lost overall than has been observed in private sector employment. Of the 11,109 agreements which became effective at all levels of local government in 1977, 95.9% were settled without a strike. Among the 452 bargaining units which elected to withhold services for at least one day, an average of only 7.7 working days were subsequently lost.[6] This is considerably less than the

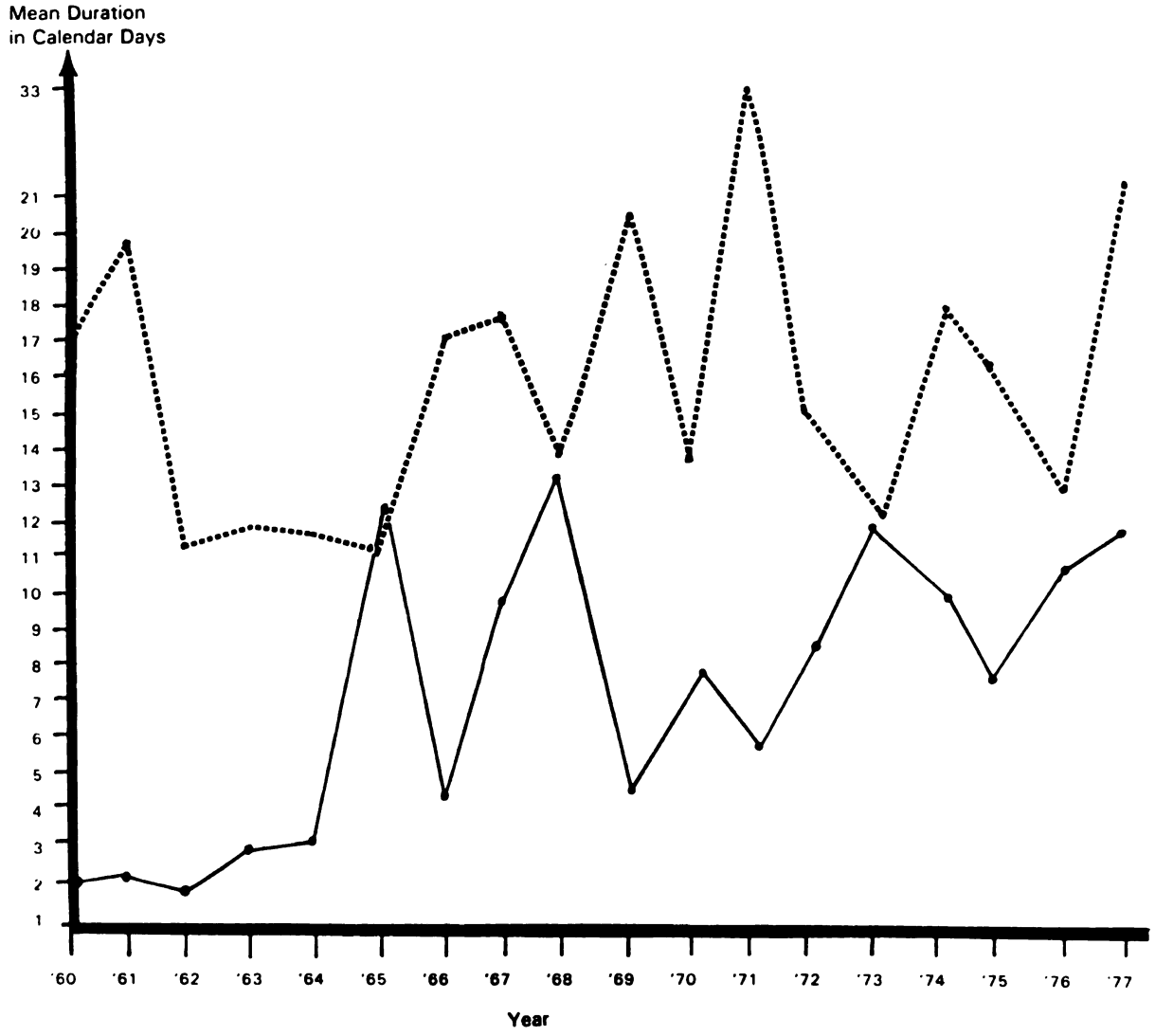
duration of strikes in private sector industries. During calender year 1977, the mean duration of strikes in manufacturing was 29.4 days, 21.3 days in contract construction, 21.2 days in the services industry, and 30.7 days in finance, insurance and real estate.[7]

For comparative purposes, it is instructive to compare the strike experience of local government employees with their closest private sector counterparts--the services industry. The secular trend over the past twenty years shows that the mean duration of strikes in the services industry exhibited a slight upward trend. As shown in Figure 1, the range in duration was bounded by 11 calender days in 1965 and 33 calender days in 1971. Local government employee strikes, on the other hand, became noticeably longer over this same period. As also shown in Figure 1, strikes initiated by local government employees in the early 1960's lasted on the average only two (2) calender days. By the late 1970's, the mean duration of public employee strikes averaged eight (8) calender days. This is less than the overall strike experience in the services industry during 1960 - 1977. Public employee strikes, on the other hand, have become noticeably larger.

In addition to evidence that supports the proposition that the public employee strike is lengthening, there are also reasons for believing that strikes will become more frequent in the 1980's. Consider, for instance, recent developments which provide added incentives to public

Figure 1

Mean Duration of Strikes by Local Government Employees
Compared to the Mean Duration of Strikes in the Service Industry
1960-1977



Data Sources: BLS, Work Stoppages in Government, 1977 (Report 554); Work Stoppages in Government, 1975 (Report 483); Work Stoppages in Government, 1974 (Report 453); Work Stoppages in Government, 1973 (Report 437); Work Stoppages in Government, 1972 (Report 434); Work Stoppages Government Employees, 1942 1961 (Report 348); Work Stoppages by Industry Group, 1950-1977, BLS Bulletin 2032, Analysis of Work Stoppages, 1977.

Mean Duration of Strikes by Local Government Employees

Mean Duration of Strikes in the Services Industry

employers to take strikes. Tightening fiscal constraints have begun to plague many local governments in the 1970's. As a result, employers are now more willing to accept strikes because they result in a savings of expenditures without a commensurate reduction in revenues.[8]

Further, a once popular alternative to the strike in public employment, compulsory arbitration, has recently been criticized.[9] This is primarily because arbitration awards have been viewed by some employers as too generous.[10] Anticipation of an arbitration settlement which could be unacceptable would be expected to enhance the attractiveness of taking a strike. The strike during the decade of the 1980's is thus expected to become better accepted as a viable means of settling public employee disputes among less essential employee groups.[11]

Public employee strikes may thus become not only longer, but also more frequent. The potential contribution of studies which predict the frequency of the strike can thus be bolstered by a better understanding of the determinants of the duration of the strike. As frequency studies continue to be of interest to public policy officials, it is hoped this study will spark interest in further studying duration.

As previously observed, one concern of this study is to evaluate the impact on strike duration, if any, of mediation and the court injunction.[12] It is important, therefore, to review the research not only on public employee

strike activity, but also the research which evaluates the impact of public policy on strikes. This review is presented in Chapter 2. Chapter 3 presents a discussion of a general model which is used to identify factors expected to contribute to an explanation of duration. Chapter 4 discusses the results when the variables defined in Chapter 3 are entered in multiple regressions. Chapter 5 further considers and analyzes the empirical relationship between the public policy factors selected for examination and strike duration. Conclusions of the study are presented in Chapter 6.

Footnotes (Chapter 1)

1
The seminal work on public employee strike activity was by John F. Burton & Charles E. Krider, "The Incidence of Strikes in Public Employment," in Daniel S. Hamermesh, Labor in the Public and Nonprofit Sectors (Princeton, N.J.: Princeton University Press, 1975), pp. 135-185. For a more thorough discussion of the literature, see Chapter 2.

2
As noted by one set of researchers, "In some cases, state boundaries may be artificial delimiters of the operation of metropolitan and regional influences." James L. Perry & Leslie J. Berkes, "Predicting Local Government Strike Activity: An Exploratory Analysis," Western Political Science Quarterly, Vol. 30 (December, 1977), p. 527.

3
Robert N. Stern, "Methodological Issues in Quantitative Strike Analysis," Industrial Relations, Vol. 17, No. 1 (February, 1978). For a general discussion of this problem, see Malcolm Fisher, Measurement of Labour Disputes and Their Economic Effects (Organization for Economic Co-operation and Development, (1973).

4
An alternative approach is to enter the size proxy as an independent (rather than a divisor of the dependent) variable. This tends to raise the explanatory power of the regression at the expense of reducing the significance of the other independent variables in the equation due to high multicolinearity.

5
Robert N. Stern, "Intermetropolitan Patterns of Strike Frequency," Industrial and Labor Relations Review, Vol. 29, No. 2 (January, 1976), p. 233.

6
U.S. Department of Commerce & U.S. Department of Labor, Labor Management Relations in State and Local Government, 1977 Census of Governments, Vol. 3, No. 3 (Washington, D.C., 1979).

7
Bureau of Labor Statistics, Analysis of Work Stoppages, 1977, Bulletin 2032, Table 14 (G.P.O.: 1977), pp. 24-28.

8 Theodore W. Kheel, "Resolving Deadlocks without Banning Strikes," in Joseph Loewenberg & Michael H. Moskow (eds.), Collective Bargaining in Government (Englewood Cliffs: Prentice Hall, 1972), p. 262. See also Robert C. Rodgers, "A Replication of the Burton Krider Model of Public Employee Strike Activity," Industrial Relations Research Association Series, (1981), pp. 241-251. The following remark is also reflective of this emerging point of view: "Until only recently the public supported a variety of anti-strike measures in the governmental sector, but lately they have shown an increased willingness to take at least some strikes." from David Lewin, "Collective Bargaining and the Right to Strike," in A. Lawrence Chickering (ed.), Public Employee Unions: A Study of the Crisis in Public Sector Labor Relations (San Francisco: Institute for Contemporary Studies, 1976), pp. 145-146; for a report of a cost savings which accrued to a city government as a result of a strike, see George A. Sipel, Public Management, Vol. 58, No. 2 (February, 1976), pp. 4-5.

9 See J. Joseph Loewenberg, "Compulsory Arbitration for Police and Firefighters in Pennsylvania in 1968," Industrial and Labor Relations Review, Vol. 23 (April, 1970), pp. 367-379.

10 Compulsory arbitration, for instance, has been cited by the Mayor of Detroit, Michigan as a primary cause for this city's recent financial difficulties.

11 This does not mean, however, that the use of compulsory arbitration schemes, whether conventional or any one of the many forms of final offer arbitration, will necessarily subside. Some experts in the field have suggested that they are likely to become even more frequently used mechanisms for resolving public employee disputes in the 1980's. Graig Overton, "The Climate for Collective Bargaining in General Purpose Local Government in the 1980's," Industrial Relations Research Association Series (September, 1981), pp. 290-295.

12 A research agenda in the 1980's included the need to learn more about the effectiveness impact of third parties in the resolution of labor management disputes. U.S. Department of Labor, Labor Management Relations Research Priorities for the 1980's, Final Report to the Secretary of Labor, (GPO: 1980), p. 46.

Chapter 2

The Literature on Public Employee Strikes

An Overview of the Research on Public Employee Strike Activity

As observed, we have little understanding of the determinants of the duration of strikes in the public sector. As will be evident in this discussion of the literature, the number of studies are limited and the evidence inconclusive. While time series analyses of private sector strike activity have been common since 1952,[1] our brief experience with public sector strikes for the most part has precluded similar analyses due to a lack of a sufficient number of observations.[2] Cross sectional analyses of interstate differences in public employee strikes have, on the other hand, not been precluded.

In their cross sectional study, Burton and Krider found the performance of the fifteen variables selected for examination across multiple strike measures, including duration, to be inconsistent and disappointing. "Most of the variation among states in strike activity in a particular year," they reported, "cannot be explained by our variables, and those variables that appear important in one year often are unimportant or have an opposite effect in other years."[3] The explanatory power of their multiple regressions was low, especially considering the

large number of predictors which were used. Inconsistent signs were also found on many coefficients across the four years of their analysis (1968 through 1971). As noted by the researchers, this may have been due to the high multicolinearity among the variables selected for examination.

Results when using duration as the dependent strike measure were especially unilluminating. Referring to the inability of previous research to explain duration, the authors subsequently questioned the merit of future attempts to study strike duration. Duration may, in fact, be "a particularly erratic aspect of strike activity."[4] An important benefit of this study is that it will provide an empirical basis for evaluating this concern.

In a subsequent cross sectional study by Perry and Berkes,[5] the development of a theory of public sector strikes was avoided in light of "the paucity of previous research and the general lack of agreement about determinants of local employee strike activity." Rather than making predictions about the relationship of specific variables with multiple measures of strike activity, they factor analyzed 40 variables which were hypothesized to influence public employee strikes.[6] These variables were divided into four general categories: macro-environmental variables, governmental sector variables, public employment variables and legal policy variables. Factor loadings suggested to the authors ten plausible groupings.

These were identified as follows, with examples

of the variables associated with each factor in parentheses: (1) urbanization-industrialization (percent of the population which is urban, percent in non-agricultural establishments), (2) union influence in the private sector (union membership as a percent of non-agriculture employment), (3) race-poverty (percent of the population below a "low income level"), (4) fiscal effort (government expenditures per capita, government expenditures per $1,000 personal income), (5) property tax reliance (per capita property tax revenues, property tax revenues as a percent of expenditures), (6) local employee status (ratio of government employee earnings to private sector employee earnings, local government employment as a percent of non-agriculture employment), (7) past strike activity (number of public employees involved in work stoppages (1958-1968, logged), (8) local reliance (percentage of government revenue raised by local governments, percent of state and local government expenditures), (9) professionalism (proportion of cities with a city manager form of government, percent of the population within city manager cities), (10) facilitation of bargaining, consisting largely of provisions in the law (scope of bargaining, unfair labor practice provisions, union security provisions).

After generating "factor variables" for each of the above ten groupings, the reconstructed variables were entered into multiple regressions for each of the

strike measures selected for examination. For one measure, the number of days idle per non-education, local government employee, more than 50% of the variance was explained by the entry of the factor variables listed above.[7] The one and only significant predictor, however, was the local employee status factor. A predicted negative sign for this factor turned out to be positive.

The absence of a control for the size of the bargaining unit makes interpretation of these findings subject to considerable qualification. As observed, the frequency of strikes is theoretically and empirically related to the number of employees negotiating or renegotiating agreements and also to the number seeking recognition status. It is thus not surprising to find that there are more strikes in states which have more public employees. If it is also true that strikes in the larger states tend, on the average, to be longer, then the local employee status variable used by Perry and Berkes may actually have been proxying the number of local public employees in the state. The author's description of and subsequent prediction for this factor may thus have been misspecified.

Public Employee Strike and Public Policy

In a third study, Perry considered the direct impact of collective bargaining laws on public employee

strike activity for three categories of employee groups: teachers, local government employees and state government employees.[8] Positive, although generally insignificant, correlations were found between multiple measures of strikes and union security provisions in state public employment bargaining laws.[9] Perry expected positive coefficients, since union bargaining power and union expectations should be greater when union security provisions are in effect.

One plausible explanation for the finding of insignificant coefficients is the fact that bargaining power may not be linearly related to strike activity. If unions with a high degree of bargaining power are able to obtain concessions without striking, while unions with relatively low levels of bargaining power seldom strike because they lack the necessary strength, then the relationship between strikes and bargaining power would be curvilinear. A positive and significant relationship between strikes and union security provisions would thus be seen only when considering labor organizations which were weak or "moderately strong."[10]

A central conclusion of the Perry study was that state enacted legislation has had little effect on public employee strike activity. This observation is consistent with similarly insignificant results obtained by Burton and Krider on a set of legal variables which were also expected to be positively associated with strike activity.

In the Burton and Krider, the Perry and Berkes and the Perry studies, a dummy variable was created to represent the presence (or absence) of a provision in state legislation covering public employees. In the factor analytic study by Perry and Berkes, eleven provisions found in state laws were considered. These consisted of the existence of an impasse procedure, a grievance procedure, provisions pertaining to the legality of strikes, management rights, the scope of bargaining, unfair labor practices, union security, bargaining rights, unit determination, rules of procedure and the establishment of a labor relations administrative policy. Burton & Krider considered, among other factors, the existence of a third party procedure law and a strike prohibition law. Perry considered the presence (or absence) of strike policies and, as noted, union security provisions. He also used a comprehensive index which was constructed by summing across twelve selected collective bargaining provisions in the state law.[11] In none of these studies was a consistently significant relationship reported between the legal variables and strikes.

Legal indexes used in prior research, regardless of whether they were constructed to capture a particular provision in a collective bargaining law or the comprehensiveness of such a law, are not factors which necessarily have a direct impact on strike activity. A provision in a state's collective bargaining law may require the

mediation of all disputes unsettled by the termination date of the contract. Nonetheless, many disputes which reach impasse at this stage are settled without the assistance of mediators.[12] Courts may be empowered, under state law, to deliver cease and desist injunctions. Injunctions can not be issued by the courts in most states, however, unless the employer is willing to file a formal complaint. The courts do, of course, deliver cease and desist injunctions, but these orders, especially without effective enforcement, may be ingored more often than obeyed. This response, if it exists, would, over time, reduce the effectiveness of penalty provisions as a strike deterrent.

Two explanations are possible for the absence of a significant relationship between laws and strikes. As observed, there is reason to believe that laws do not necessarily have a direct impact on the actual strike behavior of the parties. Alternatively, the direction of the effect, if and when it is realized, may simply be equivocal. Strike prohibition laws may serve their intended purpose by significantly reducing strike occurrences, especially in states which complement this law with compulsory arbitration. In states which have no compulsory arbitration option available to the parties, the strike prohibition law may actually encourage militant behavior.

Public policy may thus act both to encourage

and discourage the duration of strikes.[13] The theoretical possibility of this two-edged effect is, similarly, a limitation of the basic frameworks used in previous empirical studies.[14] An attempt has been made in this study to consider factors, such as the involvement of mediators and the issuance of court injunctions, which are used to limit the duration of actual strike occurrences. This eliminates the problems associated with considering the impact of legal variables which may not have a direct impact on strikes. This approach does not, however, avoid the theoretical ambiguity inherent in the direction of their impact. The empirical relationship between selected public policy factors and strike duration will be considered in greater detail in Chapter 5.

What Does the Research Tell Us?

A recurring theme in these studies is that little is actually known about the determinants of public sector employee strike activity. Perry and Berkes suggested that "political and organizational models" ought to be incorporated in the construction of a public sector strike theory.[15] Their findings, however, precluded a precise interpretation of what is meant by political or even organizational considerations. While Perry and Berkes explained more of the variation in duration than the other researchers, the sign on the coefficient of their only

significant predictor was inconsistent with their expectation. Perry expected positive and significant coefficients on his public policy variables, but discovered that correlations with his strike measures were not significant.

Unlike the Perry and Berkes and the Perry studies, Burton and Krider specified a model which provided a theoretical basis for making predictions. Like Perry, they considered the impact of state policy indicators on the incidence of strikes. Environmental and organizational factors, however, were also taken into consideration. Even with this more fully specified model, their overall results, as in the Perry study, were inconclusive.

Multiple strike measures were used in these studies. Across measures, no attempt was made to determine statistically whether or not these strike measures were capturing similar or different dimensions of the strike. With an implicit assumption that the strike measures were homogeneous, no differences were taken into consideration in what was expected in the performance of the coefficients on the independent variables when using duration as opposed to frequency or breadth.[16]

If there are basic differences across the various dimensions of the strike, including its occurrence, breadth and duration, the development of a different model and the selection of different independent predictors for each of the strike measures would have been preferable.[17] The

lack of an understanding of the general characteristics which differentiate these measures has thus far precluded this approach, however.

Treating all of the dimensions as equivalent, then, identical independent variables were used in prior studies to predict all dimensions of the strike. It was assumed that the framework developed to predict strike frequency was theoretically relevant to examinations of the other strike dimensions, including duration. This study takes a different approach. A model is proposed which has theoretical relevance for one and only one of the strike dimensions, duration. Factors which would be expected to influence the decision to engage in or take a strike may be different, presumably, from the determinants of the strike's duration. An important implication from the empirical results of prior studies is that strike frequency models have not been particularly useful frameworks for predicting strike duration. The model developed in this study, to be discussed in Chapter 3, thus modifies the frameworks which have been the cornerstone of work in this area.

Footnotes (Chapter 2)

[1] This research, an often cited work in the literature, is that of Albert Rees, "Industrial Conflict and Business Fluctuations," Journal of Political Economy, Vol. 60, No. 5 (October, 1952). This line of empirical investigation began with Alvin Hansen's publication in 1921 of "Cycles of Strikes," American Economic Review, Vol. 11, No. 4 (December, 1921), pp. 616-621.

