

THESIS



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dissertation entitled
THE IMPACT OF FINAL OFFER ARBITRATION
ON THE BARGAINING PROCESS
AND WAGE OUTCOMES

presented by

MARIE CONNOLLY

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Economics


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THE IMPACT OF FINAL OFFER ARBITRATION ON THE
BARGAINING PROCESS AND WAGE OUTCOMES

By

Marie D. Connolly

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Economics

1983

ABSTRACT

THE IMPACT OF FINAL OFFER ARBITRATION ON THE BARGAINING PROCESS AND WAGE OUTCOMES

By

Marie D. Connolly

The purpose of this thesis is to examine a critical public policy issue - final offer arbitration. First, a model of public sector wage determination is tested to determine if negotiated wages differ from arbitrated wages in a final offer arbitration (FOA) environment. Second, factors that affect the decision-making process of the union and of management are examined in order to identify factors that lead to impasses.

Data from Michigan's public safety sector are used to investigate if FOA biases outcomes or systematically interferes with the collective bargaining process. The study follows Michigan's experience with FOA from its onset in 1973 until 1979. The decision-making model uses observed outcomes to study bargaining behavior. Because either party can request arbitration, the preferences of the individual parties are not always known. To deal with this problem of partial observability, a bivariate probit model is used to estimate the probability of negotiating.

The wage model indicates that arbitrated wages are not significantly different from negotiated wages under FOA.

Although no significant wage differential is observed, several differences in the way salaries are determined are evident. Arbitrators do not necessarily use the same criteria as negotiators in formulating their awards.

The bivariate probit model allows examination of union's decision-making separately from management's. The results indicate that the city exhibits narcotic effect tendencies but the union does not. In both cases, however, economic variables are not good predictors of behavior. Attempts are also made to compare the results of this study with previous empirical literature in this area. Measures of the overall impact indicate that the union is the dominant party in decision-making. Union preferences tend to dictate observed outcomes.

To my family
who gave me the inspiration and
support to obtain an education
and to Steven
who helped me see this project through.

ACKNOWLEDGMENTS

I would first like to thank the members of my committee, all of whom made major contributions to this project. My chairman, Daniel S. Hamermesh provided professional guidance throughout this project and continually encouraged me to "get done". Richard N. Block, who was my acting chairman in Dr. Hamermesh's absence, helped me incorporate a solid industrial relations background into my economic studies. Peter Schmidt guided me through the econometrics and was always willing to explain and reexplain problems we encountered along the way. And to C. Patrick "Lash" Larrowe, who was a great sounding board, colleague, and friend throughout the entire process. Without the assistance and counsel of these men, this study would not have been possible. In addition to my committee I would like to give special recognition to two other professors, W. Paul Strassmann and Walter Adams. Their encouragement and support during my years at Michigan State were greatly appreciated.

I would also like to thank the National Association of Schools of Public Affairs and Administration and the National Association of Counties for providing the support for this project. Special thanks also go to the staff of the Michigan

State University Labor and Industrial Relations Library, the Michigan State Archives and Historical Collections, and the Michigan Employment Relations Commission, who were most helpful in making information available for this study.

In addition, this study could not have been completed with my sanity intact without the support of Renee Stahle, Tina McConnell, Pam Japinga, Terie Snyder, Cindy Rence, Randy Bennett, Mark Haas, Ed Weber, and other friends at Michigan State, too numerous to mention.

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CHAPTER ONE

Introduction

Extending the right of collective bargaining to employees in the public sector has resulted in a dramatic increase in unionization there, with more than half of all local government employees now organized.¹ The increase in public sector unionism, coupled with the failure of the Congress and most state legislatures to extend the right to strike to public sector employees, has increased the importance of alternative impasse procedures. State legislatures have sole jurisdiction over the collective bargaining laws dealing with public sector employees in their state. In order to deal with impasses that develop in bargaining, most states have created detailed dispute-resolution procedures. In essential services, such as police and fire, several states have mandated compulsory arbitration to settle disputes. The diversity of these procedures and their increasing importance in maintaining labor peace has made the study of alternative impasse procedures one of the most important theoretical and empirical issues in research on labor markets.