[2] One time series study has been reported by Andrew R. Weintraub and Robert J. Thornton, "Why Teachers Strike: The Economic and Legal Determinants," Journal of Collective Negotiations, Vol. 5, No. 3 (1976), pp. 193-206. Public employee strike activity has been worthy of note since 1965 when the Bureau of Labor Statistics first began disaggregating strikes by public employees at the state level. Before this time, there were relatively few strike occurrences.

[3] John F. Burton & Charles E. Krider, "The Incidence of Strikes in Public Employment," in Dan S. Hamermesh, Labor in the Public and Nonprofit Sectors (Princeton, N.J.: Princeton University Press, 1975), p. 170.

[4] Ibid., p. 149, p. 156. The difficulty inherent in predicting duration was further delineated during a personal conversation with John Burton in Atlanta, Georgia, December 28, 1979.

[5] James L. Perry & Leslie J. Berkes, "Predicting Local Government Strike Activity: An Exploratory Analysis," Western Political Science Quarterly, Vol. 30 (December, 1977), p. 514.

[6] The use of a factor analytic technique, a priori, assumes that the factor components are orthogonal. No theoretical justification is provided for why one might expect this to be the case and there is no reason to believe that good predictors of strikes would necessarily be uncorrelated.

[7] Perry and Berkes, unfortunately, fail to specify if their strike measures pertain to education employees, to non-education employees, or to both.

[8] James L. Perry, "Public Policy and Public Employee Strikes," Industrial Relations, Vol. 16, No. 3 (October, 1977), pp. 273-282.

[9] This study is not clear on which laws were actually examined, i.e., state laws covering local employees, state laws covering teachers, state laws covering state employees, or some combination thereof.

[10] Burton and Krider, op. cit., p. 153.

[11] This comprehensive index was initially proposed by Thomas Kochan, "Correlates of State Public Employee Bargaining Laws," Industrial Relations, Vol. 12, No. 3 (October, 1973), pp. 322-327. Kochan finds positive correlations between a comprehensive index of collective bargaining laws and the breadth of strikes by police, firefighters, teachers, local government employees and state government employees. Only the correlation with teacher strikes was, however, significant.

[12] This conclusion is evident from a comparison of state laws which require mediation and the actual use of mediation across all states. It is just as common for states without such laws to involve mediators at impasse as it is for states with these laws. A more detailed discussion of this anomaly can be found in Chapter 5.

[13] Kochan and Wheeler report that the militant tactics of firefighters, as captured by such considerations as slow-downs, sickouts and picketing, were not related to three legal provisions in the state bargaining law or to an index constructed to represent the comprehensiveness of the law. See Thomas A. Kochan & Hoyt Wheeler, "Municipal Collective Bargaining: A Model and Analysis of Bargaining Outcomes," Industrial and Labor Relations Review, Vol. 29, No. 1 (October, 1975).

[14] For a reaffirmation of this theme, see Robert C. Rodgers, "Replication of the Burton-Krider Model of Public Employee Strike Activity," IRRA Series, 1981. Strike activity (or the "militant tactic") has, on the other hand, been recently used as a predictor of collective bargaining outcomes. See Thomas A. Kochan & Hoyt Wheeler, "Municipal Collective Bargaining: A Model and Analysis of Bargaining Outcomes," op. cit.; Paul F. Gerhart, "Determinants of

Bargaining Outcomes in Local Government Labor Negotiations," Industrial and Labor Relations Review, Vol. 29, No. 3 (March, 1976), pp. 331-351.

15
Perry & Berkes, op. cit., p. 527.

16
It has been reported in a study of strikes in the private sector that the same predictors perform very differently, depending on the particular strike measure being examined. For a comparison of the performance of the same predictor when using nine different strike specifications, see Jack Skeels, "Measures of U.S. Strike Activity," Industrial and Labor Relations Review, Vol. 24, No. 4 (July, 1971), pp. 515-525.

17
Robert N. Stern, "Toward an Empirical Merger: Sociological and Economic Conceptions of Strike Activity," Twenty-Eighth Annual IRRA Meeting (1975), p. 66.

Chapter 3

The Model

The Prediction of Strike Activity Using Cost Benefit Theory

It is unfortunate that, as noted by McClean, "there is not a sufficiently well-developed theory of the role and determinants of the strike in industry specific terms from which one can develop a genuinely satisfactory model."[1] As noted, this caveat is especially evident for the one dimension of the strike under consideration here, its duration.

One approach, developed by Ashenfelter and Johnson, has been used with some success in a number of previous studies of public and private sector strike activity.[2] A guiding premise of their analysis is that labor and management, having complete and undistorted information, are rational decision makers. It is then hypothesized that the strike is continued as long as the present value of "holding out" exceeds the estimated cost of "giving in." The impact of the strike event itself on the decision making of both parties is thus taken into consideration.

If, for instance, unemployment insurance or union strike benefits are received, the propensity to "hold out" is enhanced because the net cost to the workers of remaining on strike is reduced. On the management side,

political costs are incurred as the strike interrupts essential services. Alternatively, economic benefits can accrue to the employer, since expenditures are averted without a commensurate reduction in revenues. These simultaneous effects should offset one another.

This model is based on the assumption that decision making by labor and management will be both rational and purposeful. It is assumed, moreover, that during the give and take of negotiations, the union leadership and the employer should be able to identify the terms of an economic settlement which are mutually advantageous. Strikes subsequently occur, they hypothesize, to square the expectations of the union membership with what the employer is able and willing to pay.

The behavior of union members is thereby viewed as irrational.[3] A decision to strike is not in their best long term interests, but workers are believed nonetheless to be willing to strike after the expiration of the previous contract when the offer falls short of the expectation.[4]

The model of strike duration developed for purposes of this analysis modifies the Ashenfelter and Johnson framework as follows. All parties which have a vested interest in the successful negotiation of a contract (management, union leadership, the union membership, and the public at large) are assumed to be fully capable of rational decision making. Thus, the behavior of the union membership is believed to be no less rational or purposeful

than the behavior of the union leadership who are elected to represent their interests or the public employer from whom they are seeking concessions.

This strike duration model, developed in the following section of this chapter, is similar to the framework adopted by Ashenfelter and Johnson to the extent that the decision to abort or continue the strike is assumed to be a rational process. Both models take into consideration the interests of more than one party and thereby recognize that something can be gained (or lost) by each as a result of an additional day of idleness. As observed, however, this approach lends itself to the generation of a variety of competing hypotheses.

> "It is difficult to generate unambiguous predictions regarding the effects of environmental variables on the dispute resolution process. This is especially problematic...since those variables that increase union militancy or resistance in bargaining may have the offsetting effect of reducing management resistance."[5]

A consideration such as the ability of the employer to meet union demands, a factor of central importance to this type of theory, has an ambiguous effect. On the one hand, a greater ability to pay enhances the propensity of the employer to "give in." This should lead to a reduction in the duration of the strike.

Conversely, a greater ability to pay also enhances labor's incentive to "hold out" for concessions that otherwise might not have been expected. This lends support to the expectation of an increase in duration. It is thus not surprising that when using this model, insignificant coefficients on many of the variables selected for examination have been found.[6]

A further limitation of this approach is the implicit assumption that the decision to end the strike is tied to a contract settlement which is acceptable to a majority of the voting membership. In the empirical application of their model, Ashenfelter and Johnson adjust their dependent variable, the number of strikes beginning in a quarter, by the number of contract expirations during this same period. There are many instances, especially in the public sector, when workers return to their jobs without a contract.[7] Moreover, the extent to which the decision to end a strike is tied to a rational consideration of the costs of agreeing versus the costs of disagreeing is questionable,[8] given that the actual costs involved are often discernable only after the strike has ended and after a final settlement has been reached.

In studies which adopted the Ashenfelter and Johnson framework, cost-benefit analysis thus became a useful tool for explaining strike frequency.[9] There are compelling reasons for believing that cost-benefit analysis should also be relevant to the prediction of strike duration.

The costs to each of the parties of engaging in long strikes should, after all, be a relevant consideration.

Ashenfelter and Johnson skirt the indeterminant predictions suggested by a cost-benefit framework by assuming away the rationality of the union membership and by considering primarily the net costs of the strike to the employer. Moreover, their primary interest was in being able to predict the frequency of strikes in private, rather than public, employment. When considering the impact of cost factors to labor or to the public, important considerations for a study of public sector strikes, the net impact of cost considerations becomes unavoidably problematic.

A Framework for Predicting the Duration of Work Stoppages

In recognition of the problems associated with adopting a cost-benefit model for a study of public employee strike duration, the Ashenfelter and Johnson framework has been modified and extended. Additional considerations which rational actors would be expected to take into account, including some that are specifically relevant to the public sector, are incorporated into the model.

As noted in Chapter 1, it is important to consider factors which are specifically relevant to the local bargaining situation. Because the basic unit of analysis is the bargaining unit which elected to initiate

a strike, spurious statistical relationships which result from using deflated strike measures will not be a problem.

As in previous strike studies, multiple regression will be the primary statistical technique. Based on the foregoing review of the literature, five general factors (including a control vector) have been identified for examination. These are discussed below.

The General Factors

In this model, the duration of the strike is, in part, a positive function of the difference between the union membership's expectation of the attainable wage concession and the final offer of the last, pre-strike negotiation round. Other considerations equal, enhanced expectations should lead to longer strikes.[10] It is thus assumed that final pre-strike offers analyzed across strikes do not have significant moderating affects on expectation levels.

In collective bargaining, expectations are primarily influenced by the earnings of comparable employees working in neighboring or contiguous jurisdictions. The greater the discrepancy between the perception of what the union membership believes constitutes an acceptable contract offer (as influenced by what comparable employees have been able to obtain) and the terms offered, the greater is the overall level of discontent.[11] This level of

discontent, in turn, should directly affect the duration of the strike. A vector (E_{it}) of three variables has thus been selected to capture the overall expectation level of bargaining unit i employees who elected to initiate a strike during time period t.

The construction of the variables associated with this vector is guided by the belief that the behavior of the union membership and the union leadership is significantly affected by comparisons with the earnings obtained by other, similar employee groups.[12] Data constraints in prior studies precluded the possibility of considering any factor other than the impact on strikes of mean earnings. A typical measure, for instance, was the mean earnings of all non-education employees in a state. As reported in Chapter 2, however, inconsistent or unexpected signs on all variables have been the rule, rather than the exception, in these studies.

This study builds on these results by relating the earnings of the employee group which elected to strike to the earnings of other, similar employee groups working for other employers as well as to the mean earnings of other employee groups working for the same employer. It is thus not the absolute level of earnings, but the earnings differential which may, it is believed, be the relevant factor. Variable specifications for the E_{it} vector and for the other vectors to be considered in this study will be discussed in the following section of this chapter.

Economic and political constraints also have an unmistakable impact on the ability and willingness of an employer to make concessions during the course of a strike. In a recent study of the collective bargaining experiences across nine school districts in California, Charles Perry concluded that the economic hardship experienced by six of the districts studied (as measured by a marked decline in the tax base, an absolute drop in tax support of varying types, and the failure of the community to adjust property tax levies upward) was associated with the severity of the strikes in those communities.[13] Strikes in these districts, he suggested, were "both prolonged and bitter."

Expectations thus affect the magnitude of the concessions sought by labor, while restrictions on the employer affect the magnitude of the concessions offered during the course of the strike. A vector (C_{it}) of four variables has been selected to represent the economic and political constraints confronted by the bargaining unit i employer during time period t.

These variables are not proxies for the financial capacity of the employer to make concessions. Financial conditions of public entities are particularly difficult to ascertain, given the political nature of the budget process and the complexity of public accounting procedures. Further, even if accurate measures of an employer's ability to pay were attainable, the net effect of these factors remains indeterminant. As observed, there are reasons for

believing that strikes may be longer, just as there are reasons for thinking that they may be shorter, when considering the financial capacity of an employer to award concessions. Some of the variables to be considered in the C_{it} vector do not have signs which can be predicted a priori. This does not mean, however, that their ultimate impact will necessarily be inconsequential. This is an empirical, rather than a theoretical question at this point in the early development of a theory of strike duration.

The recognition of economic factors alone, however, is not expected to be particularly successful in explaining strike duration. Existing evidence suggests that economic considerations are actually better determinants of strike occurrence than of strike duration.

> "Efforts to explain duration with an economic model have invariably explained less variance and identified fewer significant variables than similar models of frequency and breadth."[14]

Moreover, it was suggested in Chapter 1 that one of the problems with the methodology used in prior strike studies is a failure to take into consideration the overall context in which the labor relations system functions.[15] Accordingly, noneconomic considerations have been identified and subsequently grouped into three vectors. These are B_{it} (the bargaining relationship in unit i during time period

t), P_{it} (the bargaining environment in unit i during time period t), and K_{it} (other relevant factors).

Having discussed the general purposes served by vectors E_{it}, C_{it}, B_{it}, P_{it}, and K_{it}, we now turn to a discussion of the dependent variable, as well as the independent variables which are associated with each vector, respectively.

The Dependent Variable

(S_{it})

The Bureau of Labor Statistics (BLS) calculates the number of idle days which resulted from a strike by counting the total number of days lost from the beginning of the strike to the end and by subtracting all weekends and holidays which fall within this time period. Accordingly, strikes beginning on Monday and terminating on the following Sunday are reported as 5 days of idleness for all employee groups.

Firefighters, police and hospitals, on the other hand, are required to provide service on a continuous, 24 hour a day basis. S_{it}, the number of working days lost as a result of a strike, is thus the equivalent of the calender duration of the strike for nurses, firefighters and police. The coding scheme used to estimate the number of work days idled for the remaining employee groups is identical to the procedure employed by the BLS to calculate working days

idle. Log (S_{it}) will be used for purposes of the statistical analysis, since its statistical parameters represent a more normalized distribution. A description of these parameters can be found in Appendix B.

The Independent Variables

Expectations of the Union Membership

The E_{it} Vector

Relative Wage Changes (CE)

This variable measures the historical gain (or loss) of the earnings received by the striking bargaining unit vis-a-vis the wages of comparable employee groups in other jurisdictions within the same state. It is assumed that comparisons are made by public employees with their occupational counterparts, i.e. firefighters compare their wage position relative to that of other firefighters, teachers compare their earnings with the wages of other teachers working in neighboring school districts. One would expect a decline in strike duration when expectations for an acceptable contract award (based on what comparable employee groups were able to obtain) rose less rapidly than the rate of increase in previous contracts awarded to the strikers.

One variable used in this study to represent expectations measures the expansion (or contraction) of the

wages awarded to other, comparable employee groups.[16] Over the fiscal period prior to the strike, this is defined as the change in the mean, monthly earnings of the comparable employee group in the same state. This measure, as one indicator of expectations, takes into account the extent to which wage concessions historically obtained by other employees may have generated differing levels of discontent. Thus,

$$CE = (ME_t - ME_{t-1}) / ME_{t-1}$$

Where: ME is the mean monthly earnings of comparable, full time employee groups working in the same state;

t is October, 1977 for strikes initiated between October 15, 1977 and October 15, 1978

t is October 15, 1976 for all strikes initiated between January 1, 1977 and October 15, 1977.[17]

As noted previously, this is a refinement of earnings measures used in earlier studies in that it takes into consideration the fact that worker expectations should be affected by changes in the compensation awards received

by other, comparable employees.[18] CE should thus have a positive sign. The operational definitions for CE and the other variables to be used in this analysis are presented in Appendix A.

Relative Wage Levels (RE)

Although bargaining history should directly affect the extent to which workers are dissatisfied, a comparison of existing, pre-strike wage levels obtained by comparable employee groups should also be a relevant factor. Expectations of the membership are thus affected not only by past, but by current circumstances as well. The ratio of the mean monthly earnings of comparable employee groups in the same state (RE) to the mean monthly earnings of the bargaining unit which elected to strike should also be positively associated with strike duration. Thus:

$$RE = (ME_t \; / \; E_t)$$

Where: ME is the mean monthly earnings of comparable, full time employee groups employed by jurisdictions located in the same state;

E is the mean monthly earnings of the bargaining unit which elected to initiate a strike

during time period t;

t is October, 1977 for strikes initiated between October 15, 1977 and October 15, 1978;

t is October 15, 1976 for all strikes initiated between January 1, 1977 and October 14, 1977.

Internal Wage Comparisons (EV)

The maintenance of the differential in earnings across employee groups with differing skill levels is also affected by the perceived equity of pay within the same jurisdiction. It is important to the higher skilled employee groups to maintain differentials. The variation in compensation levels, however, can be narrowed by awarding increases in pay for all employee groups by fixed absolute, rather than fixed percentage increments. In so doing, employers are able to offer higher, and therefore more attractive initial salaries for entry level positions. A loss in the relative earnings advantage among skilled employees should enhance expectations for this group. The less skilled employee groups would be expected to respond similarly to the award of greater relative increases to the higher skilled employees.

The variable EV, the percent change over the fiscal year period before the strike in the mean monthly

earnings of all other employee groups working in the jurisdiction which took the strike to the mean monthly earnings of the bargaining unit which elected to initiate the strike, should thus have a positive sign. Therefore,

$$EV = \frac{100 * (MJ_t - MJ_{t-1}) / MJ_{t-1}}{(E_t - E_{t-1}) / E_{t-1}}$$

Where: MJ is the mean monthly earnings of all full time employee groups working for the same employer;

E is the pre-strike, mean monthly earnings of full time bargaining unit employees who elected to strike;

t is October, 1977 for strikes initiated between October 15, 1977 and October 15, 1978;

t is October 15, 1976 for all strikes initiated between January 1, 1977 and October 14, 1977.

Constraints on the Employer's Ability to Pay the Concessions Demanded by the Union Membership

The C_{it} Vector

Relative Importance of the Wages of the Striking Workers to Total Personnel Costs (WB)

Considerable emphasis has been placed in the collective bargaining literature on the economic bargaining power derived by a small number of organized workers whose salaries are a small component of total operating costs.[19] Fewer strikes are expected when the wage bill of the striking employees is low relative to total costs because of the greater relative bargaining power attributed to organized labor in this instance.[20]

> "Where the proportion of labor cost is small, it may not seem worth while for the management to refuse to co-operate with the employees unless there are irritating union rules limiting the freedom of management."[21]

As an argument which is relevant to explanations of strike frequency, how is the proportion of labor cost to total cost related to strike duration? If this ratio is small, the employer should have greater financial capacity to sponsor the employment of temporary strike replacements. The successful recruitment of replacements may require wage offers which exceed, by a considerable margin, the wages

paid to regular employees. When few workers are involved, the employer may have the financial capacity to pay high enough wages to attract temporary replacements, hoping that this will force the strikers back to their jobs.

If, on the other hand, the component of labor costs of the striking employee group to total labor costs is high, as is the case with teachers, hiring strike replacements becomes more difficult. Unlike the former situation, the additional economic resources required to recruit replacement personnel can be substantial. Also, a sufficient number of qualified personnel, especially if the striking group is large, may simply be unavailable.

Employees comprising a relatively small component of labor costs who are threatened with strike replacements may be cajoled into "giving in" earlier. Further, it may be more rational for the employer to settle rather than hire temporary replacements. If a heightened level of conflict results during the give and take of negotiations, resistance to "giving in" could, on the other hand, be bolstered. The interplay among these considerations: the greater bargaining power of labor when labor costs are minimal, the greater capacity of the employer to recruit strike replacements, and the recognition by labor that the employer may have the capability to make concessions, is indeed complex.

If the proportion of labor costs of the strikers to total labor costs acts primarily as a constraint on the

employer, strikes should be longer. But this variable may also proxy the ability of an employer to grant the concessions demanded. As such, its effect is indeterminant.

WB, the ratio of the wage bill of the striking bargaining unit to total wage and salary expenditures of the jurisdiction taking the strike, is the measure selected to represent the component of labor costs to the overall labor costs incurred by the employer. Since public employers are labor intensive, the denominator of WB is total labor costs, not total costs.[22] The construction of this variable is intended to represent a financial constraint on the employer. However, to the extent that WB also represents the ability of the employer to make concessions, its sign must remain indeterminant.

The Number of Bargaining Units (NU)

While the short run costs of granting a favorable contract to organized employees who account for a small component of overall costs is minimal, long term costs may be formidable. Public administrators who are required to negotiate with more than one bargaining unit have reason to be hesitant to award favorable contracts to smaller units.[23] Agreements which favor one employee group can become the contract pattern during subsequent negotiation rounds. There also exists the possibility that a contract could be used by the larger and more powerful labor unions as a bargaining strategy to obtain more favorable contract

terms for themselves.

The number of bargaining units in a jurisdiction should therefore be a practical constraint on an employer's willingness to make concessions. This consideration is captured by the variable (NU), the number of recognized bargaining units in the jurisdiction taking the strike. NU is expected to be positively associated with duration.

Fiscal Constraints

Highly constrained financial conditions may give strength to the employer to "hold out." This would suggest longer strikes, ceteris paribus. If the financial resources required to meet demands are simply unavailable, labor may be convinced early in the course of the strike that their cause is futile. Two variables have been operationalized to capture the extent to which an employer may be constrained financially and politically to make concessions. These are fiscal slack (SL) and the local tax burden (TB). A discussion and operationalization of these variables follow.

Fiscal Slack (SL)

One bargaining strategy available to organized public employee groups is to target unused surplus funds as a financial source for the award of pay concessions. Since labor organizations have a vested interest in protecting the job security of their respective memberships, they

would be expected to view favorably the commitment of a dollar to pay personnel over the commitment of a dollar to cover the wide cadre of operating expenses such as supplies, materials, equipment, utility services, etc. The greater the portion of the budget which is used to support these operating needs, the greater also should be the determination among the union leadership and membership to obtain the concessions sought.

An accurate accounting of the availability of these funds would require extensive examination of the audit statements of each jurisdiction taking a strike. Although this is beyond the scope of this study, one proxy is available--the proportion of total revenues which are not consumed by direct personnel costs (SL).

$$SL = (RV - PE) / RV$$

Where: RV = total revenues received by the jurisdiction taking the strike during the fiscal year 1975;

PE = total expenditures for personnel during the fiscal year 1975.

In one sense, SL is a crude measure for the availability of excess funds which might conceivably be

used to justify concessions. It does nevertheless represent, to a limited degree, the extent to which labor could be expected to know if the employer does (or does not) have the ability to make concessions.[24]

The greater is SL, the greater the tension one would expect between labor and management, especially since a strike has occurred. In effect, there is a larger share of the pie to fight over, even though management may have already committed the bulk of these funds to support non-personnel expenses or possibly capital expansion programs. This suggests there should be longer strikes. It remains unclear, however, whether an employer might be willing to concede earlier. The sign on SL, as with other variables in the C_{it} vector, thus remains indeterminant.

Local Tax Burden (TB)

The extent to which local citizens must bear the costs of government should be a factor in determining the length of a strike. The greater the local tax burden relative to the services received, the greater should be the degree of community resistance toward awarding concessions to public employees which have elected to strike. This represents a constraint to the extent that additional concessions can be financed only through increased tax assessments. If the strikers respond to public pressure, shorter strikes would be expected.

It is also conceivable that the local tax burden

and lack of community support for an additional tax assessment reduces the employer's willingness to make concessions. A high tax burden, relatively speaking, should become a formidable obstacle for an employer interested in identifying the source of future revenues. Under these circumstances, TB would be positively associated with strike duration. Little is known about labor's response across various strike situations to financial constraints faced by the employer. Accordingly, the expectation for TB, a variable constructed to measure the local tax burden, is indeterminant. This variable is an index which is composed of two variables:

$$TB = (PT / PE) + (PT / RV)$$

Where: PT = total property taxes paid by local citizens (including businesses) during fiscal year 1975;

PE = total expenditures for personnel, 1975;

RV = total revenues reviewed by the jurisdiction from all sources during fiscal year 1975.

The first component of this index, PT/PE, captures

the extent to which voters perceive a return in terms of the delivery of government services relative to their tax contributions. The second component of the TB index, PT/RV, captures the extent to which local taxes support government services relative to the revenues received from other governmental sources.

The Bargaining Relationship

The B_{it} Vector

Researchers have been interested for many years in examining the relationship between the size of the work group and strike propensity.[25] Regardless of the terminology (plant size, firm size, size of community or size of work group), it has been hypothesized that small work units are less dehumanizing than large units.[26] Given the greater degree of informality and personalization associated with small work groups, acceptable settlements should be easier to identify.

Number of Employees Involved in the Strike (SZ)

Previous work on strikes has, as noted in Chapter 2, been oriented toward the macro level of analysis. This explains why measures of work group size have been so indirect. Burton and Krider used, as a proxy, a variable which measured the level of urbanization in their cross section strike study.[27] Average firm size and average

plant size in an industry have been used in a recent study of strikes in private sector employment.[28] This study considers a more direct measure, the number of employees who were involved in the strike (SZ). In using size, the breadth of the strike (one of the three dependent measures often used in strike studies) is taken as a positive predictor of duration.

Combined Occupational Composition of the Bargaining Unit (CM)

Labor organizations of course do not necessarily speak with a unified voice at the bargaining table. When units are composed of diverse occupational groups, highly diversified needs can exist with respect to work rules, job security and equity in pay. As an "unstable amalgam of interests," one would expect that longer periods of time might be required to discuss, and subsequently to resolve these differences.

More homogenous units, with clearly formulated demands, should be able to engage in a unified negotiation strategy which is credible and convincing. An employer, recognizing that there is little dissension among the membership over what constitutes an acceptable settlement, may "give in" more readily to demands than when competing interests must be served.[29] The existence of combined, heterogeneous, units (CM) should thus be positively associated with duration.

It is also reasonable to believe that the duration of the strike is related to the employee type involved. Justifications for why some employee groups would be expected to have longer strikes relative to other groups, and why others might be expected to have shorter strikes, are discussed below.

Firefighter Strikes (FIR)

From a public policy point of view, considerable importance has been attributed to maintaining uninterrupted firefighting services. Replacement of firefighters is particularly difficult, however, in view of the sophisticated nature of modern fighting equipment. Neither the state police nor the national guard are, as a general rule, proficient in using this equipment. Firefighters have also long been recognized as one employee type which places a premium on maintaining a reservoir of good will in their respective communities.[30] Long and perhaps bitter strikes could easily jeopardize this good will. A dummy variable set equal to 1 if the strike was by firefighters, (FIR), should thus have a negative sign.

Police (POL)

Police also provide a service which is considered essential. When police strike, the safety and civil order of a community is jeopardized. This should exert pressure on employers to make necessary concessions and on the

police to return to work earlier than otherwise might have been the case.

On the other hand, because of the increased threat to the safety of the community, employers may be more willing to search for and to acquire the temporary services of a trained civil defense unit (public or private). Interest in maintaining order in the community, regardless of the added cost involved, would be heightened. Once replacements are obtained, the pressure on employers to obtain an early settlement is mitigated. In consideration of the countervailing effect of these factors, the sign on POL, a dummy variable set equal to 1 if the strike was by police, is indeterminant.

Sanitation Strikes (SAN)

Sanitation strikes (SAN) could also be inversely related to duration, but for a different reason. Inherent in the type of service delivered by sanitation workers is a continuous impact on an entire community. When solid waste is not picked up as scheduled, it begins to collect on street curbs. Garbage disposal units begin to overflow, resulting in a threat to the health of citizens. When waste water treatment plant workers strike, sewerage can be held in holding tanks for only a few days before it begins to back flow into businesses and homes. Pressure from citizens, directed at both the employer and the sanitation worker, would be expected to mount rapidly. The net result may be

a threat to subcontract services with a private sanitation firm, especially if the employer thinks the union's demands are unreasonable. This would suggest that the sign on SAN should be negative.

On the other hand, empirical evidence exists which shows a positive sign on SAN.[31] This may be because sanitation workers, for the reasons discussed above, have enhanced bargaining power. Further, since there is a high proportion of sanitation workers in private employment, the counterpart public employment worker may be more prone to emulate the type of militant behavior found in private employment. On balance, this reasoning, coupled with the finding of a positive relationship in prior studies, suggests an expectation of a positive sign on SAN.

Health Care Workers (HOS)

In a study comparing the attitudinal militancy of nurses and teachers, Alutto and Belasco found that nurses, as a group, are more disposed toward militancy than teachers. This finding is not altered when they control for sex across the two groups.[32] Therefore, the duration of strikes by nurses and other health care workers (HOS) is expected to be longer than strikes initiated by teachers.

Controls for three other employee groups will also be considered. No empirical or theoretical basis exists, however, for making predictions. These are strikes by street and highway workers (STR), transportation

employees (TRN) and welfare service workers (WEL). Post hoc interpretations over the meaning of the signs found on the coefficients for these dummy variables are also subject to considerable qualification due to the small number of strike occurrences for these groups.

Other Employee Types (OTH)

Other bargaining units which initiated a strike comprise a variety of employee type combinations. In one case, firefighters and police may have been combined into the same unit. In another, sanitation workers may be combined with street and highways workers. The OTH category thus represents for many cases, the existence of a mixed occupational bargaining unit. Its correlation with CM should be strong. As was the case with CM, the sign on OTH, a dummy variable set equal to 1 for strikes by all other employee groups except education, should thus be positive.

Degree of Inessentiality (NS)

While it is important to control for unique factors which characterize the various employee groups, it is also meaningful to consider the degree of essentiality commonly associated with the services delivered by the various employee groups. The greater the degree of essentiality, the greater should be the pressure for a timely strike settlement, other things being equal. Previous

research on the empirical relationship between strike duration and the degree of essentiality confirms this belief, although no attempt was made in these studies to control for other factors which should also affect duration.[33] In this study, public employee services were categorized into three basic types:

(1) Essential services - police and firefighters;
(2) Intermediate services - sanitation, hospitals, transit, water and sewerage;
(3) Nonessential - streets, parks, education, housing, welfare and general administration.

An index of inessentiality (NS) has thus been constructed which represents varying degrees of essentiality. The number 1 is assigned if the striking employee group is either the police or firefighters, the number 2 is assigned if the employee group falls within the intermediate services category, and the number 3 is assigned if the strike is initiated by one of the nonessential employee types. Since the most essential employee groups are assigned the smallest number, NS is expected to be positively associated with duration.

The variables SZ, FIR, POL, SAN, OTH, HOS, STR, TRN, WEL, NS and CM constitute the bargaining relationship vector B_{it} and thereby represent an importance facet of the overall labor relations environment. A consideration of the bargaining context, another important aspect of the labor relations environment, is also important.

The Bargaining Environment

The P_{it} Vector

Negotiation of the First Agreement (FN)

Once a policy is in effect and a determination of the bargaining unit has been made, the parties are obligated to negotiate. Negotiation of first contracts, however, may be most difficult. Strikes occurring after recognition, but before a written contract has been obtained, may be long and bitter. The union tends to get "shunted around among the conflicting or overlapping authorities of a department manager, a mayor and a city council."[34]

Observers of the problems associated with the negotiation of first contracts have suggested that the parties, inexperienced often in the give and take of the collective bargaining process, are less inclined to alter their original positions, especially after a strike has been initiated.[35] Further, no contract language exists over which the parties can haggle. In view of the disagreements which can arise, especially after a bitter recognition

campaign, considerable time should be required, even after the strike has begun, to settle on acceptable contract language. FN, a dummy variable representing the negotiation of a first contract, should thus be positively related to duration.

Union Support for the Work Stoppage (US)

Without the support of the labor organization there is no formal mechanism through which worker grievances can be heard. Strikes initiated without the support of the bargaining agent would indeed be expected to be short lived. The membership responsible for an unauthorized strike would not be eligible for strike benefits, if any exist.[36] Also, depending on the union constitution which governs relationships between the international union and its member locals, unauthorized strike action may be grounds for establishing trusteeship. Thus, the sign on US, a variable representing the presence of union support for the strike, should be positive.

The Issues Under Dispute

Although a majority of strikes in public employment result from disputes over economic issues, this is not true of all strikes. One-fourth of the strikes which occurred during the negotiation or renegotiation of a contract during 1977 and 1978 were for non-economic

reasons.[37] Other concerns important to striking employees include job security, the administration of work rules, promotions and demotions, and the administration of the contract.

No empirical evidence is available on whether economic strikes in public employment are longer or shorter, ceteris paribus, than the non-economic strike. Recent evidence, however, suggests that strikes over economic issues in private sector employment are longer. Economic issues, in a 1967[38] study, were defined to include general wage changes, supplementary benefits (pensions, insurance, dismissal pay, premium pay) and adjustments to the rate of pay due to such considerations as job reclassification, incentive rate adjustments, or changes in policy pertaining to retroactivity of wage adjustments. One plausible explanation is that non-economic issues were less important to the membership. For this reason, workers were less willing to sustain a long strike. This evidence, although not directly relevant to the public employment situation, suggests strikes over economic issues may, as a general rule, be positively associated with duration.

In contrast with the approach taken in the 1967 strike study, two types of economic issues will be considered in this analysis--those which resulted primarily over wages (EC) and those which resulted primarily over a concern with supplemental or fringe benefits (SB).[39] Supplemental benefits were considered to be: (1) pensions,

insurance, or other welfare programs, (2) severance or dismissal pay such as Supplemental Unemployment Benefits (SUB) or the Guaranteed Annual Wage (GAW), (3) premium pay (shifts, overtime or weekend pay), (4) travel time, vacation pay, paid holidays, lunch periods, call in pay, sick leave, vacation allowances, funeral leave. Because only 16 strikes out of the 558 cases occurred because of one of the issues noted above, any conclusions with respect to the performance of this variable should be considered very preliminary. The coefficients on both EC and SB are expected to be positive.

The existence of a positive relationship may, in part, depend on the financial ability of the employer to "give in" to demands. In jurisdictions which are hard pressed to identify sufficient revenues to meet current expenditures, job security issues may be more important bargaining issues than wages or fringe benefits. It is important to take into account different economic milieu, especially when economic issues are the principal issue. The interaction terms EC*WB and EC*SL will thus also be considered as a relevant factor.

The four variables (FN, US, EC and SB) represent the bargaining environment of unit i during time period t. These variables constitute vector P_{it}.

Other factors merit consideration which cannot be directly associated with any of the vectors discussed above. These are the season and location of the strike.

These two general factors have been identified in prior research as relevant considerations and are therefore included in the control vector K_{it}.

Additional Considerations: Where and When

The K_{it} Vector

Location

There is a considerable body of research by sociologists which has examined the impact on strikes of various community characteristics.[40] In a recent analysis of private sector strikes, this trend was expanded to include a prediction of strike occurrences across Standard Metropolitan Statistical Areas (SMSA's). This research was inspired by Kerr and Siegel's suggestion in the 1950's that strikes are associated with the extent to which a community is tightly or loosely interconnected.[41] In the urban, more congested, less personalized environments, longer strikes are expected. As suggested forty years ago:

> "A society where farmers predominate is likely to require industrial employees and employers to co-operate."[42]

The sign on RU, a dummy variable coded as a 1 if the strike occurred outside of an SMSA, is therefore expected to be negative. This relationship should be strengthened by the fact the RU is also likely to be an inverse proxy for union

penetration.

Region of the strike should also be relevant. Strikes which occur in the northern states, where public employee collective bargaining has stronger political support, would be expected to be longer than strikes occurring in the western or southern regions of the country. The coefficient on NO should thus be positive.

Strikes in southern states, on the other hand, should be shorter relative to the length of strikes in the west or the north. Collective bargaining is not well established, nor has it been enthusiastically accepted in southern states.

Season

Skeels hypothesized that strikes during the winter months should be shorter, other considerations held constant, than strikes occurring during the summer months.[43] Using a dummy variable to represent three of the four seasons of the year, he finds that, controlling for economic and political factors, strikes occurring in the winter lasted significantly fewer days than strikes occurring in the fall. With winter strikes, there is less opportunity to picket or otherwise solicit public support. Since this reasoning would not be expected to apply to strikes occurring in southern or western states, the interaction term NO*WR (where WR represents a strike occurring during

the winter months (December, January and February) is expected to be inversely related to duration.

The Public Policy Vector

(L_{it})

The final vector, L_{it}, is comprised of two dispute resolution procedures which are used to resolve public employee disputes (mediation and the court injunction), and one public policy found in state laws covering local government employees, the permissive strike law. Considered first is the relationship of the two impasse resolution mechanisms on strike duration.

Over the past decade, penalities have been imposed on workers and on labor organizations who struck, cease and desist injunctions have been issued by the courts, and mediators have participated in the resolution of many disputes. These procedures have been supported and guided by a variety of state and local laws.[44] In some states, disputes that remain unsettled after the termination of the contract must be mediated by third parties who are employed by the state's public sector labor relations commission. Other states encourage the mediation of disputes by neutrals from the private sector or from the Federal Mediation and Conciliation Service (FMCS). As an alternative remedy, the judiciary can be requested by an employer to issue an

injunction when a strike threatens the health and safety of a community. The penalty, a more punitive measure than a cease and desist order, is also imposed occasionally on striking employees or on their respective labor organizations.

The Court Injunction (IJ)

Historically, most public policies have supported the involvement of the courts in public employee disputes.[45] These policies evolved because the threat of an injunction was thought to be instrumental in preventing strike occurrences.[46] To be a credible threat, however, the injunction must also be effective in convincing workers who illegally strike to return to work.

The injunction could, however, aggravate militancy. One observer has suggested that "a ban on strike is, in itself, an inducement to strike."[47] When employees refuse to comply with an injunction, the petitioner is placed in the tenuous position of choosing among several unattractive courses of action, including further litigation. In most states, courts have the latitude of imposing penalties on the members or the union that struck when an injunction is deliberately disobeyed. Whether threats, coercion, dismissal or some combination thereof constitute the nature of the action taken, employees may actually become more uncompromising. Compromise, after all, is critical to obtaining a settlement. The net effect of IJ, a dummy variable representing the issuance of a court injunction, is thus

indeterminant.[48]

Mediation (ME)

Unlike the court injunction, mediation is an impasse procedure which is widely practiced.[49] It is popular because of the anticipation that a better mutual understanding will result over the substantive issues in dispute. The suggestion of compromises by a mediator also introduces a new dimension to the bargaining process. The parties are no longer merely reacting to the same proposals and counter-proposals. With an outside proposal on the table, the parties, it is assumed, are more likely to settle. Mediators thus introduce a sense of law and order to the bargaining process. Skilled third parties can also help inexperienced negotiators avoid dysfunctional bargaining strategies which can contribute to a lengthening of a dispute. Earlier settlements should be facilitated. The sign on the coefficient of ME, a dummy variable which represents the presence or absence of mediation, should be negative.

The prediction of a negative relationship for ME could, on the other hand, be counterbalanced by the assignment of mediators to strikes which are unusually difficult to settle. The extent to which this effect may (or may not) be present is the subject of Chapter 5.

Permissive Strike Law (PL)

Nine states have enacted permissive public sector

strike laws. Seven of these states experienced at least one strike during the 1977-1978 period of this analysis. In Montana, only strikes by firefighters are prohibited. In Oregon, all public employees except police, firefighters and guards at prisons and hospitals have a right to strike as long as all pre-strike procedures prescribed by statute have been met. Pennsylvania, with a law similar to Oregon's, also prohibits guards and court employees from striking. In Vermont, non-teaching municipal employees may strike if 30 days have passed since the issuance of a fact finder's report and the dispute has not been submitted to an arbitrator. Minnesota porvides a limited right to strike to all non-essential employee groups. In Alaska, only "semi essential" personnel (utility, school, snow removal and sanitation workers) may strike. In no state is the strike privilege extended to all public employee groups and in no state is this right totally unqualified.

Without mandatory legal sanctions against strikes the courts can not be employed as a mechanism for forcing workers to return to work. The presence of these laws also represents public support of and tolerance for strikes by public employees. The dummy variable PL measures the existence of a permissive strike law in a state's collective bargaining policy. It should be positively associated with strike duration.

The Expanded Estimating Model

The expanded form of the estimating model to be used in this study is as follows:

(1) $S_{it} = f(E_{it}, C_{it}, B_{it}, P_{it}, K_{it}, L_{it})$

Where: S_{it} represents the number of working days lost as a result of a strike in bargaining unit i during time period t;

E_{it} is a vector of variables representing the expectations of bargaining unit i employees during time period t;

C_{it} is a vector of variables which measure the economic and political constraints on the bargaining unit i employer during time period t;

B_{it} is a vector of variables representing the structure of bargaining unit i during time period t;

P_{it} denotes a vector of variables which describe the bargaining environment of unit i during time period t;

K_{it} denotes a vector of control variables which are expected to affect the duration of the strike by bargaining

unit i employees during time period t;

L_{it} is a vector of policy variables expected to affect the strike initiated by bargaining unit i during time period t.

Having discussed and defined the variables to be considered in this study, the results from entering these variables in a multiple regression are presented in Chapter 4. As a prelimary to this discussion, the method and unit of analysis will be reviewed.

Footnotes (Chapter 3)

1
Robert A. McLean, "Coalition Bargaining and Strike Acitivty in the Electrical Equipment Industry, 1950-1974," Industrial and Labor Relations Review, Vol. 30, No. 3 (April, 1977), p. 360.

2
Orley Ashenfelter & George Johnson, "Bargaining Theory Trade Unions, and Industrial Strike Activity," The American Economic Review, Vol. 59, No. 1 (March, 1969), pp. 35-49.

3
The proposition that strikes are not economically profitable to the union membership is not undisputed, however. In an analysis of 26 strikes in the Vancouver area of Canada, strikes were found to be profitable to the union membership, even after conservative assumptions about the probability of continued employment and the availability of alternative job opportunities during the strike were made. See B. Curtis Eaton, "The Worker and the Profitability of the Strike," Industrial & Labor Relations Review, Vol. 26, No. 1, (October, 1972), pp. 670-679. For a critical discussion of the Ashenfelter and Johnson analysis, see P. K. Edwards, "Time Series Regression Models of Strike Activity: A Reconsideration with American Data," British Journal of Industrial Relations Vol. 16, No. 3 (November, 1978), p. 320.