Compulsory Arbitration

Compulsory arbitration requires that all impasses in bargaining be submitted to a neutral third party, who can be a single arbitrator or a tripartite panel chaired by a

neutral chairperson.² The arbitrator, after hearing the positions of both parties, dictates the terms of a new contract. The award of the arbitrator is binding on both parties.

There are two forms of compulsory arbitration, conventional and final offer. Conventional arbitration allows the arbitrator or arbitration panel to weigh the proposals of both sides, and then to fashion a compromise agreement. Final offer arbitration requires the parties to submit a last best offer to the arbitrator at some time during the hearing, with the arbitrator obligated to award either the last best offer of the union or of management. Final offer arbitration can be implemented on an issue-by-issue basis or the arbitrator can be required to choose between the package presented by the union and the package offered by management.

The main concern of legislators in enacting compulsory arbitration laws seems to be to prevent strikes in the public sector by providing third party intervention that results in a settlement. Compulsory arbitration, obviously, creates a substitute for the strike in the public sector. Compulsory arbitration also tends to equalize the power relationship between the parties by removing their most effective bargaining weapon, the threat of a strike or the ability to take a strike.³ At the same time, it interjects the arbitrator into the negotiating process.

The use of compulsory arbitration, however, has led to much debate. Many industrial relations practitioners and scholars feel that compulsory arbitration prevents "true" collective bargaining.⁴ Questions have arisen over its narcotic and chilling effect on the bargaining process. Recent critics are also turning their attention to the cost, which is borne by the public, of arbitration settlements.

Originally, arbitrators were seen as protectors of the public interest. By preventing strikes in the public sector, they were protecting the public from the consequences of interrupted services. At the same time, they were seen as guarantors of a reasonable settlement. Although critics of compulsory arbitration will concede that states with compulsory arbitration laws suffer fewer strikes, they do not feel that strike prevention should be the sole criterion of evaluation.⁵ In this age of fiscal awareness, the price of labor peace is also a major concern. Many feel that arbitrators have not done a good job of protecting the public purse.⁶

The ability of the parties to settle their differences without outside interference is also an important evaluation criterion.⁷ Most industrial relations scholars feel that the best impasse procedure is the one used least. There is a growing body of evidence that suggests that compulsory arbitration "chills" bargaining, that parties are relying on arbitration because there is no motivation to make concessions during bargaining.⁸

Another problem associated with compulsory arbitration is the narcotic effect.⁹ Continued use of arbitration by certain parties suggests that once parties rely on an arbitrator to solve their disputes, they tend to become addicted to arbitration in future contract negotiations. Both the narcotic and the chilling effect tend to reinforce each other according to this view, and lead to less "true" collective bargaining in the public sector than in the private sector.

Thesis Outline

The main purpose of this study is to determine the factors leading to impasses in collective bargaining negotiations. In particular, this paper examines the probability of negotiating a contract as a function of several factors believed to affect the decision-making process of the parties. One factor included is the expected outcome differential. Negotiated settlements and arbitrated awards in a final offer arbitration environment are examined. All data are taken from Michigan's public safety sector for the years 1973-1979. If an outcome differential exists, and if that differential affects the probability of negotiating, then the case can be made that there is an additional cost imposed on the public by the arbitration procedure. In addition to the expected outcome differential, the effect of other variables on the probability of negotiating will also be examined. This study differs from others, not only in

its examination of the expected outcome differential, but also in examining the effect of the variables on each party individually, rather than in the aggregate.

The remainder of Chapter One gives a brief background of the evolution of compulsory arbitration in Michigan. Chapter Two presents a review of the literature. Because several reviews of the qualitative literature in this field exist, this chapter will concentrate on the new theoretical evaluations of final offer arbitration, and on the most recent attempts to test empirically the effects of compulsory arbitration on wage outcomes and collective bargaining. Chapter Three discusses union-management decision-making and how the objective functions of the parties influence their decision to arbitrate or to negotiate. It also sets out the theoretical framework of the wage equation used in this study. Chapter Four develops the estimating equations and empirical methodology for the probability of negotiating and for the wage equation. Included in this chapter is the rationale behind the use of the bivariate probit model. Chapter Five presents the results of estimating the wage equation and the probability of negotiating. In Chapter Six, conclusions drawn from this study and suggestions for further research are presented.