4
As further noted by one critic, this model "fails to take into account that the executive ... must have some degree of confidence in order to negotiate with employers at all." Otherwise, the union leadership will "lose all credibility as a negotiating instrument with management." There is no strong evidence, however, that there has been a dissipation in the credibility of the union leadership at the negotiating table. Malcolm Fisher, op. cit., p. 80.

5
John C. Anderson & Thomas A. Kochan, "Impasse Procedures in the Canadian Federal Service: Effects on the Bargaining Process," Industrial & Labor Relations Review, Vol. 30, No. 3 (April, 1977), p. 288.

6
This was initially demonstrated by the insignificance of a variable used to measure industry profits in the Ashenfelter and Johnson study, op. cit.

7 This framework was originally used in an analysis of private sector strike activity, with no assertion that it was applicable, necessarily, to analyses of public employee strike activity. In a review of over 50 newspaper accounts of strikes in the public sector which occurred during 1975, it was found that in more than one-fourth of the cases, settlements were reached sometime after the workers returned to the jobs. For a further discussion of this issue, see Thomas A. Kochan, "Dynamics of Dispute Resolution in the Public Sector," in Benjamin Aaron, Joseph Grodin and James Stern, Public Sector Bargaining (Washington, D. C.: Bureau of National Affairs, 1979), p. 168.

8 This terminology is borrowed from Neil Chamberlain & James W. Kuhn, Collective Bargaining (New York: McGraw Hill, 1965), pp. 170-173.

9 For a summary of recent studies of strike duration which build on the work by Ashenfelter and Johnson, see Robert Stern, op. cit., p. 34.

10 This has been described as a form of aspirational deprivation, in contrast with decremental or progressive deprivation. Korpi warns that increasing aspirational deprivation should be positively, but not necessarily significantly related to the probability of conflict. Walter Korpi, "Conflict, Power and Relative Deprivation," American Political Science Review, Vol. 68 (1974), pp. 1575-1576.

11 T. R. Gurr, "A Comparative Study of Civil Strife," in H. D. Graham & T. R. Gurr (eds.), Violence in America (New York: New American Library), p. 590.

12 This idea has been identified in the literature as the orbits of coercive comparison. See Neil W. Chamberlain & James W. Kuhn, Collective Bargaining (New York: McGraw-Hill, 1965), pp. 203-209. These standards are similar to the criteria applied by arbitrators. See Frank Elkouri & Edna Elkouri, How Arbitration Works (Washington, D. C.: BNA, 1973), pp. 745-796; Howard S. Block, "Criteria in Public Sector Interest Disputes," Proceedings of the 24th Meeting of the National Academy of Arbitrators (Washington, D. C.: BNA, 1971)

13
Charles Perry, "Teacher Bargaining: The Experience in Nine Systems," Industrial and Labor Relations Review, Vol. 33, No. 1 (October, 1979), pp. 10-11.

14
Robert N. Stern, "Methodological Issues in Quantitative Strike Analysis," Industrial Relations, Vol. 17, No. 1 February, 1978), p. 38.

15
This was also the conclusion of a summary of recent work in the area of public policy and labor relations research. Ralf R. Jones, Public Sector Labor Relations: An Evaluation of Policy Related Research (Contract Research Corporation, 1975), p. 53.

16
For the construction of different wage change measures, see Jack W. Skeels, "Measures of U.S. Strike Activity," Industrial and Labor Relations Review, Vol. 24, No.4 (July, 1971), pp. 515-525; David Snyder, "Early North American Strikes: A Reinterpretation," Industrial and Labor Relations Review, Vol. 30, No. 3 (April, 1977).

17
These dates are an artifact of the fact that the Annual Survey of Governments, from which these measures are drawn, is conducted on October 15th of each year. For a further explanation of the sources for the variables to be used in this analysis, see Appendix A.

18
This same variable has, however, been operationalized in an entirely different manner. David Snyder, op. cit., used a moving average of the rate of change in wages over a six year period of time to represent the divergence (or convergence) of expectations. The possibility of constructing a wage comparison measure such as CE has not been possible in previous studies because the bargaining unit initiating the strike was not the primary unit of analysis. The conception of an expectations variable is not a new idea. Operationalization of this variable in this study is, however, a refinement on earlier strike research.

19
This concept was first introduced by Alfred Marshall in Principles of Economics, 8th edition (New York: Macmillan Company, 1949), pp. 383-387; see also Albert Rees, The Economics of Trade Unions (Chicago: The University of Chicago Press, 1960), pp. 70-73.

20
Malcolm Fisher, op. cit., p. 81.

21
Samuel P. Hayes, "Psychology of Conciliation and Arbitration," in George W. Hartmann & Theodore Newcomb (eds.), Industrial Conflict (New York: The Gordon Company, 1939) p. 417.

22
A measure of labor costs to total costs has traditionally been viewed as the proportion of all labor costs of the firm to total costs. The WB measure thus differs from this construction. It has been modified primarily because public, rather than private sector strikes are being studied.

23
For a discussion of the implications to a public employer of granting particularly generous concessions to one employee group, see Roben W. Fleming, "Public Employee Bargaining--Problems and Prospects," Industrial Relations Research Association (1978), pp. 14-23.

24
As public employee bargaining has matured over the past decade, the parties have undoubtedly become more sophisticated in their negotiation strategies. Some public employee labor organizations have developed elaborate auditing procedures for identifying the extent to which a public employer has the ability to grant the concessions demanded. The Michigan Education Association, for example, has developed a computer program which analyzes public expenditures in comparison to revenues. Nevertheless, the identifying of financial reserves to pay concessions, especially in the larger jurisdictions, is a practical impossibility. The availability of uncommited, surplus reserves can be skillfully hidden by public employers through the establishment of special accounts for utilities, the commitment of funds to capital expansion programs which have not been approved by the governing body, or the refusal to report surplus funds carried over from one fiscal year to the next. The variable SL may better represent, then, the extent to which the union membership believes there "is enough in the kitty" to grant the concessions sought, than the extent to which funds may, in fact, be available for this purpose. As such, it could be viewed as a candidate for the E_{it} vector.

25 For one of the earliest studies, see Sherill Cleland, Influences of Plant Size on Industrial Relations (Princeton, New Jersey: Princeton University Press, 1955).

26 John Shorey, "The Size of the Work Unit and Strike Incidence," Journal of Industrial Economy (1977), Vol. 23, No. 2, p. 177.

27 Burton and Krider, op. cit., pp. 156-157.

28 Robert N. Stern, "Toward and Empirical Merger: Sociological Conceptions of Strike Activity," 28th Annual Meeting of the Industrial Relations Research Association Proceedings (1975), pp. 59-61.

29 Malcolm Fisher, op. cit., p. 28.

30 James A. Craft, "Fire Fighter Strategy in Wage Negotiations," Quaterly Review of Economics and Business, Vol. 11, (Fall, 1971), pp. 65-75.

31 Burton and Krider, op. cit., p. 171.

32 Joseph A. Alutto & James A. Belasco, "Determinants of Attitudinal Militancy Among Nurses and Teachers," Industrial and Labor Relations Review, Vol. 27, No. 2 (January, 1974), pp. 220-222.

33 John F. Burton and Charles Krider, "The Role and Consequences of Strikes by Public Employees, in J. Joseph Loewenberg and Michael H. Moskow (eds.), Collective Bargaining in Government (Englewood Cliffs, New Jersey: Prentice Hall, 1972), pp. 278-279.

34 Neil W. Chamberlain, "Public vs. Private Sector Bargaining," in Loewenberg and Moskow, op. cit., p. 16.

35 Albert A. Blum and Gadi Harel, "The Generic Reasons for Strikes: An Interpretative Analysis of the Israeli Case," unpublished manuscript, 1978.

36
Sheldon M. Kline, "Strike Benefits of National Unions," Monthly Labor Review, Vol. 98, No. 3 (March, 1975), pp. 17-23.

37
This was drawn from preliminary analyses of the machine readable data file obtained from the BLS which covered the years 1975-1978.

38
David B. Lipsky and Henry S. Farber, "The Composition of Strike Activity in the Construction Industry," Industrial and Labor Relations Review, Vol. 29, No. 3 (April,1976), pp. 388-404.

39
Stern has recently addressed the importance of considering models which take into consideration different issues over which strikes occur. See Robert N. Stern, "Quantitative Strike Analysis, op. cit., p. 41.

40
James R. Lincoln, "Community Structure and Industrial Conflict: An Analysis of Strike Activity in SMSA's," American Sociological Review, Vol. 43 (April, 1978), pp. 199-220.

41
Clark Kerr and Abraham Siegel, "The Interindustry Propensity to Strike," in Arthur Kornhauser, Robert Dubin, and A. Ross (eds.), Industrial Conflict (New York, 1954).

42
Samuel Hayes, "Psychology of Conciliation and Arbitration," in George Hartman and Theodore Newcomb (eds.), Industrial Conflict (New York: Gordon Company, 1939), p. 410.

43
Jack Skeels, "Measures of U.S. Strike Activity," op. cit. For a much earlier discussion, see Dale Yoker No. 4 (July, 1971), pp. 515-525; see also Dale Yoker, "Seasonality in Strikes," Journal of the American Statistical Association, Vol. 33, No. 204 (December, 1938), pp. 687-693.

44
The most recent summary of these policies can be found in U.S. Department of Labor, Labor Management Services Administration, Summary of Public Sector Labor Relations Policies: Statutes, Attorney General's Opinions and Selected Court Decisions (Washington, D. C.: GPO, 1979).

45
A recent summary of penalty laws found across the 50 states is available in the Hawaii Labor Relations Group, Guide to Statutory Provisions in Public Sector Collective Bargaining, "Strike Rights and Prohibitions," (Industrial Relations Center, University of Hawaii, 1978). According to John Bonner, Director of the Office of Public Labor Relations, Department of Labor, there are considerable differences across states in the extent to which penalties are legally used to shorten the duration of strikes.

46
An excellent summary of the pros and cons of strike penalties can be found in Eva Robbins, "Penalties in Strikes Against a Public Employer, the New York Conference Series, Vol. 22, pp. 315-335.

47
William J. Kilberg, "A LImited Right to Strike for Public Employees," in Loewenberg and Moskow, op. cit., p. 306; An alternative view has been offered by Paul Gerhart. Finding that strike penalties, with explicit prescriptions for the type of penalty to be imposed, were inversely and significantly related to outcomes, Gerhart suggests that it is not whether strikes are prohibited, but "whether penalties for engaging in strikes are explicit." Paul F. Gerhart, "Determinants of Bargaining Outcomes in Local Government Labor Negotiations," Industrial and Labor Relations Review, Vol. 29, No. 3 (April, 1976), p. 344.

48
The Department of Labor has recently funded a study examining the impact of penalties on strike activity, with particular emphasis on whether they reduce the occurrence of duration of the strike.

49
For a discussion of the function of impasse procedures, see Anthony V. Sinicropi, Dispute Settlement in the Public Sector: The State of the Art (Washington, D.C.: GPO, 1972)

Chapter 4

The Analysis

This chapter is composed of two sections. The first discusses the method of analysis and the data. Results are presented and analyzed in the second section.

The Method of Analysis and the Data

The unit of analysis to be used is the local government bargaining unit (or units) which was involved in a work stoppage while negotiating or renegotiating a collective bargaining contract.[1] Strikes by state government employees were excluded because of the difficulty in ascertaining the composition and scope of the bargaining unit at the state level.[2] The analysis will include strikes which occurred in the United States between January 1, 1977 and October 15, 1978. During this period, 558 stoppages, resulting in 5,108 days of idleness, satisfy this description.[3]

Data on the characteristics of stoppages are available from the U.S. Department of Labor, Bureau of Labor Statistics (BLS). Strikes are identified through newspaper accounts which are monitored on a daily basis by the BLS district offices, and the Federal Mediation and Conciliation Service. Because short strikes may not be as newsworthy, the data represent a biased representation of the larger strikes.

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Requests for information are then sent to the public employer and to the employee association (or union) involved. In approximately 33% of all instances, responses are received from both parties. The bulk of the other responses come from public management. BLS officials estimate that between 95% and 98% of all public employee strikes are included in this file.

The information requested on the BLS Work Stoppage Report includes a report on when and how long the strike lasted,[4] the type of employee group involved, the union, and the types of dispute resolution procedures which were used, if any, to resolve the impasse. Data is also requested on whether the strike occurred during the first or a subsequent negotiation period.

These responses, in conjunction with what is known about the strike from press reports, are coded onto machine readable data files. This data was acquired with the support of a National Association of Schools of Public Affairs and Administration/National Association of Counties dissertation fellowship.

While this data file identifies the union involved, the jurisdiction involved remains anonymous. Fortunately, the Bureau of the Census uses BLS strike reports to identify the jurisdiction affected. Considerable effort is taken to insure that the correct jurisdiction is identified. If it is not clear on the BLS Work Stoppage Report which jurisdiction took the strike, a phone call (or calls) are made to

insure that an accurate determination is made.

The case number assigned by the BLS, unfortunately, has no correspondence with the jurisdiction ID number assigned by the Census. Thus, the extensive data resources collected by these two agencies could only be merged by obtaining a lexicon which matched the BLS case number with the Census jurisdiction ID number. It was learned that the jurisdiction identification number was written on a copy of the BLS strike questionnaire which was used by the Census to develop their internal strike files. The Census provided a listing of the BLS case number with their matched jurisdiction ID numbers for all 1978 strikes. A similar listing of 1977 strikes was gathered by the investigator during a field trip to Washington, D.C. in October, 1979. By merging the BLS strike files with the Census files on earnings and collective bargaining coverage, the union which initiated the strike could be associated with the jurisdiction which took the strike.

Having identified the jurisdiction involved, Census data found on machine readable data files were matched with the data coded onto the BLS strike file. These data were drawn from the annual employment survey which was sent to all jurisdictions in the country during 1977, and to a sample of 15,000 jurisdictions during 1975 and 1976.[5] This survey requests participating governments to report information on the monthly earnings by employee group as well as data on collective bargaining coverage. Finance data were

also drawn from the 1975 Census finance machine readable data file.

For the variables drawn from the Census data, RE, EV, WB, NU, SL, and TB (see Appendix A), the number of strikes in jurisdictions sampled by the Census equaled 412. For this reason, regression results reported in this chapter utilize samples of varying sizes, depending on the variables which are included in the regressions.

Measures to be examined in this study are expected to be interrelated. It is reasonable to expect that the same factors which theoretically explain strike duration will also be related to each other. Introducing modified versions of the basic model permits the inclusion of highly correlated variables in separate equations. Their independent effects on duration can then be evaluated. Reformulation of the basic model also permits deletion of variables found to be insignificant. The performance of significant predictors can then be reexamined.

Moreover, an important purpose served by the consideration of multiple variables in E_{it}, the expectations vector, and in C_{it}, the constraints vector, is to enhance the probability of identifying at least one (or more) variables for each general factor which contributes to an explanation of strike duration.

The number of valid cases will vary depending on the variable in the regression having the fewest number of nonmissing values. Tests of significance are based on

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the number of observations for which all variables were found to have non-missing values. This is the sample size, or "n", which will be reported in the tables which follow.

The Results

The regressions reported in Tables 1 and 2 include as independent variables all of the factors identified in Chapter 3. The dependent variable, S_{it}, is strike duration.

Two equations are reported in Table 1. The first includes all "employee types" which were identified as components of vector B_{it} (FIR, POL, SAN, OTH, HOS, STR, TRN, WEL). The omitted employee type reference category is education. As a variable which captures a common characteristic across the various employee groups, NS, the inessentiality index, is not entered in this equation. The essentiality of an employee group is sufficiently captured by the eight "employee type" dummy variables. The second equation considers the impact of NS, while deleting FIR, POL, SAN, OTH, HOS, STR, TRN, and WEL.

CM, the combined bargaining unit variable, is not entered in the Table 1 equations because the construction and subsequent inclusion of WB, the labor cost to total labor cost variable, necessitated the identification of specific employee groups. This, by definition, excluded from consideration employees who were organized into combined, or mixed bargaining units. Although constructed

TABLE 1. The prediction of strike duration (S_{it}) with and without "employee type" variables
(The 412 Sample)

Vector	Variable	Expected Sign	Coefficient	Beta	Coefficient	Beta
E_{it}						
	wage change (CE)	+	1.499 (1.30)	.10	1.153 (1.03)	.07
	wage level (RE)	+	.169 (.42)	.03	.023 (.06)	.00
	internal comparison (EV)	+	.017 (1.33)	.09	.019 (1.49)	.10
C_{it}						
	labor cost (WB)	?	.014** (2.88)	.46	.007** (2.22)	.23
	units (NU)	+	-.003 (.24)	-.02	-.003 (.27)	-.02
	slack (SL)	?	.560 (.76)	.08	.880 (1.29)	.12
	tax burden (TB)	?	.124 (.80)	.06	.074 (.49)	.04
B_{it}						
	size (SZ)	+	.009 (.16)	.01	.021 (.39)	.03
	inessentiality (NS) index	+			-.235 (1.47)	-.13
	firefighter (FIR) strike	-	1.057* (1.81)	.17		
	police strike (POL)	?	.989* (1.91)	.18		
	sanitation strike (SAN)	+	.990* (1.95)	.18		
	other strike (OTH)	+	.571* (1.91)	.21		
	hospital strike (HOS)	+	1.642** (2.34)	.18		
	street and highway (STR) strike	?	.854* (1.70)	.16		
	transportation (TRN) strike	?	.990** (2.02)	.15		
	welfare strike (WEL)	?	.996 (1.63)	.14		
P_{it}						
	first negotiation (FN)	+	-.174 (.71)	-.05	-.129 (.54)	-.04
	union support (US)	+	.653** (2.04)	.14	.634** (2.00)	.14
	wage issue (EC)	+	.197 (1.19)	.08	.252 (1.54)	.11
	benefit issue (SB)	+	-.479 (1.08)	-.07	-.436 (.99)	-.07
K_{it}						
	winter (WR)	-	.184 (.39)	.06	.026 (.05)	.01
	rural (RU)	-	-.206 (1.22)	-.09	-.165 (.99)	-.07
	north (NO)	+	-.359* (1.66)	-.14	-.402* (1.87)	-.15
	south (SO)	-	-.101 (.26)	-.02	-.055 (.14)	-.01
	north * winter (NO*WR)	-	-.018 (.04)	-.01	.149 (.29)	.05
L_{it}						
	mediation (ME)	-	.503** (3.02)	.22	.450** (2.74)	.19
	injunction (IJ)	?	-.123 (.65)	-.04	-.096 (.51)	-.04
	permissive law (PL)	+	.471** (2.48)	.17	.566** (3.04)	.22
	R		.52		.49	
	R^2		.27		.24	
	F		2.32**		2.72**	
	n		205		205	

NOTES: SZ was divided by 1,000 so that significant digits could be reported
t-scores are reported in parenthesis ( ) under each of the coefficients
* means significant at the .10 level or better
** means significant at the .05 level or better
See Appendix B for sources and variable means

differently from CM, OTH, the other, or catchall occupational category, is a measure which also represents, to a large extent, the existence of combined units.

Coefficients of multiple determination (R^2=.27 and R^2=.24) were generated for the two equations, respectively. This compares favorably with the explanatory power of the four year pooled regression for 1968-1971 obtained in the Burton-Krider study.[6] In that study, an R^2 of .10 was reported. The regressions also had F scores which were also significant at the 99% level of confidence. Note, however, that due to missing values for some of the variables, tests of significance were based on 205 and not 412 cases.

While the expected signs on some of the coefficients were not predicted by the model, a number of variables were significant at the .05 level or better in at least one equation. These included coefficients on labor costs (WB), hospital strikes (HOS), transportation strikes (TRN), firefighter strikes (FIR), police strikes (POL), sanitation strikes (SAN), street and highway strikes (STR), other employee strikes (OTH), union support (US), northern strikes (NO) and mediation (ME). The signs found on FIR, NO and ME were not, however, predicted by the theoretical model developed in Chapter 3.

Perhaps most surprising was the finding of a coefficient on mediation (ME) which was positive and significant at the .01 level or better. There is no reason

to believe, based on this relationship alone, that mediation contributes to a lengthening of public employee strikes. In many cases, mediators may only become involved in the most militant strikes. In light of their importance from a public policy point of view, the performance of ME and the other L_{it} variables will be analyzed in Chapter 5.

As observed, prior work on strikes has suggested that noneconomic considerations may be more important determinants of strike duration than economic factors. The three significant variables with unexpected signs--firefighter strikes (FIR), north (NO), and mediation (ME)--were all associated, however, with noneconomic vectors. Further, among the 22 variables considered in the bargaining vector (B_{it}), the labor relations environment vector (P_{it}), the legal vector (L_{it}) and the control vector (C_{it}), less than half were significant in one or both of the regressions. Given the contradiction between the positive results for the variables in these vectors which were anticipated, and the discovery of many insignificant coefficients, it is appropriate to discuss first the performance of the variables in vectors B_{it}, P_{it}, and K_{it}.

The B_{it} Variables

In view of the relatively small number of strike occurrences for many of the employee groups (see Appendix B), the performance of the eight "employee type" variables

needs to be considered when using the 558 sample of cases. Note that because all variables (with the exception of CM) were included in Table 1, tests of significance were based on a sample of 412 cases. The sample size was reduced as a result of merging the economic data drawn from the census data files.

Two additional equations are thus reported in Table 2. Variables entered in this equation were drawn primarily from the BLS data source. The first considers the impact on duration, S_{it}, of the "employee type" variables. This is illustrative, since the predictors which have strong correlations with the "employee type" variables were associated with the omitted C_{it}, the political and economic constraints vector. The second regression considers the impact of NS, the inessentiality index, and CM. Tests of significance for the Table 2 regressions are based on 514 and 444 observations, respectively. Relative to the results for the 205 strike samples reported in Table 1, this narrows the interval required for predictors to be significant.

The "employee type" control group is represented by instructional and noninstructional employees in education. A positive sign on any of the eight "employee type" variables means that holding strikes by all other groups constant, this group experienced longer strikes relative to the length of strikes in education.

Generally speaking, the evidence in Tables 1 and 2

suggests that strikes in education are not longer than strikes initiated by most other employee groups. For this to be true, the signs on the "employee type" variables should be negative. Instead, most signs are positive. The expectation that strikes in education should be longer than strikes initiated by other, more essential "employee groups" such as firefighters or the police appears to merit reevaluation.

Significant, positive coefficients were found in the equation seen in Table 1 for variables POL (police strikes), STR (street and highway strikes), HOS (hospital strikes), SAN (sanitation strikes), TRN (transportation strikes), FIR (firefighter strikes) and OTH (strikes by other employee groups). Prior findings which supported the prediction of a positive sign on HOS and SAN appear to be confirmed. According to these results, strikes by hospital workers are somewhat longer relative to strikes which occur in education. The sign and significance for SAN is comparable in direction and significance to Burton and Krider's results.[7]

Conclusions based on these results alone must be considered tentative. Only 23 strikes among sanitation workers occurred during the period of this analysis, and a scant 8 strikes were found among hospital workers. Without the support of positive relationships in prior studies, one would be prone to conclude that these findings are, in and of themselves, inconclusive.

TABLE 2. The prediction of strike duration (S_{it}) when excluding variables drawn from the merged Census data source (The 558 Sample)

Vector	Variable	Expected Sign	Coefficient	Beta	Coefficient	Beta
E_{it}						
	wage change (CE)	+	.876 (1.30)	.06	1.130 (1.58)	.07
B_{it}						
	size (SZ)	+	.022 (.67)	.03	.000 (.62)	.03
	inessentiality (NS) index	+			-.094 (1.11)	-.05
	police strike (POL)	?	-.077 (.34)	-.01		
	sanitation strike (SAN)	+	.064 (.28)	.01		
	other strike (OTH)	+	.047 (.40)	.02		
	hospital strike (HOS)	+	.586 (1.60)	.07		
	street and highway (STR) strike	?	-.041 (.18)	-.01		
	transportation (TRN) strike	?	.854** (2.98)	.13		
	welfare strike (WEL)	?	-.033 (.11)	-.01		
	firefighter strike (FIR)	-	.038 (.14)	.01		
	combined unit (CM)	+			.209** (2.05)	.09
P_{it}						
	first negotiation (FN)	+	-.105 (.71)	-.03	-.105 (.67)	-.03
	union support (US)	+	.596** (3.03)	.13	.551** (2.64)	.12
	wage issue (EC)	+	.226** (2.26)	.10	.237** (2.22)	.10
	benefit issue (SB)	+	-.347 (1.29)	-.05	-.296 (1.02)	-.05
K_{it}						
	winter (WR)	-	.094 (.33)	.03	.051 (.16)	.02
	rural (RU)	-	-.111 (1.13)	-.05	-.141 (1.35)	-.06
	north (NO)	+	-.347** (2.62)	-.13	-.348** (2.48)	-.13
	south (SO)	-	-.076 (.32)	-.01	-.025 (.10)	-.00
	north * winter (NO*WR)	-	-.020 (.06)	-.01	.056 (.17)	.02
L_{it}						
	mediation (ME)	-	.480** (4.68)	.21	.476** (4.40)	.20
	injunction (IJ)	?	-.080 (.68)	-.03	-.080 (.64)	-.03
	permissive law (PL)	+	.640** (5.83)	.25	.672** (5.72)	.27
	R		.47		.46	
	R^2		.22		.21	
	F		6.19**		6.99**	
	n		514		444	

NOTES: See Table 1

The only coefficient among the eight "employee type" variables which was significant in both Table 1 and Table 2 was TRN (transportation strike). This was surprising, since an a priori prediction was not possible for this variable. With only 14 strikes in the sample, this finding could be a function of sampling error. It is interesting, however, that TRN is significant at the 99% level of confidence in both regressions. Bus drivers and other transit workers may be more inclined to wait longer for a settlement which compares favorably with the earnings obtained by their private sector counterparts. This finding may also be influenced by the impact of the New York City transit strikes during this period.

It is interesting that the positive and significant coefficients on FIR (firefighter strike), SAN (sanitation strike), POL (police strike), STR (street and highway strike) and OTH (other strike) became insignificant in Table 2. Signs on STR and POL were even negative. One possible explanation lies in the relationship seen between these variables and two of the variables associated with the C_{it} vector, SL (fiscal slack) and TB (the local tax burden index). The correlations between FIR, SAN, POL, OTH, STR and SL are positive and significant (r=.17, r=.20, r=.11, r=.40, and r=.19 respectively). On the other hand, correlations between these variables and TB are negative (r=-.23, r=-.08, r=-.07, r=-.11, and r=.02) and, in many cases, significant.

Since many of the "employee type" variables are inversely correlated with TB, the omission of TB from the Table 2 regressions means that these variables are probably picking up some of its variation. Thus, the positive association between "employee type" variables and strike duration is probably being reduced when TB is excluded. Note that the strong positive correlations between the "employee type" variables and slack (SL) also infers that there is a strong negative correlation between the omitted "employee type" variable (education strikes) and SL. This correlation was r=-.71. One inference that can be drawn from this is that noneducation public employees may have an incentive to target strike actions against employers which have a greater capacity to make concessions. If the strike decision is a rationally determined process, then one would expect to see local labor organizations strike jurisdictions which extract a relatively low level of local taxes versus total revenues, and who have a relatively high degree of "slack." As discussed in Chapter 3, the SL variable (the proportion of personnel expenditures as a component of total revenues received) is the variable in this study which most closely proxies the employer's ability to pay.

The relatively strong association between the slack measure and the noneducation employee type variables may be partly explained by the fact that noneducation union locals take relatively independent action with respect to the

decision to strike. The National Education Association (NEA), the sponsor of the largest number of public employee strikes during this period (256 out of 558), on the other hand, has conducted a more centrally coordinated bargaining strategy. In states such as Michigan, the NEA establishes a contract pattern that is used as a standard against which to evaluate the progress of negotiations with all school districts. Districts with a greater capacity to make concessions, with a higher degree of slack (SL) and a lower tax burden (TB), are more likely to settle before strike action is necessary. Districts with relatively less capacity to make concessions (or having less slack and a higher tax burden) may thus be more likely to have strikes.

An alternative explanation for the strong relationship between the "employee type" variables and both the slack and the tax burden variables is as follows: the proportion of nonlabor costs to total revenues across all school districts which both take and avoid strikes is lower than for jurisdictions employing noneducation personnel. Further analysis, outside the scope of this study, would be necessary to verify this alternative explanation.

The coefficient on WEL in Table 1 is positive, but not significant at the .10 level or better. Its sign in Table 2 is reversed. It also has a low beta weight (-.01). This seems to confirm the expectation of an ambiguous sign on this variable. With only 13 welfare strikes (see

Appendix B), this finding is contaminated with considerable sampling error.

In contrast to confirmatory findings for signs on SAN, OTH, HOS and WEL, the negative sign on NS, the inessentiality index, was unexpected. Recall that less essential employee groups were assigned the higher number. A positive sign had therefore been predicted for the NS variable. In the Table 1 results, NS also has a relatively large absolute beta (-.13) compared to the betas seen on other variables in this same equation. Findings for the "employee type" variables in the first regression are also consistent with this result, since strikes in education were categorized in Chapter 3 as the least essential employee group, NS=3.

The construction of the dependent strike duration measure (S_{it}) was weighted in favor of the more essential employee groups (firefighters, police, and hospital workers) since these groups provided services to the community on a continuous basis. The duration of the strike for these groups was defined as the calender duration of the strike. To a degree, this would have biased the finding of an inverse relationship between NS and S_{it}.

The provision in many state laws for compulsory arbitration of firefighter and police strikes has apparently reduced their frequency. The negative sign on NS suggests, however, that once firefighter and police strikes are initiated, there is no reason to believe that their duration

will necessarily be shorter than strikes by teachers or other, less essential employee types.

It is not unreasonable necessarily to find longer strikes among more essential employee groups. Employers would have a greater incentive to identify a readily available means of providing substitute services if an essential employee group has struck. Strike replacements, or even the enhanced credibility of the threat of hiring replacements, could lengthen a strike as labor and management become less amenable to compromise in the process.

The performance of the size variable (SZ) was positive, as predicted, but not significant. The failure of size to influence strike duration significantly has also been found in four previous studies. Two of these studies constituted an examination of strikes in the private sector. The other two studies used non-education public employees as the unit of analysis.

Britt and Galle found that the zero order correlation between strike extensivity (or duration) and average union size was not significant across eighteen broad industrial categories.[8] This analysis included strikes in both manufacturing and nonmanufacturing industries. In an extension of this work, Stern found negative and insignificant signs on plant size and average union size variables which were considered as predictors of strike duration.[9]

In their study of public employee strikes discussed in Chapter 2, Burton and Krider found that a proxy for work

group size, the percentage of employment in cities over 50,000, was both negative and insignificant in a four year pooled regression for 1968-1971.[10] In a replication of the Burton and Krider study that considered a more recent period (1974-1975), a negative and also insignificant sign was found on a size variable.[11]

Is size really unrelated to strike duration? Since our hypothesis suggests there should be a relationship, it is possible that SZ is not linearly, but curvilinearly related. Because of their enhanced bargaining power, very large units may actually have shorter strikes. Certainly strike replacements would be difficult to recruit. One would also expect to find greater sophistication in the bargaining skills of both labor and management. A respecification of the basic model thus considers SZ^2, in addition to SZ, as predictors of S_{it}. These results are presented in two regressions found in Table 3. The first regression uses the same model specification as seen in Table 1 (the 412 sample). The second regression is similar to the model specification used in the Table 2 regressions (the 558 sample).

Since NS represents a common characteristic of all employee groups, it is entered in the Table 3 regressions in lieu of the eight "employee type" variables. This eliminates much of the multicolinearity among the predictors which was evident in the regressions reported in Table 1 and as evident in the correlation matrix reported

TABLE 3. Regression results for S_{it} which consider a curvilinear specification for size

Vector	Variable	Sign	The 412 Sample Coefficient	Beta	The 558 Sample Coefficient	Beta
E_{it}						
	wage change (CE)	+	1.057 (.95)	.07	1.102 (1.56)	.07
	wage level (RE)	+	.073 (.19)	.01		
	internal comparison (EV)	+	.017 (1.37)	.09		
C_{it}						
	labor cost (WB)	?	.006* (1.95)	.21		
	units (NU)	+	-.006 (.50)	-.04		
	slack (SL)	?	.972 (1.43)	.14		
	tax burden (TB)	?	.058 (.39)	.03		
B_{it}						
	size (SZ)	+	.294** (2.09)	.37	.312** (3.51)	.39
	size^2 (SZ^2)	-	-.00002** (2.10)	-.36	-.00002** (3.55)	-.39
	combined units (CM)	+			.215** (2.13)	.09
	inessentiality (NS) index	+	-.229 (1.44)	-.13	-.128 (1.51)	-.07
P_{it}						
	first negotiation (FN)	+	-.127 (.54)	-.04	-.099 (.64)	-.03
	union support (US)	+	.609* (1.95)	.13	.515** (2.50)	.11
	wage issue (EC)	+	.271* (1.67)	.12	.261** (2.48)	.11
	benefit issue (SB)	+	-.409 (.93)	-.06	-.256 (.90)	-.04

Vector	Variable	Sign	The 412 Sample Coefficient	Beta	The 558 Sample Coefficient	Beta
K_{it}						
	winter (WR)	-	.048 (.10)	.02	.089 (.29)	.03
	rural (RU)	-	-.123 (.74)	-.05	-.083 (.79)	-.03
	north (NO)	+	-.386* (1.80)	-.15	-.330** (2.37)	-.13
	south (SO)	-	-.111 (.29)	-.02	-.063 (.25)	-.01
	north and winter (NO*WR)	-	.106 (.21)	.03	.019 (.06)	.01
L_{it}						
	mediation (ME)	-	.437** (2.68)	.19	.450** (4.21)	.19
	injunction (IJ)	?	-.105 (.57)	-.04	-.093 (.76)	-.03
	permissive law (PL)	+	.606** (3.24)	.24	.719** (6.17)	.28
	R		.51		.48	
	R^2		.26		.23	
	F		2.85**		7.50**	
	n		205		444	

NOTES: See Table 1.

in Appendix C.

The evidence reported in Table 3 lends support to this respecification. Each of the regressions explain approximately one-fourth of the variation in S_{it}. SZ is a significant, positive predictor of strike duration when one controls for the possibility that larger units, because of their enhanced bargaining power, have shorter strikes. This is seen by the negative and significant coefficients on SZ^2 in both regressions. The coefficients on SZ and SZ^2 are both significant at the .01 level. Their beta weights also are comparable in magnitude. Previous studies which demonstrated the absence of a significant relationship between size and strike duration may have failed to identify a relationship because of the assumption that the relationship was linear.[12]

The magnitude of the beta coefficient seen on WB (labor cost) in Table 1 is reduced considerably in the Table 3 regression (from .46 to .21). Some of the variation explained by WB variable in Table 1 is apparently now being captured by the size variables (SZ and SZ^2). WB, however, remains significant.

Turning to the final variable in the B_{it} vector, significant, positive coefficients can be seen on combined units variable (CM) in Table 2 and in the Table 3 regression. As expected, it appears to take longer to settle strikes initiated by more heterogeneous units.[13] There are more issues to be settled. Compromises made at

the bargaining table may also take longer to sell to the union membership. In addition, note that controlling for SZ and SZ^2, the strength of the positive relationship between combined units (CM) and strike duration does not diminish. It has a beta in both equations of .09.

The P_{it} Variables

As expected, US, union support for the work stoppage, has a positive sign in the six regressions reported in Tables 1 through 3. The consistency of this performance is strengthened by a significant coefficient at the .05 level or better in five of the six regressions reported. The absence of international or national union support for a work stoppage does apparently mitigate determination among a local union membership to obtain the desired settlement. The employer may also perceive the absence of union support for the strike as sufficient justification for "holding fast." Little or no movement by an employer during negotiations, dissipating interest among the local union membership, and the ineligibility to receive strike benefits may all be factors which contribute to shorter strikes, other considerations held constant.

The wage issue variable (EC) also exhibited a positive performance, as expected. This variable is more significant, however, in regressions which omit C_{it} variables. EC represents the fact that workers are striking primarily

over wage issues. The reason that economic considerations became an issue may be caused by the difficulty in identifying the revenues needed to fund the concessions which were demanded. A more salient, stable predictor of duration may be the financial condition of the employer taking the strike. The combined effect between EC and two of the variables in the C_{it} vector (slack and tax burden) was insignificant.[14]

The performance of SB, the supplementary fringe benefits variable, was also consistent across model specifications, but its sign was unexpected. As a variable which represents a specific type of economic concern, SB was expected to be positive. These results suggest that a union membership may be willing to strike longer when the issue relates to the magnitude of the weekly (or monthly) paycheck than when it relates to other, supplemental benefits. Employers may also be more willing to compromise when disputes concern fringe benefits.

This is because cost savings accrue when group benefit programs for health, dental or life insurance are established. As a general rule, the larger the employee group serviced with a group fringe benefit, the greater is the economies of scale. The strength of the relationship is relatively weak, however, and the number of observations (see Appendix B) makes interpretation for this variable also subject to considerable qualification.

The last variable in the P_{it} vector, FN, the

"first negotiation" variable, also exhibited a consistent performance across the six equations reported in Tables 1 through 3. Its negative signs, however, were insignificant. Further, a positive sign had been predicted. This suggests that during the recognition campaign, many of the more difficult issues may have been resolved. As a general rule, both employer and union appear to be no more (or less) willing than better established units to execute a first agreement and proceed with administering the new contract.

Given the insignificance of FN, there is no reason to think that strikes occurring during first negotiation rounds will necessarily be shorter. This evidence, however, does question the general proposition that strikes which occur during the negotiation of first agreements should be longer relative to the duration of strikes occurring during subsequent negotiation rounds.

The K_{it} Variables

Among the five variables included in this vector, only one, North (NO), was significant and its sign not expected. Holding strikes in southern states constant, the evidence reported here suggests that strikes in northern states are shorter than strikes occurring in other regions of the country. Contrary to expectations, this is consistent with the proposition that bargaining units with a longer (and therefore more mature bargaining history) may be able

to resolve their differences more expeditiously. This qualifies the conclusion based on the results seen on FN that the length of the bargaining relationship is not a relevant factor.

WR, the variable which represents the occurrence of a strike during the winter quarter, was positive in the six equations presented, but it never attained significance. In preliminary analyses of the data, season appeared to be a more relevant predictor of the type of employee most likely to initiate a strike. For instance, a positive correlation was found between street and highway strikes (STR) and the winter (WR) (r=.17) as well as between education strikes and fall (r=.38). Organized workers would be expected to prefer strikes during the season that they think would cause the most inconvenient disruption in service delivery. A more exhaustive examination of this possibility is outside the scope of this study. It is significant to suggest here that no significant or predictable relationship was found between WR and duration.

The sign on SO (South) was also consistent. It was negative in the six regressions reported, but never attained significance. This is consistent with a priori expectations, but its contribution to the explanatory power of the model is miniscule. Not a large number of strikes actually occurred in south during 1977-1978, so little weight can be given to this result.

Consistent with the insignificant performance of

WR, the interaction term NO*WR (strikes occurring during winter in the north), is negative twice and positive four times in the regressions reported. This variable is also never significant. Apparently there are other, more salient factors which affect the duration of public employee strikes than season.

Finally, the signs of rural (RU) were negative, as predicted, but never became significant. As one would expect, strikes in rural areas were slightly shorter than strikes in more populated areas, but there is no evidence that this effect is significant. Organized workers in rural areas who have opted for strike action may simply be more militant than has been acknowledged in previous studies. While this variable is a weak predictor of duration, RU could be a more salient determinant of strike frequency.

It is also interesting that the magnitudes of the beta weights on RU drop slightly when it is entered in regressions having a curvilinear specification for the size (SZ^2). In the Table 3 regressions, it has a slightly lower significance level than in Table 1 or Table 2. Controlling for size, it is not surprising that RU becomes less significant. One justification for the prediction of its negative sign was the fact that rural communities tend to be smaller and more highly interconnected. This is being captured, to a degree, by SZ and SZ^2.

The C_{it} Variables

The Insignificance of the Number of Units Variable

Perhaps the most unexpected result among the four variables associated with the C_{it} vector was the negative sign on NU, the number of bargaining units. Recall that a positive sign had been predicted. This expectation was based on the assumption that the employer should be the primary actor affected by the number of units that are recognized to bargain collectively.

A greater number of units may, on the other hand, be also a reflection of the enhanced bargaining power of organized labor in the jurisdiction taking the strike. NU has a strong negative correlation with RE (r=-.25), the ratio of comparable employee earnings with the earnings of the striking bargaining unit. Earnings levels in jurisdictions with a relatively large number of bargaining units appear to be higher relative to the earnings of their comparable counterparts. With a greater comparative earnings advantage, there may be less incentive for labor to conduct long strikes which may ultimately yield only modest concessions. The fact that NU also represents the degree of bargaining leverage held by labor has apparently moderated the positive sign expected on NU.

This analysis has thus far considered strikes initiated in all types of jurisdictions. Many jurisdictions,

however, have few bargaining units. This is especially true of school districts and special districts.

A second possible explanation for the insignificance of NU may be that no relationship was found because of a failure to control for differences in the type of governments taking a strike. The effect that the number of units has on the duration of strikes in school districts may be quite different from the effect found in counties and cities. Accordingly, separate regressions were run which considered the duration of strikes occurring in cities, town and counties.[15] In this analysis, the mean value of NU is increased.