Legislative History in Michigan

A brief review of Michigan's compulsory arbitration law will be helpful in putting the discussion of the effects of

compulsory arbitration on wage outcomes and collective bargaining in its proper institutional context. This discussion is not meant to evaluate or judge the procedure, but only to explain the background and environment under which compulsory arbitration takes place in Michigan's public safety sector.¹⁰

Michigan public employees were given the right to bargain collectively in 1947 by the Hutchinson Act.¹¹ This Act allowed public employees to "meet and confer" with their employers to determine wages and other conditions of employment. The final decision, however, remained the sole discretion of management. The Act provided for mediation and factfinding to deal with impasses, but it explicitly forbade strikes. Severe penalties were imposed upon unions for violation of the no-strike clause.¹²

The 1960s proved to be the great impetus toward more rights for public sector employees. Michigan followed the general trend of the day by passing, in 1965, the Public Employee Relations Act (PERA) which expanded the rights of Michigan public employees.¹³ The law gave public employees the explicit right to organize and bargain collectively, provided a system for determination of representation rights through elections, laid out employer unfair labor practices, and retained mediation and factfinding as the dispute resolution procedures. Although strikes were still forbidden, the severe penalties in the Hutchinson Act were removed.¹⁴

During 1965 and in the years immediately following the passage of PERA, several groups argued that arbitration should be the final step in the impasse procedure. Several illegal strikes by public sector employees and the decision of the Michigan Supreme Court in the Holland case lent credence to their arguments. In the Holland case the court ruled that in order to seek injunctive relief from a strike, the public employer had to bargain in good faith, take part in mediation and factfinding, and prove that the strike jeopardized the public health, safety, and welfare.¹⁵ The less severe penalties for striking and the aftermath of the Holland case led to further revisions of the public sector laws in Michigan. The Compulsory Arbitration Act, Public Act 312, was passed in 1969. All contract disputes involving public safety employees would now be subject to compulsory arbitration. This law covered all public safety employees in county or municipal jurisdictions. The arbitration procedure was conventional and the compromise award was to be determined by a tripartite board. The panel consisted of one representative chosen by the employer, one selected by the employee bargaining unit, and a neutral chairperson selected in conjunction with both parties. If a neutral could not be agreed upon, s/he was to be appointed by the Michigan Employment Relations Commission (MERC). The strike ban in PERA was still in effect, and the law was to be effective for three years.

In 1972, the legislature had to decide whether to extend Act 312 or to let it expire. Legislative debate centered on two major issues. First, some legislatures were concerned that Act 312 diminished the parties' voluntary settlement efforts in the course of collective bargaining. Secondly, some were afraid that conventional arbitration gave the arbitrators too much opportunity to issue excessively high awards.¹⁶

The legislature dealt with these concerns separately. To try to prevent interference with the bargaining procedure, the panel was permitted to send the case back to the parties for further negotiations if they had not engaged in good faith bargaining prior to going to arbitration. Secondly, the legislature amended the Act by substituting final offer for conventional arbitration on all economic issues.¹⁷ The panel was instructed to choose the last best offer of one of the parties on each economic issue. The rationale of this change was that a forced choice between last best offers would exert pressure on the parties to submit reasonable offers.¹⁸ Some ability to compromise, however, remained in Michigan's bill in that each issue is handled separately and that last best offers can be presented rather late in the hearing. Final offer arbitration on economic issues became effective, Jan. 1, 1973. In March 1975, the legislature extended the Act permanently. Several amendments to the Act have been passed since 1975, but none has altered the essential nature of the Act.