This analysis is important for comparative purposes. As discussed in Chapter 2, much of the previous work on the duration of public employee strikes has selected non-education employees as the primary unit of analysis. A consideration of the performance of the variables used in this study can then be compared with the results obtained in previous studies.

The Duration of Strikes in Towns, Counties and Cities

The results of this analysis are reported in Table 4. In the left column regression, all variables which were found in previous analyses to be insignificant were omitted. In the right column regression, all predictors which were subsequently found to be insignificant were

omitted. "Employee type" variables, however, were also included in the second regression.

These results show no appreciable change in the significance of the number of units (NU). Its sign became positive, but its beta weight was .00. This evidence, combined with the results for NU seen in Tables 1 and 3, suggests that the number of bargaining units may not have a direct effect on the duration of public employee strikes. There probably are, however, important indirect effects.

Although NU contributes little to the explanatory power of the model, these regressions report higher coefficients of multiple determination than were seen in Tables 1, 2 or 3. The first regression reports an R^2 of .32, while the second has an R^2 of .31.

In comparison to the explanatory power of the Burton-Krider regression results (r^2=.10), a study which also considered non-education strikes, the explanatory power of the variables in this regression, and the relative consistency of their performance, were better.[16] The coefficients of multiple determination reported in Table 4 were, however, comparable to a study which recently replicated the Burton-Krider model by analyzing 1974-1975 strikes. When using days idle as the dependent variable, this replication study reported an R^2 of .28.[17] The most consistent finding across all three studies was the discovery of a negative and insignificant sign on the size variable (SZ). SZ^2 was also insignificant. In comparison

TABLE 4. The prediction of the duration of strikes occurring in cities, towns and counties

Vector	Variable	Expected Sign	Coefficient	Beta	Coefficient	Beta
E_{it}						
	wage change (CE)	+	1.498 (1.23)	.11	.765 (.60)	.05
C_{it}						
	labor cost (WB)	?	.020** (3.57)	.37	.023** (4.07)	.43
	units (NU)	+	.000 (.03)	.00		
	slack (SL)	?	2.172** (2.12)	.21	2.738** (2.76)	.26
	tax burden (TB)	?	-.209 (1.19)	-.12		
B_{it}						
	size (SZ)	+	-.063 (.19)	-.06		
	size^2 (SZ^2)	-	-.000 (.11)	-.03		
	inessentiality (NS) index	+	-.180 (1.16)	-.12		
	firefighter strike (FIR)	-			.426 (.95)	.09
	police strike (POL)	?			.578 (1.40)	.13
	sanitation strike (SAN)	+			.882 (1.95)	.19
	other strike (OTH)	+			.374 (1.57)	.16
	hospital strike (HOS)	+			.893 (1.48)	.13
	street and highway (STR) strike	?			.185 (.48)	.04
	transportation strike (TRN)	?			1.650** (2.58)	.23
	welfare strike (WEL)	?			.147 (.29)	.03
P_{it}						
	union support (US)	+	.931** (2.57)	.22	.724** (2.04)	.17
	wage issue (EC)	+	.091 (.46)	.04		
K_{it}						
	north (NO)	+	-.371 (1.65)	-.15		
L_{it}						
	mediation (ME)	+	.227 (1.09)	.10		
	injunction (LJ)	?	-.306 (1.22)	-.11		
	permissive law (PL)	+	.865** (3.44)	.31	.760** (3.14)	.27
	R		.57		.55	
	R^2		.32		.31	
	F		3.46		3.46	
	n		116		116	

NOTES: See Table 1

to the mean size of the 558 bargaining units which initiated a strike, the mean size of bargaining units which struck city, town, and county jurisdictions was reduced considerably (from 406 employees to 254 employees). By deleting from consideration teacher strikes, previous studies may also have eliminated from consideration the effect of the larger units. Having contrasted the results obtained when excluding the duration of strikes in school districts and special districts, the results obtained on the other variables as reported in Tables 1, 2, 3 and 4 are presented below.

The Performance of Other Variables in the C_{it} Vector

In both regressions seen in Table 4, SL, the slack variable, attained significance at the .05 level or better. This is contrasted to the insignificant, but positive signs found in previous regressions reported in Tables 1 and 3. Although never significant, SL had relatively strong betas (.08, .12, .14, and .21) in prior equations. Moreover, this finding is consistent with the argument that while it may be strategically advantageous for labor organizations to strike employers who have a greater capacity to award concessions, this may result in longer strikes. The greater the component of non-labor costs to total revenues, the greater is the size of the economic pie over which labor and management have to haggle. With the prospect of gaining (or losing) more as a result of the final contract, there

should be a greater incentive to wait the other side out.

TB, the local tax burden measure, was positive, but not significant in the 3 regressions found in Tables 1 and 3. It was negative in the Table 4 regression. The negotiation of contracts during a strike may thus be more directly affected by public pressure when they occur in cities, towns and counties than in school districts. This is because school districts serve a dispersed, more heterogeneous voting public. This offers one explanation for the finding of a negative sign on TB in Table 4.

The finding of insignificant coefficients on TB in all four regressions can be explained by the possibility that two countervailing effects are present. The strike may tend to be longer because employers are less willing to compromise if concessions can be made only at the expense of increased tax assessments for an already heavily taxed public. Labor, on the other hand, may recognize public resistance to accepting an increased tax burden and thereby become less adamant at the bargaining table. The theoretical model in Chapter 3 suggested that the sign on TB was indeterminant. Empirically, this appears to be verified.

The final variable in this vector, Labor Cost (WB), exhibited a strong and significant positive performance across all regressions seen in Tables 1 through 4. It was significant at the .05 level or better in four out of five regressions. The WB beta ranged from .21 to a value of .46. Viewed as a constraint on the employer's ability to

make concessions, the proportion of the labor costs of the strikers to total labor costs is thus associated with longer strikes. When labor costs are high, the employer has good reason to be more hesitant to compromise. Revenues necessary to support higher wages would certainly be expected to be more difficult to identify when large numbers of workers are involved.

There is also an incentive to take a long strike because of the greater net savings to the employer. Property tax and intergovernmental transfer revenues are unaffected by public employee strikes, but expenditures are temporarily interrupted. The resultant savings for an employer when large units strike can be formidable.

Strikers who comprise a relatively small component of labor costs may also be in a more advantageous bargaining position, since the employer can more readily make concessions without also accepting a difficult financial burden. According to these results, the magnitude of these labor costs appear to be a more important factor than the type of employee group who struck.

The E_{it} Variables

All three variables associated with the E_{it} vector, CE (the change in mean earnings of other, comparable employee groups), RE (the ratio of the earning of comparable employee groups to the earnings of the strikers), and EV

(the change in the mean earnings of all other employee groups working for the same employer relative to the mean change in earnings of the striking bargaining unit), had positive, but insignificant signs in the regressions presented in Tables 1 through 4. In the initial construction of these measures, they were all expected to represent the level of expectations held by the bargaining unit which elected to strike. Thus, the fact that none of these coefficients were significant may be due to the fact that when entered in regressions together, they are competing with one another to explain the same variation in S_{it}, the dependent variable. Accordingly, each of these three variables are entered separately in a regression with other predictors found to be significant in the previous analysis. These results are presented in Tables 5 and 6.

Table 5 presents regression results when CE and EV are introduced separately into equations with the other significant predictors. Table 6 presents the regression coefficients when introducing RE (and not CE and EV) and when omitting all three E_{it} variables.

In none of these regressions do the significance levels, the magnitude of the coefficients, or the size of the beta weights on the other predictors change as a result of the introduction of CE, RE or EV. In addition, the explanatory power of the regression which omits the three E_{it} variables in Table 6 has an R^2 which is comparable in magnitude to the coefficients of determination found in

the other regressions.

The EV coefficient, while still insignificant at the .10 level, exhibits the strongest performance of all three variables. Employees would be expected to be well acquainted with earnings concessions awarded to other workers employed by the jurisdiction. This variable unexpectedly exhibited considerable variation. This suggests that a bargaining unit which has elected to strike may have received no pay adjustments for a considerable period before the actual strike. Unable to settle on a contract, the employer may be hesitant to award even minimal increases because of the concern that it might diffuse his bargaining leverage.

Thus, rather than capturing merely the extent to which an employee group may have experienced a loss or gain in earnings relative to other employee groups, this variable also picks up the fact that earnings concessions may not have been awarded to the employees who struck for a number of months before the strike. With a settlement held in abeyance as negotiators become more and more frustrated, the level of discontent among the bargaining unit membership would be expected to become intensified.

Public employee strikes do not necessarily occur shortly after the termination of an existing contract (if one exists). Employees may be willing to linger on for months working under the conditions set forth in an expired contract. The delay between the expiration of the

TABLE 5. The prediction of strike duration when considering the independent effects of CE and EV

Vector	Variable	Expected Sign	Coefficient	Beta	Coefficient	Beta
E_{it}						
	wage change (CE)	+			.925 (1.12)	.06
	wage level (EV)	+	.017 (1.64)	.09		
C_{it}						
	labor cost (WB)	?	.005** (2.31)	.19	.006** (2.70)	.21
	slack (SL)	?	1.013* (1.91)	.14	1.191** (2.39)	.17
B_{it}						
	size (SZ)	+	.311** (2.79)	.39	.323** (3.10)	.40
	size^2 (SZ^2)	-	-.00002** (2.81)	-.37	-.00002** (3.09)	-.40
	inessentiality (NS)	+	-.250** (2.10)	-.14	-.213* (1.85)	-.12
P_{it}						
	union support (US)	+	.539** (2.11)	.12	.537** (2.23)	.12
	wage issue (EC)	+	.299** (2.39)	.13	.284** (2.42)	.12
L_{it}						
	mediation (ME)	-	.414** (3.13)	.18	.424** (3.39)	.18
	permissive law (PL)	+	.627** (4.30)	.25	.597** (4.27)	.24
R			.48		.47	
R^2			.23		.23	
F			8.11		8.93	
n			283		318	

NOTES: See Table 1.

TABLE 6. The independent effect of RE

Vector	Variable	Expected Sign	Coefficient	Beta	Coefficient	Beta
E_{it}	internal (RE) comparison	+	.039 (.14)	.01		
C_{it}	labor cost (WB)	?	.006** (2.62)	.20	.006** (2.63)	.20
	slack (SL)	?	1.147** (2.30)	.16	1.143** (2.30)	.16
B_{it}	size (SZ)	+	.327** (3.06)	.41	.324** (3.10)	.40
	size^2 (SZ^2)	-	-.00002** (3.08)	-.40	-.00002** (3.09)	-.40
	inessentiality (NS)	+	-.243** (2.16)	-.14	-.242** (2.16)	-.14
P_{it}	union support (US)	+	.541** (2.23)	.12	.538** (2.23)	.12
	wage issue (EC)	+	.282** (2.38)	.12	.281** (2.38)	.12
L_{it}	mediation (ME)	-	.422** (3.36)	.18	.421** (3.37)	.18
	permissive law (PL)	+	.619** (4.43)	.25	.623** (4.52)	.25
	R		.47		.47	
	R^2		.22		.22	
	F		8.77		9.77	
	n		318		318	

NOTES: See Table 1

contract and the initiation of the strike is not uncommon among teachers who have been known to continue working over one year after the expiration of a contract before striking. The EV variable may thus have been more significant because of the greater discontent that would have been expected to build up among teachers as well as other employee groups who worked without a contract for a number of months. In a separate analysis of teacher strikes not reported in this study, EV was both positive and significant.

While RE has consistently been positive in all regressions reported in this chapter, it has also always been insignificant. Based on these findings, employers may be less concerned about the prospective length of a strike if the earnings previously paid to the strikers have fallen considerably behind the earnings awarded to other, comparable employees. Similarly, there is no reason, based on these results, for employers paying better than average wages to be optimistic that the duration of a strike, if one occurs, will necessarily be shorter. Other factors apparently are more important once the strike has begun.

The performance of these variables is also affected by the fact that only the most militant employee groups have been selected for examination. This reduced the variation in the expectation variables (E_{it}) relative to the variation for the same variables when considering

all bargaining units having recognition. As a direct result of this selection bias, fewer causal relationships are apparent from an examination of the correlation matrix found in Appendix C.

Moreover, these expectation measures are probably better predictors of strike frequency than of duration. It is interesting that a similar conclusion was reached in a replication of the Burton-Krider strike model[18] for the years 1974-1975. In this study[19], an alternative specification for an expectation measure, the ratio of change in private sector earnings to the change in public sector earnings, was found to be a more significant predictor of strike frequency and strike breadth than of strike duration.

Some Concluding Considerations

The summary results seen in the Table 6 regressions suggest there is still much to be learned about the determinants of strike duration. Note that among the nine variables considered in the second regression, two (WB and SL) had signs which a priori were indeterminant. One variable (SZ^2) was not included in the development of the theoretical model. Two of the variables found to be significant (ME and NS) had signs which were predicted to lie in the opposite direction.

The vector, K_{it}, was introduced so that factors not captured by the other vectors could be controlled. None of these variables were found to be significant enough to be included in the Table 5, 6 or 7 regressions. Some expected findings, but many unexpected results, were generated. This is not a negative signal, since it may be just as important in this stage of the early development of public employee strike theory to identify irrelevant factors as it is to identify significant ones. After many of the less important predictors of strike duration were omitted in Tables 5, 6 and 7, it is interesting that the explanatory power of these regressions was not that different from the coefficients of determination found in Table 1.

On the positive side, the significance of all of the regressions was high, as seen by the F scores. Many of the predictors behaved consistently, regardless of the model specification. The explanatory power of the regressions ranged from one-fourth to one-third of the variation in the dependent variable.

From a public policy point of view, the factors identified by the variables in the C_{it}, B_{it}, and P_{it} vectors can not be affected by public policy once a strike has begun. The variables in the L_{it} vector, however, do represent options that are available to employers in the event a strike occurs. The purpose of Chapter 5 is to examine further the implications of the results reported

in Tables 1 through 4 on these public policy variables.

Footnotes (Chapter 4)

1
Recognition strikes, strikes occurring during the term of the agreement, and wildcat strikes accounted for only about 15% of all reported strike occurrences in the public sector. These strikes are excluded from the analysis since they are much more likely to be symbolic protests to the public rather than a result of an interest in obtaining better concessions. See, for instance, Ronald W. Glass, "Work Stoppages and Teachers: History and Prospect," Monthly Labor Review, Vol. 90, No. 8 (August, 1967), pp. 43-46.

2
Census officials have reported considerable difficulty in identifying whether bargaining units at the state level of government are organized across occupational lines, or cut across departmental structures.

3
Eighteen of the 558 strikes were not continuous events. In some instances workers struck for a day or more, decided to return to their jobs, and then soon thereafter initiated subsequent strike actions. This was defined as a single strike event. All days of idleness for the same bargaining unit were summed together to reflect the total work days lost. Strikes occurring during the final two and one-half months of 1978 were deleted because matched jurisdiction identification Census numbers and BLS case numbers were not available.

4
Respondents are asked to indicate when the stoppage began and when the employees "returned to work." In calculating the number of work days idled, it is impossible to determine how many days falling within the strike period were holidays, or simply "non-work" days. In determining the number of work days idled, the BLS thus assumes that local jurisdictions observe the same holidays as federal government employees. These are New Year's Day (January 1st), Washington's Birthday (3rd Monday in February), Memorial Day (4th Monday of May), July 4th, Labor Day (1st Monday of September), Columbus Day (2nd Monday of October), Veteran's Day (November 11th), Thanksgiving (4th Thursday of November) and December 25th.

5
This sample of jurisdictions includes all cities which have a population of over 25,000, and all counties with a population over 50,000. Cities and counties with smaller populations were selected on a random basis stratified by geographical area.

6 Robert C. Rodgers, "A Replication of the Burton-Krider Model of Public Employee Strike Activity," Industrial Relations Research Association Series (1981), pp. 241-251.

7 For a discussion of these studies, see Chapter 3.

8 David Britt and Omer Galle, "Industrial Conflict and Unionization," American Sociological Review, Vol. 37 (February, 1972), pp. 53-55.

9 Robert N. Stern, "Toward an Empirical Merger: Sociological and Economic Conceptions of Strike Activity," 28th Annual IRRA Meeting (1975), pp. 58-61.

10 John F. Burton and Charles E. Krider, "The Incidence of Strikes in Public Employment," in Daniel S. Hamermesh, Labor in the Public and Nonprofit Sectors (Princeton, N.J.: Princeton University Press, 1975).

11 Robert C. Rodgers, op. cit.

12 Depending on the strike deflator when states were used as the primary unit of analysis, a day's idle dependent strike measure could also have been adjusted disproportionately when the day's idle variable was divided by the size deflator selected.

13 Although it is impossible to identify from the information obtained on the work stoppage questionnaire whether units were combinations of occupational groups, the BLS codes onto machine readable data files information pertaining to the occupational categories of the strikers. This is drawn from a review of the press reports on the strike by the BLS coding clerks.

14 The interaction terms EC*SL and EC*WB were positive, as would be expected, but their coefficients were not significant at the 99% level of significance. Their beta weights were .03 and .08 respectively.

15 An alternative analytic technique was also considered. Dummy variables were constructed to represent each of the four major jurisdiction types. With school districts as the comparison group, the results were consistent with the regression reported in Table 4. Consistent also with the findings on "employee type" variables was an inverse relationship between the duration of strikes in school districts relative to the duration of strikes in other governmental units.

16 John Burton and Charles Krider, op. cit.

17 Robert C. Rodgers, op. cit.

18 John Burton and Charles Krider, op. cit.

19 Robert C. Rodgers, op. cit.

Chapter 5

Analysis of Public Policy Variables

Two of the variables in the public policy vector, L_{it}, had signs which were consistent with the theoretical model. These were the injunction (IJ) and permissive law (PL). The third variable, mediation (ME), was significant but its positive sign was not expected. This chapter further analyzes these results by considering first the performance of the IJ and PL variables.

Do Court Injunctions Enhance or Deter the Duration of Strikes?

The injunction variable IJ (representing the issuance of an injunction sometime during the course of the strike) had negative coefficients in the Chapter 4 regressions, but it never attained significance. Injunctions sought by employers, presumably, do force strikers back to their jobs earlier than otherwise might have been the case. Initial discussion for this variable suggested that there are reasons for believing that injunctions might both reduce and enhance strike duration. This is why the sign on IJ was predicted to be indeterminant.

No information is available on the duration (if any) of the strike before the injunction was issued. An heuristic assumption for purposes of this analysis was that

employers usually seek injunctive relief shortly after a strike begins. It is important to note, however, that this assumption may or may not be valid. Employers who face unusually long strikes may choose to pursue a court remedy only after all possibilities for a settlement have been explored. Conceivably, this could take two or more weeks. This delay would moderate the magnitude and significance of the sign on IJ.

Unfortunately, data limitations preclude the possibility of disentangling these effects. With this caveat in mind, however, it is worthwhile to explore three additional questions. The effect of the court injunction may vary depending on the presence of compulsory penalty laws, the size of the striking unit, or the type of employee involved. These additional considerations are discussed below.

Do State Compulsory Penalty Laws Make a Difference?

Some states have compulsory penalties for employees who strike illegally. The employer, however, must first request from a judge a cease and desist injunction. Then the court has an obligation under the law to fine the strikers or, depending on the law, their respective bargaining agent. The existence of a state compulsory penalty law, PE (coded equal to 1 for states having a mandatory penalty law and 0 for states without this

provision in their collective bargaining statute), may thus be a significant predictor of strike duration. This possibility was examined in a regression analysis which included PE as well as all of the significant predictors of strike duration identified in Chapter 4.

With an expectation that the sign on the compulsory penalty law variable (PE) should be negative and its coefficient significant, the regression results confirmed a negative sign. Its significance was, however, inconsequential. The coefficient for PE was -.132, its t-score was .59, and its beta was -.03.

Injunctions were considerably less common in states with compulsory penalty provisions in their public employee collective bargaining law than in states which did not have this provision. As shown in Table 7, among states with mandatory penalty laws, ten (10) injunctions were issued during 1977-1978. This constitutes 17% of the total number of strike occurrences in these states. This is actually slightly lower than the proportion of injunctions to the total number of strikes in states which had no compulsory penalty law. This proportion was 20% (95 injunctions issued out of 476 strikes initiated in these states).

The compulsory penalties may have little relationship to strike duration because in practice, employers are no more (or less) likely to seek injunctive relief in states having these laws once a strike has

Table 7. States with and without compulsory penalty laws (PE), by the number of strike occurrences and the number of injunctions issued.
(1977-1978)

States With Compulsory Penalty Laws

State	Number of Strikes	Number of Injunctions Issued
Florida	2	1
Indiana	15	2
Maryland	1	0
Minnesota	16	0
Nebraska	1	0
New York	18	5
Wisconsin	7	2
TOTALS	60	10

States Without Compulsory Penalty Laws

States	Number of Strikes	Number of Injunctions Issued
California	50	9
Connecticut	7	3
Illinois	41	7
Kansas	3	1
Kentucky	3	1
Maine	7	3
Michigan	101	17
Missouri	4	2
New Hampshire	1	1
New Jersey	33	7
Ohio	84	22
Oregon	6	2
Pennsylvania	99	10
Rhode Island	7	3
Tennessee	6	3
Washington	24	4
TOTALS	476	95

Data Sources: U.S. Department of Labor, Labor Management Services Administration, Summary of Public Sector Labor Relations Policies (Washington, D.C., 1979); Commerce Clearing House, Labor Law Reporter; BLS Work Stoppage data file.

actually begun than in states without compulsory penalty laws. This reaffirms the expectation of loose associations between state laws and strike duration. This relationship between PE and strike duration may be insignificant because the law is not being obeyed or enforced.

What accounts for the fact that 50 public employers during 1977-1978 violated state law by neglecting to seek injunctive relief? Strikes may be a preferable option in comparison to alternative forms of worker protest. When workers strike, the conflict is overt. If strikers are forced to return to their jobs, the basic reasons for their original discontent will be unchanged and a new source of resentment will be enflamed. Alternative methods of protest will then emerge, including work slow downs, blue flu epidemics, or even "working to rule." These forms of protest are not explicitly punishable by law.

By avoiding court involvement, employers may be attempting to cultivate or to maintain a more viable relationship with labor. A decision to seek court relief, especially in light of the reluctance of other employers to also see injunctive relief, may strain further what may be an already hardened labor management relationship.

The Relationship Between the Injunction and the Number of Strikers

It has been suggested that the effectiveness of

the court injunction may vary depending on the size of the bargaining unit which has struck. Tom Kochan has suggested that:

> "In general, court injunctions appear to be more effective in ending smaller strikes where the union is weak; they have been less successful in ending larger strikes by more powerful unions."[1]

This possibility was investigated by considering the combined effect of IJ with SZ as well as with SZ^2 on strike duration. These results, controlling for other predictors found to be significantly related to duration, are as follows:

$$S_{it} = .282 - \underset{(-.09)}{.254\ IJ} + \underset{(.32)}{.000254\ SZ} - \underset{(-.31)}{.0000000152\ SZ^2}$$

$$+ \underset{(.34)}{.000456\ IJ*SZ} - \underset{(-.33)}{.0000000271\ IJ*SZ^2}$$

$$(R^2 = .24)$$

The impact on strike duration of the injunction does appear to covary with size, although the interaction terms IJ*SZ and $IJ*SZ^2$ are not significant at the .10 level. Beta weights, reported in parenthesis below each of the coefficients, were relatively large, however. Interpretation of the net effect of the injunction is difficult to ascertain from these coefficients alone.

Table 8 presents a prediction of the net effect

Table 8. The Effect of the Court Injunction on the Duration of the Strike (1977-1978)

Number of Strikers Involved	Proportion of Strikes having a fewer number of strikers	Increase (or decrease) in duration as a result of an injunction (in days)
100	.20	-.75
406	.50	-.40
1334	.67	+4.0
2668	.95	+35.0

of the injunction on strike duration derived from these coefficients. For purposes of comparison, four different "number of strikers involved" were considered. These included the mean number of strikers in this study (SZ=406). For strikes involving a fewer number of workers, the net effect of the injunction was to slightly reduce the strike's length. For example, if an injunction was issued in a strike involving 100 workers, its duration, according the results reported in Table 8, would be on the average .75 days shorter.

This finding is reversed when a larger number of strikers were considered. Strikes were four (4) days longer when 1334 workers were involved. Little weight should be given to the prediction of a strike which is predicted to last 35 days longer when 2668 workers were involved due to the few number of strike occurrences of this size which were considered in this study.

Although not significant, these results lend some support to Kochan's original hypothesis.

The Impact of the Injunction Depending on the Type of Employee

The results shown, seen in Table 4 (the prediction of the duration of strikes in cities, towns, and counties), indicated a more significant relationship between the injunction (IJ) and strike duration than had

been seen in other regressions. The mean beta for IJ in the Tables 1, 2, and 3 regressions was -.035. The beta weight on IJ in Table 4 was -.11. The primary jurisdiction type omitted in the Table 4 analysis was the school district.

This suggests the possibility that the injunction may be associated with longer strikes for teachers relative to the other employee groups. To test this possibility, the interaction term IJ*EDU was constructed, where EDU is a dummy variable representing a teacher strike.[3] This regression is presented in Table 9.

The variable of interest in this table, IJ*EDU, is positive and also significant at the .10 level of confidence. The negative and significant sign on education strike (EDU) is consistent with the results reported in Chapter 4 with respect to the relationship between duration and the "employee type" variables. Noting that each of the three variables--IJ, IJ*EDU, and EDU--are dummy variables, their regression coefficients can be added to generate prediction of the net effect of the teacher strike injunction duration. The injunction, as far as teachers are concerned, contributes .065 per cent to the duration of the strike, according to these results.

To summarize, with a beta weight for the compulsory penalty law variable (PL) of -.03, there is little support for the proposition that making penalties compulsory has a moderating effect on strike duration. As seen in Table 7, these laws also do not appear to have

Table 9. The prediction of strike duration when considering the impact of the injunction (IJ) on teacher strikes (EDU)

Vector	Variable	Coefficient	Beta
L_{it}			
	injunction (IJ)	-.252 (1.38)	-.09
	injunction * education strike (IJ*EDU)	.583* (1.83)	.13
	mediation (ME)	.464** (3.48)	.20
	permissive law (PL)	.571** (3.87)	.23
E_{it}			
	internal comparison (EV)	.016 (1.54)	.08
C_{it}			
	labor cost (WB)	.003 (1.55)	.11
	slack (SL)	.885 (1.57)	.12
B_{it}			
	size (SZ)	.328** (2.94)	.41
	size^2 (SZ^2)	-.00002** (2.90)	-.40
	education strike (EDU)	-.266 (1.80)	-.12
P_{it}			
	wage issue (EC)	.287** (2.30)	.12
	union support (US)	.464* (1.83)	.10
R		.48	
R^2		.23	
F		6.78	
n		284	

Notes: See Table 1

influenced employer's decisions to seek injunctive relief. In the smaller bargaining units, injunctions slightly reduce the length of the strike. In the larger units, this effect is reversed. This finding is not statistically significant, however, and could be biased by a tendency of employers from smaller jurisdictions to seek an injunction earlier than might be true for employers in the larger jurisdictions. On the other hand, larger units, regardless of when injunctive relief is requested, are probably more likely to disobey cease and desist orders than smaller units. Data limitations preclude the possibility of disentangling these effects. Finally, as shown in Table 9, injunctions issued against teacher strikes tend to be longer.

The Permissive Strike Law

As predicted, the permissive strike law (PL) was positive in the regressions shown in Tables 1 through 6 and in Table 9. PL was consistently significant at the .05 level or better. This variable, with a mean value of .233, is dominated however by the 95 strike occurrences in Pennsylvania. There may be characteristics other than the existence of a permissive strike law in Pennsylvania which are also being captured by the dummy variable PL.

Features which characterize Pennsylvania's labor relations environment could be different from features which

characterize the collective bargaining environments of other states. Moreover, it would be interesting to compare Pennsylvania strikes with strikes in another state having a similar legal environment. Unfortunately, no other permissive strike state has a sufficient number of strike occurrences to make this comparison meaningful.

Nonetheless, Ohio, with 81 strikes, is an interesting comparison state. A comparison between Pennsylvania and Ohio strikes will enable a contrast between determinants of strike duration in a permissive strike state with a strike prohibition state.

Table 10 presents a comparison of mean values for significant predictor variables when considering Pennsylvania strikes to the mean value of significant predictor variables when considering Ohio strikes. Note that all variables having a positive relationship with duration have higher values for Pennsylvania strikes than for Ohio strikes. These variables include ME, EC, SZ, and WB. This suggests the possibility that the coefficient on the permissive strike law (PL) may be representing considerations other than the fact Pennsylvania is a permissive strike state.

The Relationship Between Mediation and Strike Duration

One of the most surprising discoveries was a positive and significant coefficient on mediation (ME) in

Table 10. A comparison of mean values for significant predictors when considering Pennsylvania and Ohio strikes.

		Pennsylvania Strikes	Ohio Strikes
C_{it}	labor cost (WB)	79.7	66.3
	slack (SL)	.49	.49
B_{it}	size (SZ)	622	445
P_{it}	union support (US)	.98	.94
	wage issue (EC)	.75	.69
L_{it}	mediation (ME)	.88	.69
Total Number of Strikes		99	84

most regressions. With the data available, it is not possible to determine whether mediation causes longer strikes, since there is no way of determining (as was the case with IJ) when the mediator actually became involved in the dispute (or with what intensity). The variable ME represents the fact that the employer (or union) respondent to the BLS questionnaire indicated that mediation was one, or one among other, methods used to resolve the dispute.

Mediators may have had no involvement at the outset, but provided assistance sometime after the strike began. As observed in Chapter 3, there is reason to believe that mediators, by virtue of their role, would be expected to be involved in the resolution of the more militant and already longer strikes.

There is evidence which indirectly supports this possibility. BLS data files indicate that only 65 strikes out of 101 were mediated in Michigan, a compulsory mediation state. The mean duration of strikes which were not mediated was only 2.8 days. Upon further discussion with Public Employment Relations officials in Detroit, it was confirmed that about one-third of the strikes in Michigan receive no mediation services, primarily because no mediators are available when the strike is called. During September, many education strikes can occur and there are often not a sufficient number of mediators to provide assistance to all of these strikes. Thus, many short strikes never receive the services of a state mediator.

Further support for this is found when the combined effect of ME and EDU is considered (where EDU equals 1 if the strike is called by educational employees). This interaction term (ME*EDU) is positive and significant at the .10 level when entered in a regression with other significant predictors. Thus, one explanation for this finding is that since education strikes tend to occur during a relatively short period of time in September, mediators tend to become involved only in the longer strikes.

Mediation may thus not cause longer strikes, but rather longer strikes attract mediation. Empirically, the question of interest is to determine which of these causal relationships is stronger. Without information on the actual date of involvement, this question is outside the scope of this study.[4]

One indirect way of addressing, but not resolving, this dilemma is to hypothesize that states which require mandatory mediation of disputes are more likely to have mediator involvement from the first day of the strike. According to most compulsory mediation provisions, involvement of a mediator is required soon after the expiration of the prior contract, and only after a period of time has passed (30 days is common) since the issuance of a fact finder's report. Under the further assumption that the defiance of pre-strike procedures is the exception rather than the rule,[5] it is possible to examine the difference between the length of strikes in compulsory

mediation states and the length of strikes in states without this provision in their state statute.

A dummy variable is thus introduced (MUST) which represents the existence of a compulsory mediation statute in a state collective bargaining law. Assuming that mediators are involved earlier in resolving strikes in these states, the sign on MUST should be negative.

This analysis is presented in Table 11. The coefficient on compulsory mediation (MUST) is negative, as expected, and significant at the .05 level. This lends support to the proposition that early intervention in conflict situations should generate earlier strike resolutions. Moreover, with early involvement, there should be less entrenchment by the parties, and a greater likelihood of ongoing discussion. Mediators may thus be more successful when their interventions occur at the early stage of bluff and counterbluff, when positions are still being clarified.[6] In addition, early involvement of mediators may also reduce the number of issues to be settled after a strike has been called. With fewer issues in dispute, less time may be required to settle them.[7]

The coefficient on mediation (ME) remains positive and significant in this regression. Suffice to say, without information on the time and intensity of mediator involvement, it is impossible to make a definitive statement with respect to the relationship between the duration of the strike and mediation.

Table 11. The prediction of strike duration when considering the impact of compulsory mediation provisions in state collective bargaining statutes.

Vector	Variable	Expected Sign	Coefficient	Beta
L_{it}				
	mediation (ME)	-	.448** (3.43)	.19
	compulsory mediation law (MUST)	-	-.300** (2.34)	-.14
	permissive law (PL)	+	.733** (4.70)	.29
E_{it}				
	internal wage comparison (EV)	+	.019* (1.87)	.10
C_{it}				
	labor cost (WB)	?	.003 (1.50)	.11
	slack (SL)	?	.887* (1.65)	.12
B_{it}				
	size (SZ)	+	.283** (2.53)	.35
	size^2 (SZ^2)	-	-.00002** (2.55)	-.35
P_{it}				
	wage issue (EC)	+	.294** (2.36)	.13
	union support (US)	+	.500** (1.99)	.11

R	.48
R^2	.23
F	7.51
n	284

Notes: See Table 1.

Nonetheless, there are a number of justifications for why the relationship between mediation and strike duration could be positive. One role of the mediator is to develop "lines of communication with people other than those representing the parties at the bargaining table."[8] The greater the number of persons who are involved, the longer, one would expect, it would take to resolve the strike. Further, public employee strikes may be longer because the mediator must spend considerable time and effort in helping the parties appreciate the intricacies of the bargaining process.[9] This adds to the time required to settle the strike.

It is also possible that some interventions may actually contribute to a lengthening of the strike. Many mediators emphasize the recognition of the middle ground--the "zone" where each party needs only to yield a little gound to meet the other. The problem with this intervention strategy may be that some issues are simply not amenable to compromise. If the less skilled mediators force compromise on just such an issue, more intranscience on behalf of the parties may result.[10] Conceivably, longer strikes may be the outcome.

Having discussed the performance of the public policy variables IJ, PE, IJ*EDU, PL, ME, and MUST, we now turn to a concluding discussion of the results in Chapter 6.

Footnotes (Chapter 5)

1
Thomas A. Kochan, "Dynamic of Dispute Resolution in the Public Sector," in Benjamin Aaron, Joseph Grodin, and James Stern, Public Sector Bargaining (Washington, D.C.: Bureau of National Affairs, 1979), p. 168.

2
Results on the variables which were omitted from the analysis are available from the author upon request. The magnitude and signs of the coefficients on the omitted predictors, however, were not appreciably affected by the introduction of the interaction terms IJ*SZ and IJ*SZSQ.

3
The variable EDU represents striking teachers who are organized in instructional bargaining units only. An alternative specification for EDU which included both instructional and noninstructional employees generated similar results.

4
Contact was made with the public employment relations offices in the states of Michigan, New Jersey and Pennsylvania in an attempt to acquire the time and date mediators first became involved in strike situations. In every state, this information was unaccessible. In some states the information was not available in a useable form. In Michigan, public law stipulates that any transactions between a mediator and the parties must remain confidential. This makes all internal records unavailable for research purposes.

5
There are limitations to this assumption, since it is known that in some states (such as Pennsylvania) pre-strike procedures are not followed. Phone conversation with John Bomer, P.O.L., Labor-Management Services Administration, January, 1979.

6
Linda Dickens, "Conciliation, Mediation and Arbitration in British Industrial Relations," in Geoffrey M. Stephenson and Christopher J. Brotherton, Industrial Relations: A Social Psychological Approach (New York: John Wiley and Sons, 1979), pp. 295, 303-304.

7 This argument was made by Ed McMann of the Federal Mediation and Conciliation Service in a phone conversation, October 19, 1979.

8 Thomas C. Schelling, The Strategy of Conflict (Cambridge, Mass.: Harvard University Press, 1960), p. 44.

9 Thomas P. Gilroy and Anthony V. Sinicropi, "Impasse Resolution in Public Employment: A Current Assessment," Industrial and Labor Relations Review, Vol. 25, No. 4 (July, 1972) p. 499.

10 Linda Dickens, op. cit., p. 295

Chapter 6

Summary of Results and Conclusions

The performance of the variables found to be significant is discussed in the first section of this chapter. In the second section, insignificant findings are summarized and discussed. In the final section, the contributions as well as the limitations of the study are presented.

Summary of Significant Findings

The average (or mean) beta weights on the variables which were significant are shown in Table 11. None of the variables associated with the expectations vector (E_{it}) were significant at the .10 level or better. The expected positive direction of their signs was confirmed, however. Two of the variables associated with the "employer constraints" vector (C_{it}) were significant--the proportion of labor costs of the striking bargaining unit to total labor costs (WB) and the component of revenues were not used by the jurisdiction to compensate personnel, slack or SL. For all strike occurrences and for strike occurrences in cities, towns and counties, the beta weights on WB and SL were relatively strong. In general, the larger the beta weight, the longer the strike is predicted to last as a result of that factor's influence.

Table 12. A comparison of the mean beta weights on variables which were significant in Tables 1 through 6 for strikes occurring in all jurisdiction types and strikes occurring in cities, towns, and counties.

Vector	Variable	All Strikes	Strikes Occurring in Cities, Towns, and Counties
Expectations (E_{it})	no variables were significant	—	—
Constraints (C_{it})	Labor Cost (WB)	.26	.40
	Slack (SL)	.14	.24
Bargaining Relationship (B_{it})			
	Size (SZ)	.39	-.06
	Size^2 (SZ^2)	-.38	-.03
	Inessentiality (NS)	-.12	-.12
	Combined Units (OTH)	.21	.16
Labor Relations Environment (P_{it})			
	Union Support (US)	.13	.22
	Wage Issue (EC)	.11	.04
Legal Environment (L_{it})			
	Mediation (ME)	.19	.10
	Compulsory Mediation (MUST)	-.14	—
	Permissive Law (PL)	.24	.31
	Injunction Issued Against Teachers (EDU*IJ)	.13	—

Note that the sign on the labor cost variable, WB, was positive in the analyses of all strikes and in the analysis which excluded strike occurrences in special districts and in school districts. When the labor costs of the striking unit are a small component of total labor costs (when WB is small), labor may be able to obtain quicker settlements. The total cost of a concession to the employer is small, relatively speaking. Labor thus attains more bargaining leverage with employers because labor costs constitute a small component of total labor costs. This implies that strikes for comparatively small units are shorter in part because the employer is more able, and therefore more willing, to make concessions.

An employer may also be more convincing in their threat to use strike replacements. It is also more feasible to recruit replacements. An implication of this alternative explanation is that strikes may be shorter because an employer is less likely, not more likely as in the previous argument, to "give in" to labor's demands. Here labor may be more receptive to a downward adjustment of their bargaining demands. With an incentive for each side to moderate their respective positions, one would expect to find evidence of shorter strikes when labor costs are small.

The positive sign on WB is consistent also with an expectation that labor costs of the strikers constitute a constraint on the employer's ability to adjust their

final pre-strike offers upward. The greater this constraint--the greater the component of labor costs of the strikers to total labor costs--the longer the strike should last, according to these results.

When labor costs of the strikers are relatively high (when the value of WB is large), there is also an incentive for the employer to "hold out" longer because each strike day constitutes an additional cost savings. Revenues are unaffected when public employees strike. Payroll expenditures, however, are temporarily interrupted. Strike occurrences during the 1977-1978 period may thus have been one, among other, mechanism public employers used to bring expenditures "in line" with projected revenues. Long strikes may have been the preferred alternative for some employers to other options such as the imposition of an additional tax levy on an increasingly unreceptive public.

It is not possible to determine from these results alone why strikes are longer when labor costs of the striking unit are high. Is it because of the increased financial benefits which accrue to the employer as a result of the interruption in expenditures, or because of the greater difficulty an employer has in identifying the additional resources required to fund the concessions demanded? Both considerations may be equally important factors.

The slack variable (SL) captures the share of

the economic pie which is available to support labor costs in lieu of supporting nonlabor costs. To the extent that a larger share of existing revenues are available to support nonpersonnel costs, labor should have a greater incentive to strike as long as necessary to obtain the concessions they want. Slack was initially considered as a member of the constraints vector (C_{it}). When considered as an indicator of the various financial constraints faced by management, a negative relationship was expected.

These results indicate that the positive sign on this variable is theoretically consistent when viewed as an indicator of employee expectations. As such, the greater the component of revenues which do not support labor costs, the greater the enhancement in expectations among the union membership. The probability of greater tension in the labor management relationship may also be enhanced. As observed, enhanced expectations should result in longer strikes, other considerations held constant.

Specifically, the positive sign on the beta for WB (the labor cost variable) means that strikes in education are longer than strikes by other public employees as a result of the higher relative labor costs in education. Labor costs consumed by non-education public employees are low relative to the labor costs incurred by school districts.

On the other hand, the negative sign on the inessentiality index (NS) means that the length of teacher strikes, controlling for the fact that labor costs in

education are higher, are shorter than strikes by other public employees. Two explanations may account for the finding that strikes by teachers, as a group, are shorter than strikes by all other public employees.

Users of public educational services find it virtually impossible to acquire substitute services when teachers strike. If nurses strike, patients can be transferred to operational medical centers located in a contiguous jurisdiction. When mass transit workers strike, commuters have a number of alternative options available--they can walk, use car pools, or even ride motorbikes. School age children, on the other hand, must generally wait for a strike settlement to be reached before returning to the classroom. Elementary and secondary public education is thus not a readily substitutable service when strikes occur. The net result may be heightened public pressure exerted by the parents of school age children to settle strikes by teachers.