ENDNOTES

- ¹For information on unionization in the public sector see "Facts and Figures in the Public Sector," Midwest Monitor, July/August 1979, pp. 1-8. Also, John F. Burton, Jr., "The Extent of Collective Bargaining in the Public Sector," in Public Sector Bargaining, eds. Benjamin Aaron, Joseph R. Grodin, and James L. Stern, Industrial Relations Research Association Series (Washington D.C.: Bureau of National Affairs, Inc., 1979), pp. 1-43.
- ²In the case of a tripartite panel the decision is based on a majority vote. The neutral chairperson must receive the support of at least one of the other panel members. For the pros and cons of a tripartite panel see Thomas A. Kochan, "Dynamics of Dispute Resolution in the Public Sector," in Public Sector Bargaining, p. 185.
- ³For a discussion of bargaining power and factors that affect bargaining power see Neil W. Chamberlain and James W. Kuhn, Collective Bargaining, 2nd ed. (New York: McGraw-Hill, 1965), Ch. 7.
- ⁴See, for example, the statement of the Taylor Committee on this issue in the Final Report (Albany: State of New York, March 31, 1966) at 33.
- ⁵Thomas A. Kochan, "Dynamics of Dispute Resolution in the Public Sector," in Public Sector Bargaining, pp. 161-162.
- ⁶B. V. H. Schneider, "Public-Sector Labor Resolution - An Evolutionary Analysis," in Public Sector Bargaining, pp. 206-207.
- ⁷Kochan, "Dynamics of Dispute Resolution in the Public Sector," p. 170.
- ⁸John C. Anderson and Thomas A. Kochan, "Impasse Procedures in the Canadian Federal Service: Effects on the Bargaining Process," Industrial and Labor Relations Review, 30:3 (April 1977), 285. For a direct test of the chilling effect see Hoyt N. Wheeler, "Compulsory Arbitration as a Method of Resolving Collective Bargaining Impasses: Firefighters and Municipalities," Diss. Univ. of Wisconsin 1974.

- ⁹Williard Wirtz, Address before National Academy of Arbitrators in Chicago, Feb. 1, 1963, in Daily Labor Report, No. 23, Feb. 1, 1963, F1-F4.
- ¹⁰For a thorough discussion and evaluation of final offer arbitration in Michigan see James L. Stern et al., Final Offer Arbitration (Lexington, Mass.: D. C. Heath, 1975) Ch. 3.
- ¹¹Act 336 of Michigan Public Acts of 1947.
- ¹²For a complete review of the legislative history of compulsory arbitration in Michigan see Mollie H. Bowers, "A Study of Legislated Arbitration in the Public Safety Services in Michigan and Pennsylvania," Diss. Cornell Univ. 1973., and Review of Michigan's Compulsory Arbitration Act (Lansing, MI: Dept. of Labor and Dept. of Management and Budget, 1979) pp. 4-7.
- ¹³Act 379 of Michigan Public Acts of 1965.
- ¹⁴Stern et al., p. 38.
- ¹⁵Holland School District v. Holland Education Association, 380 Mich. 314, 157 N.W. 2d 206 (1968). For more information on the ramifications of the case, see Stern et al, p. 39.
- ¹⁶Review of Michigan's Compulsory Arbitration Act, p. 5.
- ¹⁷Ibid.
- ¹⁸Ibid., p. 6.

CHAPTER TWO

Survey Of The Literature

This thesis explores two aspects of final offer arbitration. It formulates a wage differential that can be attributable to the choice of procedure, and it tries to identify factors that may lead to impasses in bargaining. Numerous other authors have addressed themselves to the study of alternative impasse procedures.¹ Articles exist concerning both the merits of various forms of impasse laws, and evaluations of the impact of those laws on the collective bargaining process. The majority of the literature in both categories, however, is descriptive or qualitative in nature. There is, however, a growing number of authors who have tried to analyze impasse laws rigorously, and to test the effects of these laws empirically. Because their aims parallel the main purpose of this thesis, this review of the literature concentrates on these select articles.

This review first examines the theoretical justifications that led to the birth of final offer arbitration. In doing so, the underpinning of several of the controversies surrounding final offer arbitration will be uncovered. In the latter half, the review examines previous attempts to measure an outcome differential attributable to compulsory arbitration, and explores other authors' efforts to identify factors that might lead the parties to submit their disputes to arbitration.

Theoretical Analysis

Final offer arbitration (FOA) was the invention of labor relation practitioners and scholars. Because the strike was illegal in most public sector jurisdictions, an alternative impasse procedure was needed. Conventional arbitration had been used in various jurisdictions and found wanting. Final offer arbitration (FOA) was seen as a way to increase the costs of disagreeing and therefore to induce the parties to negotiate their settlements. The ability of FOA to fulfill its role adequately as an alternative impasse procedure has been discussed by several authors.

The premier analytical article on FOA, written in 1966 by Carl M. Stevens, was concerned with the preservation of true collective bargaining. Stevens recognized that the strike in the private sector was successful in stimulating bargaining, because it imposed costs on both parties.² Not only an actual strike, but the mere threat of a strike was enough to induce negotiations. The effectiveness of an alternative impasse procedure in Stevens' analysis lay in its ability to impose costs on the parties. Stevens felt that FOA had the ability to mimic a strike if the final offers presented by the parties were synonymous with the final negotiating positions of the parties. The ability of the parties to alter their positions prior to or during a hearing limited the costs imposed by the compulsory arbitration procedure.³ The ability of FOA to be an effective

strike alternative depended on the uncertainty surrounding the process. The more uncertain the parties were concerning the behavior of the arbitrator the less likely they were to risk using arbitration as a means of dispute settlement. In his discussion, Stevens identified one of the Catch-22 situations surrounding FOA. Although uncertainty increased true collective bargaining in Stevens' framework, it created another problem. With uncertainty, the final offers of the parties diverged significantly. Therefore, because FOA forces the arbitrator to choose an either-or solution, FOA could lead to unworkable awards.⁴

Stevens' paper on FOA was a major contribution to the literature. He felt that final offer arbitration was more compatible with bargaining than conventional arbitration because it was riskier. Stevens did, however, point out the problems with FOA mainly in the area of workable results. Most of the subsequent theoretical literature on FOA built on Stevens' analysis and reemphasized the role of uncertainty in preserving true collective bargaining.

More recently, work on final offer arbitration has centered not only on uncertainty, but also around the relative risk preferences of the parties. A study by Henry S. Farber and Harry C. Katz relied on a discussion of uncertainty and risk preferences to evaluate the effectiveness of FOA in encouraging bargaining and to investigate what effect FOA might have on outcomes.⁵ Farber and Katz modeled FOA in terms of maximizing the expected utility of the parties.

Farber and Katz accepted Stevens' hypothesis that it is the threat of a strike that acts as the incentive for bargaining; and it is this threat that creates the contract zone or range of potential settlements. They argued, however, more explicitly than did Stevens, that while FOA is not inherently better at securing bargained settlements, it is the uncertainty surrounding the arbitrator's decision and the risk preferences of the parties that determines if FOA will lead to negotiated settlements.⁶

The ability of an arbitration procedure to induce a negotiated settlement is a function of its ability to create a contract zone. In the absence of direct costs due to arbitration, this contract zone is not dictated by costs, but by the uncertainty regarding the arbitrator's behavior and the relative risk preferences of the parties. As long as risk aversion dominates, the parties will give up expected gains in order to avoid the uncertainty of arbitration.⁷ According to Farber and Katz, the more uncertainty involved, the larger the contract zone; therefore, the increased probability that the parties will negotiate. As uncertainty disappears, the contract zone also disappears, and with it the chance of a negotiated settlement.⁸ This finding implied several interesting facts about final offer arbitration. If FOA is riskier than conventional arbitration, or if it has more uncertainty associated with it, then it will lead to more true collective bargaining, as Stevens predicted. According to a separate working paper by Farber,

however, there is no inherent reason to believe that FOA is riskier than conventional arbitration. In FOA the parties can control the risk by adjusting their final offers so as to minimize the probability of a bad outcome.⁹ Secondly, if the parties learn about the behavior of arbitrators over time, then uncertainty decreases as time passes. This implies that as time passes, the contract zone will disappear, and the frequency of arbitration will increase.¹⁰ Thirdly, not only does uncertainty decrease over time, but any intermediate step, such as mediation or factfinding, which is designed to increase the information to the parties may discourage true collective bargaining.¹¹