A majority of education strikes during the 1977-1978 period were initiated by one labor organization, the National Education Association (NEA). An inverse relationship between the inessentiality variable (NS) and strike duration may also be explained by NEA's emphasis on coordinating the bargaining strategies of local negotiating teams. It may be that school districts which took strikes found it extremely difficult to meet NEA's standard contract demand. Many districts experienced rapidly declining

student enrollments during the late 1970's. This was an additional economic consideration which was not confronted by other public employers. School systems which took strikes could thus have been facing more formidable economic constraints than noneducational jurisdictions taking strikes. To the extent that greater economic constraints result in longer strikes, one would expect to find evidence of longer strikes by teachers. This is an especially interesting finding, since teacher strikes were initially expected to be longer.

Aside from the significant performance of the inessentiality index (NS), there were a number of other significant noneconomic determinants of strike duration. These factors included size (SZ), the existence of combined occupational units (OTH), union support for the strike (US) and whether the issue concerned wages (EC). One of these variables, size, and the square of size (SZ^2), were significant in the analyses of all strikes. Beta weights on these variables were .39 and -.38 respectively. Insignificant beta weights, however, were observed in these variables in the analysis of strikes occurring in cities, town and counties (see Table 11). Consider first the implications of these results for establishing legislation which pertains to all public employee groups.

For the very large units, shorter strikes would be anticipated. Longer strikes, on the other hand, are expected from bargaining units which are moderately large

in comparison to small units. This means that the encouragement of broad based units may lead to longer strikes in small jurisdictions, but to shorter strikes in the very large jurisdictions.

How does public policy affect the size of the bargaining unit? Criteria for determinating the composition and size of bargaining units is established by statute in some states and by public employment labor relations boards in others. Representative criteria include such factors as the degree of (1) common supervision, (2) the integration and interchange of the work function, (3) the desires of the employees, (4) the similarity of working conditions, (5) operational efficiency, (6) the geographical dispersion of employees, and (7) the inclusion (or exclusion) of supervisors from bargaining units.

The effect of the application of such criteria is to encourage either broad-based, large units or small, narrowly based units. Understandably, both labor and the employer want units that they believe will be conducive to obtaining favorable election outcomes. Employers generally favor large, broad-based units because of the belief that they are easier to defeat in representation elections. The size of these units, however, may also affect the subsequent duration of strikes if and when they occur.

When considering legislation which applies to all local government employees or which applies only to

teachers, public policy makers should be advised that, at least based on these results, bargaining unit size is related to strike duration. On the other hand, when debating state legislation excludes special district and school district personnel, there was no evidence of a significant relationship between unit size and duration.

In contrast to the difference found in the magnitude of the beta weights in Table 11 for size (SZ) across the two analyses, the beta on the combined unit variable (OTH) was positive and significant in both analyses (+.21 and +.16). Regardless of the employee type being considered, more heterogeneous units (which also tend to be larger) were positively associated with the duration of public employee strikes.

Two other significant predictors of strike duration are now considered--the support given by the international or national labor union (US) and the disputed issue (EC). When the union fails to support the strike, its duration is shorter. Negotiations must be carried on by local negotiators who may be unexperienced. Strike benefits are not paid. If there is lack of union support, doubt may be seeded among the local union membership concerning the worthiness of the strike. Interest in continuing the strike should thus dissipate. As also expected, workers are also willing to strike longer when the issue concerns wages than when the dispute concerns other terms and conditions of employment.

Finally, the negative sign on North (NO) means that strikes occurring in northern states are shorter than strikes occurring in other regions of the country. This unexpected result may be due to the possibility that bargaining units with a longer and conceivably more mature labor management relationship are able to resolve their disputes more expeditiously. Alternatively, jurisdictions in northern jurisdictions may also have fewer resources to haggle over, relative to jurisdictions taking strikes in other regions of the country. This should dampen labor's interest in sponsoring long strikes.

Four public policy variables were found to be significant. These included mediation (ME), the compulsory mediation law (MUST), cease and desist injunctions issued against teachers (EDU*IJ), and the permissive strike law (PL). Considered first is the unexpected performance of the mediation variable. Recall that an inverse sign was expected, but this variable was consistently positive.

Considerable public support has been committed to the employment and training of neutral third parties. The Federal Mediation and Conciliation Service uses an argument before Congress that mediation contributes to a reduction in the number of days of idleness as one justification for continued support. The limited empirical evidence to date from this and previous studies suggests that the involvement of outside mediators may not reduce strike duration, at least if timing of intervention is not

identified.

This conclusion merits qualification. The existence of a state compulsory mediation law (MUST) was inversely related to strike duration. This supports the importance of insisting on pre-strike mediator involvement. An important conclusion of this study is thus that the timing of mediator involvement is a critical factor in making a definitive determination of the impact of mediation on strike duration. A follow-up study is being undertaken in the summer of 1981 which will enable the identification of when mediators became involved in 1979 public employee strikes.

The injunction, a more punitive policy option than mediation, was not significantly related to strike duration. However, when strikes were initiated by teacher groups, they were significantly longer. The beta on EDU*IJ was +.13. Perhaps teachers resent court injunctions because of the implication that they are being "unprofessional," or because of the implication that they have little regard for the best interests of students. If this reaction is an explanation for the finding of slightly longer strikes when injunctions are issued against teachers, what accounts for the greater level of animosity among teachers relative to the reactions other employee groups would be expected to have?

Perhaps when teacher injunctions are issued, a variety of political, legal and other professional leaders

become involved. This may be less likely to happen when small bargaining units strike. This would introduce a new dimension to the two party bargaining process. As the arena of negotiations is broadened, it is also reasonable to expect that it would take longer to discuss, and subsequently to resolve the disputed issues. The IJ variable may thus also be picking up considerations other than the issuance of an injunction.

The performance of the final significant public policy variable--the permissive strike law (PL)--was positive, as predicted. According to these results, permissive strike laws contribute only 1.2 days to the duration of strikes, all other considerations held constant. These results suggest that legislatures need not be overly concerned about encourageing long and bitter strikes by public employees if they elect to enact permissive strike legislation.

Summary and Discussion of Insignificant Results

The role of the strikers has been taken into consideration by the variables associated with the expectations vector (E_{it}). These results suggest that expectations do have a positive effect on strike duration, but this effect is not as important as other factors. The employer may be influenced by the earnings of other, comparable employees, and therefore adjust wage offers

accordingly. This would tend to moderate the impact of expectations on the duration of the strike. Expectations may thus be more salient factors in determining whether to strike or accept the employer's last offer.

The role of the public received the least attention. Only one variable, the local tax burden (TB), represented the pressure citizens might be expected to exert on the parties. While the local tax burden, as viewed in this study, had a slight moderating effect on strike duration, this effect also was not significant. The influence of citizens may thus be a less important factor than other considerations in determining the length of the strike.

There are indications, however, that the public may increasingly exert a greater influence in the collective bargaining process in the future.

> "Employers and the public have become more willing to resist strike pressures recently as economic conditions of cities and states have deteriorated and the political pendulum has shifted against public employees."[1]

The insignificant performance of the other factors is summarized below.

Rural (RU): As expected, strikes in rural areas were slightly shorter than strikes in the more populated areas, but this effect was not significant. Rural workers who

have opted to organize and who have elected to strike may simply be more militant than has been acknowledged in previous studies.

First negotiation (FN): Although strikes occurring during first negotiation rounds were expected to be longer, these were found to be slightly shorter. Perhaps during the recognition campaign, many of the more difficult issues were resolved. These results suggest that, in general, both employer and union on strike appear to be no more or less willing than better established units to settle a first agreement. Alternatively, first negotiation round strikes in states with no collective bargaining statute (such as Ohio) may be longer. A reverse effect may be found for first negotiation rounds in states with comprehensive laws. This remains to be determined.

Winter (WR): With an expectation of a negative sign on this variable's coefficient, its sign was positive. Indirect evidence suggests that season may affect the decision by certain types of employees to strike, but not the subsequent duration of the strike itself. There is, for example, a positive and significant relationship between the winter season (WR) and street and highway strikes (STR) as reported in the correlation matrix (see Appendix C).

Supplemental benefit issue (SB): As a variable which represented a unique type of economic issue, SB was expected to be positive. Instead, its sign was negative.

With relatively few strikes over benefit issues, these results must be considered tentative. However, this result emphasizes the importance of taking into consideration the various types of economic issues that workers may be willing to strike over.

Compulsory penalty laws (PE): There is little evidence from these results that making penalties compulsory has an effect on strike duration. Further, these laws are not being obeyed or enforced. Employers are no more likely to seek court relief in states with compulsory penalty laws than in states without these laws. While compulsory penalty laws may affect the propensity to take or initiate a strike, these results give no indication that they have any significant effect whatsoever on the duration of strikes that do occur.

Injunctions (IJ): Although insifnificant, injunctions slightly reduce the length of the strike in smaller bargaining units. In larger units, this effect is reversed.

Having presented a summary and discussion of the performance of both the significant and the insignificant variables, we turn to a concluding discussion of both the contributions and limitations of the study.

The Contributions and Limitations of the Study

The two years of strike activity considered

(1977-1978) were in a period of economic expansion. Different relationships may have been found had a period of economic contraction been considered. Second, existing theory and empirical work on strike duration is lacking. The discovery that many variables were insignificant is a testament to the lack of a comprehensive theory. Third, data limitations precluded a consideration of many factors which may also be relevant considerations. These include, among others, the skills and personalities of the negotiators and mediators, the effect of prior strike activity by the same bargaining unit, nonwage bargaining history, and the payment of strike benefits.

On the positive side, the performance of the predictors was relatively consistent across model specifications. With an explanation for one-fourth to one-third of the variation in strike duration, the "disappointing" results found in the Burton-Krider study were not replicated in this study.

As expected, many of the more important predictors of duration were associated with the local bargaining environment. Region, season, and population density contributed less to the explanatory power of the model than factors such as the issue under dispute, union support, the number of strikers, the "employee type" involved, or the proportion of labor costs to total labor costs. The identification of factors which describe the local bargaining context is apparently an important

consideration in the design of strike duration research and bolsters an important assumption of this study--that the bargaining unit as a unit of analysis is most appropriate.

With a primary focus on the collective bargaining process rather than its outcomes, these results indicate that more needs to be known about the processes associated with resolving disputes. It is necessary, but not sufficient, to know that a mediator was involved or a court injunction was issued during the course of a strike. It is also important to identify when mediators began providing conciliation services and with what degree of intensity. Injunctions may have been sought by employers and subsequently ordered by the courts, but it is also important to know whether an injunction was coupled with a penalty. Conceivably, the impact on strike duration of the injunction may vary depending on its timing. This remains an unsettled question.

These results do indicate nonetheless that strike duration is a potentially fertile and important analysis to pursue.

In conclusion, it is important to recognize that this study has directed an emphasis away from predicting strike occurrences and toward considering a prediction of their duration. From the perspective of the parties who are confronted with a strike, resolution of the dispute is what matters. Since there is no reason to

believe that strike prohibition laws will be any more effective in the future decade than was evident in the 1970's, it is time that industrial relations scholars began to consider the dilemmas faced by employers, unions and the public once strikes occur. It is in this spirit that this study has been undertaken.

Footnotes (Chapter 6)

1 Thomas A. Kochan, "Dynamics of Dispute Resolution in the Public Sector," Benjamin Arron, Joseph Grodin and James Stern, Public Sector Bargaining (Washington, D.C.: 1979), p. 168.

APPENDICES

Appendix A. Variable Descriptions and Predictions

Vector	Variable	Description	Prediction
E_{it}			
	Wage Change (CE)	Over the two year period prior to the strike, the change in the mean earnings of the comparable employee group in the same state	+
	Wage Level (RE)	Ratio of the mean monthly earnings of the comparable employee group in the state to the pre-strike, mean monthly earnings of the striking bargaining unit	+
	Internal Comparison (EV)	Over the one year period prior to the strike, the ratio of the change in the mean, monthly earnings of all employee groups working for the same jurisdiction to the change in the mean monthly earnings of the striking bargaining unit	+
C_{it}			
	Labor Cost * (WB)	Ratio of the wage bill of the striking unit to total expenditures for personnel	?
	Units (NU)	The number of bargaining units recognized to bargain collectively in the jurisdiction taking the strike	+
	Slack (SL)	Total revenues minus total expenditures for personnel as a proportion of total revenues	?
	Tax Burden (TB)	An index composed of the addition of two variables: the proportion of property taxes to total expenditures for personnel and the proportion of property taxes to total revenues	?

* this variable can only be considered in instances where a a specific employee group (or groups) can be identified. By necessity, any strikes which constitute a combination of employee types were deleted from analyses which considered this variable

Appendix A (continued). Variable Descriptions and Predictions

Vector	Variable	Description	Prediction
B_{it}	SZ	Number of workers involved in the strike	+
	FIR	Firefighter strike (1=yes; 0=no)	—
	POL	Police strike (1=yes; 0=no)	?
	SAN	Sanitation strike (1=yes; 0=no)	+
	OTH	A strike by all other employee groups except education (1=yes; 0=no)	+
	HOS	Hospital and health service strike (1=yes; 0=no)	+
	STR	Street and Highway strike (1=yes; 0=no)	?
	TRN	Transportation strike (1=yes; 0=no)	?
	WEL	Welfare services strike (1=yes; 0=no)	?
	Inessentiality Index (NS)	1= police or firefighter strikes 2= sanitation, hospital, transit, or water and sewerage strikes 3= street, parks, education, housing, welfare or general administration strikes	+
	Combined Units (CM)	Combined occupational composition of the bargaining unit (1=yes; 0=no)	+

Appendix A (continued). Variable Descriptions and Predictions

Vector	Variable	Description	Predictions
P_{it}	FN	Negotiation of the first agreement (1=yes; 0=no)	+
	US	Union support for the work stoppage (1=yes; 0=no)	+
	EC	Primary issue under dispute is wages (1=yes; 0=no)	+
	SB	Primary issue under dispute is the payment of fringe and other supplemental benefits (1=yes; 0=no)	+
K_{it}	WR	Occurrence of a strike during the winter quarter (1=yes; 0=no)	-
	RU	Occurrence of a strike in a rural, non-SMSA area (1=yes; 0=no)	-
	NO	Occurrence of a strike in a northern state (1=yes; 0=no)	+
	SO	Occurrence of a strike in a southern state (1=yes; 0=no)	-
	NO*WR	Interaction term constructed by the multiplication of WR*NO	-
L_{it}	ME	Federal, state, local or private mediator involvement (1=yes; 0=no)	-
	IJ	Issuance of a court injunction (1=yes; 0=no)	?
	PL	Permissive strike legislation (1=state has a permissive strike law; 0=state has no permissive strike law)	+
	PE	Compulsory penalty statute in state legislation covering local government employees	-
	MUST	Compulsory mediation statute in state legislation covering local goverment employees	-

Appendix B. Means, standard deviations and data sources (N = 558)

Variable	Mean	Standard Deviation	Data Source
The Dependent Variable			
S_{it}	1.647	1.07	Work Stoppage Data File, BLS
The Independent Variables			
CE	.111	.068	Annual Employment Data File (1975-1977), Census
RE	1.014	.201	"
EV	.577	5.704	"
WB	65.31	35.81	Annual Employment Data File (1977), Census
NU	4.22	6.98	"
SL	.478	.148	Annual Finance Data File (1975), Census
TB	1.104	.525	"
SZ	406.470	1334.040	Work Stoppage Data File, BLS
FIR	.0305	.172	"
POL	.0394	.195	"
SAN	.0412	.199	"
OTH	.2007	.401	"
HOS	.0143	.119	"
STR	.0412	.199	"
TRN	.0251	.156	"
WEL	.0233	.151	"
NS	2.736	.603	"

Appendix B (continued). Means, standard deviations and data sources (N=558)

Variable	Mean	Standard Deviation	Data Source
The Indedpendent Variables (continued)			
CM	.328	.470	Work Stoppage Data File, BLS
FN	.1057	.308	"
US	.9433	.232	"
EC	.6989	.459	"
SB	.0287	.167	"
WR	.1631	.370	"
RU	.2867	.453	"
NO	.7885	.409	"
SO	.0448	.207	"
NO*WR	.1362	.343	"
ME	.7025	.458	"
IJ	.1846	.388	"
PL	.2330	.423	U.S. Department of Labor, Summary of Labor Relations Policies (Washington: G.P.O., 1979)

Appendix C. The Correlation Matrix

Variable																															
1	S_{it}	1.00																													
2	CE	.08	1.00																												
3	RE	-.02	.25	1.00																											
4	EV	.12	.03	.01	1.00																										
5	WB	.13	-.16	.06	.07	1.00																									
6	NU	-.04	-.06	-.25	-.03	-.23	1.00																								
7	TB	-.03	-.13	-.08	-.10	.06	-.01	1.00																							
8	SL	.04	.08	-.05	.06	-.64	.01	.00	1.00																						
9	SZ	.08	-.00	-.19	.04	.15	.18	.05	-.13	1.00																					
10	OTH	.00	-.12	-.15	.02	-.26	.07	.11	.40	.02	1.00																				
11	FIR	-.03	.13	-.03	-.00	-.27	-.03	-.23	.17	-.03	-.09	1.00																			
12	POL	-.06	.13	.02	-.07	-.34	.07	-.06	.11	-.05	-.10	-.03	1.00																		
13	SAN	.02	.17	-.01	-.00	-.30	-.06	-.08	.20	-.05	-.10	-.03	-.04	1.00																	
14	HOS	.06	-.03	-.06	.00	-.17	.27	-.08	.06	-.02	-.06	-.02	-.02	-.03	1.00																
15	STR	-.03	-.03	.04	.03	-.30	-.02	.02	.19	-.06	-.10	-.04	-.04	-.04	-.03	1.00															
16	TRN	.14	.17	-.07	.01	.03	-.05	-.05	.11	.06	-.08	-.03	-.03	-.03	-.02	-.03	1.00														
17	WEL	-.02	-.07	-.02	-.03	-.25	.13	.16	.20	-.03	-.08	-.03	-.03	-.03	-.02	-.03	-.02	1.00													
18	FN	-.07	-.01	.12	-.11	.06	-.08	.04	-.03	-.03	-.08	.04	-.01	-.04	.01	-.04	-.06	.14	1.00												
19	US	.16	-.03	-.08	.01	.10	.11	.09	-.11	.05	-.05	-.00	-.13	-.07	.03	.05	-.11	-.07	.00	1.00											
20	EC	.14	-.04	-.08	-.08	.01	.06	-.04	.05	.01	.13	-.11	-.03	.02	.01	.02	.01	-.00	-.18	.01	1.00										
21	SB	-.10	.03	.02	.00	-.01	-.04	-.03	.11	-.03	-.01	.09	-.03	.02	-.02	.02	.04	-.03	-.02	-.01	-.26	1.00									
22	WR	.02	-.06	.05	-.01	-.16	-.03	-.07	.11	-.05	.05	-.02	.04	.01	-.01	.20	-.01	-.00	.04	-.00	.04	.01	1.00								
23	RU	-.05	.04	.26	.01	.05	-.25	-.12	.01	-.13	.03	-.02	.03	-.05	.02	.05	-.10	.01	.08	-.08	-.04	-.01	-.01	1.00							
24	NO	-.04	.06	.14	.04	.15	-.06	.15	-.16	.03	-.19	-.11	-.05	-.00	-.09	.02	-.03	-.01	-.16	.16	.05	.01	.05	-.06	1.00						
25	SG	.01	.02	-.04	.04	-.16	-.00	-.22	.16	.01	.11	.11	.00	.09	.12	.04	.08	-.03	-.02	-.14	.05	-.04	-.10	-.00	-.42	1.00					
26	ME	.28	-.00	-.04	.03	.18	-.04	-.02	-.14	.07	-.14	.00	-.03	-.00	-.05	-.10	.05	-.08	-.09	.19	.04	-.10	-.07	-.02	.12	-.05	1.00				
27	PE	-.02	-.03	-.03	.01	.01	-.00	-.02	-.08	.07	-.02	.16	-.03	-.03	-.02	-.03	.04	-.04	.02	-.01	.00	-.08	.05	-.16	.03	.01	.14	1.00			
28	PL	.31	.10	.15	.02	.15	-.07	-.03	.09	.07	-.00	-.10	-.11	.04	-.03	-.01	.02	.08	-.07	.08	.06	-.04	.08	.07	.15	-.12	.22	-.13	1.00		
29	OTH	-.01	-.00	.16	.02	.83	-.16	.20	-.70	.05	-.59	-.21	-.24	-.25	-.14	-.25	-.19	-.18	.07	.15	-.08	-.03	-.12	-.00	.24	-.22	.19	-.00	.04	1.00	
30	CM	.10	-.14	-.01	.07	.26	-.01	-.01	-.03	.09	.18	-.10	-.14	-.05	-.02	-.09	-.04	.09	-.03	.08	.03	-.05	-.11	.00	-.04	-.00	.07	.01	-.03	-.01	1.00	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30