In addition, Farber and Katz deal with the effect of final offer arbitration on wage outcomes. They hold that a necessary requirement for measuring the effectiveness of alternative impasse procedures is to investigate any bias introduced into the environment by the procedure.¹² If outcomes are different in a compulsory arbitration environment from what they would have been if the parties could not avail themselves of the procedure, then the procedure introduces a bias. In the case of FOA, the contract zone sets the bounds for negotiated settlements. Because the arbitrator's expected behavior influences these contract zones, the presence of FOA affects not only arbitrated awards, but also negotiated ones.¹³ The difference between negotiated and arbitrated settlements is a function

of the uncertainty regarding the arbitrator's award, the relative bargaining power of the parties, and the relative risk preferences of the parties. Any change in the average arbitrator's award will change negotiated outcomes by the same amount; therefore, a differential will not be detected by a simple comparison of negotiated and arbitrated outcomes.¹⁴ An increase in the uncertainty involved will bias the negotiated outcomes, but as uncertainty is reduced all settlements will tend to converge.¹⁵

The work done by Farber and Katz agreed in principle with the earlier work by Stevens. Uncertainty regarding the arbitrator's award was most conducive to true collective bargaining. Thomas A. Kochan, however, in an earlier review of Stevens' article, challenged the premise that conditions are best for a negotiated settlement where uncertainty is at a maximum.¹⁶ Citing an article by Robert J. Hines, Kochan stated that legal scholars have recognized for years that it is the lack of uncertainty, i.e. predictability, that obviates the necessity for litigation in many cases.¹⁷ Why go to arbitration, a costly endeavor, if one can predict with certainty the arbitrator's award?

The reconciliation of these divergent views lies not in the theory of Farber and Katz nor in the observation by Kochan, but in their use of the rate of usage as a measure of the reliance on the arbitration procedure. Farber and Katz mention that one criterion used to evaluate interest

arbitration is the frequency with which it is necessary to employ the procedure.¹⁸ This follows from the common belief that a good procedure is one that is seldom used and that provides an incentive for the parties to reach a negotiated settlement.¹⁹ Failure to use the procedure, however, does not imply an incentive to bargain. The model used by Farber and Katz holds that as uncertainty decreases the contract zone shrinks and therefore increased use of arbitration may be observed.²⁰ Kochan, however, implies the seemingly obvious. Why bother to arbitrate when you can win the same award without resorting to the procedure? If Farber and Katz's assumption of no direct costs involved in arbitration is relaxed, then a contract zone can exist even under certainty.²¹ Although the contract zone may be small, there is reason to believe that under certainty the parties could find the contract zone and settle without direct reliance on the arbitration procedure. Therefore, shrinkage of the contract zone would not necessarily imply increased usage of the procedure. The fact remains, however, that in the absence of uncertainty, compulsory arbitration does interfere with true collective bargaining. Where the parties settle at the arbitrator's expected award no unique aspects of the bargaining relationship are taken into account. They have mutually agreed to a position, but the arbitrator's beliefs are still interfering with the collective bargaining process. Even though there is no increase in usage, or where usage rates do not seem unacceptable, it is not

necessarily the case that true collective bargaining is being enhanced. Usage rates, therefore, are not necessarily a good barometer of "true" collective bargaining.

There seems to be basic agreement over the factors that affect the quality of an alternative impasse procedure. Procedures that entail uncertainty enhance true collective bargaining. At the same time, however, uncertainty can lead to unworkable results. Certainty, on the other hand, leads to more reasonable awards, but it interferes with the collective bargaining process. The controversy arises over deciding if final offer arbitration, or any other form of compulsory arbitration, possesses these qualities and, if so, to what degree. In order to check the magnitude of these qualities and to investigate the actual effect on the collective bargaining process, empirical work is needed.

Empirical Literature

The empirical literature concerning compulsory arbitration can be divided into two main categories. One branch concentrates on the effect of compulsory arbitration on wage outcomes. Authors in this area have tried, through various techniques, to measure the bias to outcomes introduced by alternative impasse procedures. The other branch emphasizes the effect of compulsory arbitration on the collective bargaining process. These latter articles explore the concerns voiced by George W. Taylor:

The design of dispute settlement procedures must consistently avoid two pitfalls. The first is that impasse procedures often tend to be overused; they may become too accessible and as a consequence, the responsibility and problem solving virtues of constructive negotiations are lost. Dispute settlement procedures can become habit-forming and negotiations become only a ritual.²²

In order to avoid some of these pitfalls, authors have tried to identify factors that lead parties to rely on third-party intervention instead of negotiated settlements.

Effect on the Bargaining Process

Practitioners and scholars have chosen to judge the merits of an alternative impasse procedure by its lack of interference with the collective bargaining system. Alternative impasse procedures or entire systems — mediation, factfinding, and compulsory arbitration — are designed with the intent of enticing the parties to settle on their own. In order to design effective impasse procedures, one must be aware of the factors that cause parties to arbitrate. What is it in the economic, political, or personal environment of collective bargaining that causes negotiations to break down?

Thomas A. Kochan and Jean Baderschneider (K & B) explored the impact of the 1974 change in the Taylor law on the bargaining process in "Dependence on Impasse Procedures: Police and Firefighters in New York State."²³ The Taylor Law, passed in 1967, provided a three-step impasse procedure for all public sector employees in

municipalities and counties in New York State, except New York City. The impasse procedure provided for mediation, factfinding, and a legislative hearing.²⁴ In 1974 the Taylor Law was amended to make conventional compulsory arbitration the final step in the impasse procedure. K & B were concerned with predicting if the change in the law would increase or decrease the probability of an impasse developing. In order to measure the impact of the change in the law, K & B had to control all other variables that might influence the parties decision to go to arbitration. K & B developed a model which encompassed a wide array of variables that reflected the diverse forces present during collective bargaining. K & B divided the sources of impasse into environmental, structural-organizational, and miscellaneous. Environmental sources included economic, political, and legal factors as well as size. Structural-organizational sources included whether pattern bargaining was followed, the degree of intraorganizational conflict, the degree of authority given the management negotiator, and the presence of union pressure tactics. Miscellaneous sources of impasse included the personal characteristics of the negotiators, the attitudes of the parties toward each other, and the bargaining history of the parties. The data for their study were collected between 1974-1976 in semi-structured interviews with union and management negotiators. The sample consisted of all municipalities in the State of New York that bargained with both police and firefighters,

excluding New York City.²⁵ Basically, K & B used a predictive model to determine the effect of a change in the law. A set of correlations and regression equations was generated using the data from factfinding (the previous law) from 1972-1974. A reduced set of variables was then included in the equation to predict whether an impasse would have been expected to develop between July 1974 - June 1976 if the law had not been changed.²⁶ These results were compared to the actual experience with bargaining under the new law.

Kochan and Baderschneider's conclusions were three-fold. Concerning their original task, they determined that the change from factfinding to compulsory arbitration increased the probability of impasse by approximately 16% for both police and firefighters. More interesting from the point of view of this thesis were their results concerning factors causing impasses. The variables used to capture the economic environment did not have much effect. Economic conditions did not distinguish cities that settled from those that arbitrated.²⁷ Of the environmental characteristics, only city size and previous starting salary were significant with any consistency. Variables measuring previous impasse behavior, management-negotiator authority, union pressure tactics, intergroup hostilities, and experience were better predictors of behavior. One reason given for this by K & B was that economic and

political environmental characteristics tend to have offsetting effects on the decisions of the parties. Factors that increase union resistance tend to decrease management resistance. This offsetting effect diminishes the ability of these variables to distinguish between groups that arbitrate and those that negotiate.²⁸

A tertiary conclusion drawn from Kochan and Baderschneider's study concerned the presence of the narcotic effect. First, they looked at the rate of impasses for each bargaining unit across its complete bargaining history. Second, the conditional probability of going to impasse in later rounds of bargaining, given that the parties had gone to impasse previously, was calculated. K & B found there was a definite trend toward increased usage in each successive round of bargaining since the passage of the Taylor Act, and the probability of going to impasse increased in subsequent rounds of bargaining for those units that had gone to impasse in the past.²⁹ This finding proved to be one of the more controversial of their study.

An article by Richard Butler and Ronald G. Ehrenberg has challenged this finding of K & B. Reanalyzing the data used by K & B, Butler and Ehrenberg (B & E) found that the narcotic effect did exist, as K & B argued, but it only lasted during the early period and was actually reversed in later years.³⁰ B & E maintain that the conditional probability estimates do not allow one to differentiate

between the narcotic effect and simple heterogeneity. Therefore, one cannot conclude that a narcotic effect actually exists unless you can control for differences in unobservable characteristics or for other economic, structural, or political differences that might affect the probability of a jurisdiction going to impasse. B & E concluded that although a positive narcotic effect existed in the first three rounds of bargaining, in the last three rounds examined a negative narcotic effect was dominant. They attributed this negative effect to being dissatisfied with previous awards, awards not corresponding to prior expectations, or the tendency of the parties to "give arbitration a try" in its first years of existence.³¹

Another article which presented a theoretical framework for assessing factors that affect the ability of the parties to reach a settlement without resorting to arbitration was Anderson and Kochan's discussion of the Canadian Federal Service.³² John C. Anderson and Thomas A. Kochan (A & K) used the unique Canadian federal system to explore whether compulsory arbitration was as effective as the strike in encouraging bargaining. In doing so, they examined factors that lead to impasses and tested for the existence of the chilling effect, the narcotic effect, and the half-life effect. The chilling effect examines whether the negotiators hold back concessions during negotiations because they believe the arbitrator is likely to split the difference

between the final positions of the two parties. The narcotic effect tests whether the parties become addicted to the process after initial usage. The half-life effect investigates whether impasse procedures lose their effectiveness over time as a result of the learning process.

Anderson and Kochan's study used Canadian federal employees employed by the Treasury Board. The total employment in the bargaining unit had to exceed 500 sometime during the four rounds of bargaining to be included in the sample. Their sample covered forty-nine of the seventy-two bargaining units in the population, and they mapped these same units through four consecutive rounds of negotiations.³³ The dependent variables in A & K's study were whether the unit settled prior to impasse or not, and at what stage of impasse procedure the unit did settle.

The independent variables were chosen with two factors in mind. First, whether they aided in the conceptualization of the bargaining and impasse-resolution process in public employment, and as in the case of many studies, data limitations. Although A & K recognized that collective bargaining is an economic, political, organizational, and interpersonal process, they were forced to concentrate on relating objective features of the environment to the impasse procedure.³⁴ A & K reiterated the concerns of Kochan and Baderschneider:

...we recognize that it is difficult to generate unambiguous predictions regarding the effects of environmental variables on the dispute resolution process...in developing a theory of the determinants of impasses, researchers should be cognizant of these countervailing pressures, which may suggest alternative hypotheses for each environmental variable depending on the point of view considered (management or union).³⁵

Environmental characteristics used by A & K included both labor market or labor demand variables and real wage pressure on employees. Because they were dealing with the federal government ability to pay was not considered. Organizational characteristics such as size of bargaining unit and occupational category were also included. A & K also included whether the parties went to impasse in the previous round of bargaining as a partial test of the narcotic effect.

The results of A & K's study supported the "pessimistic" view of compulsory arbitration procedures. The overall pattern of results supported the existence of a chilling effect. Over time the proportion of units settling on their own steadily decreased.³⁶ There was also preliminary evidence of the narcotic effect in that the probability of going to impasse was greater if the unit had gone to impasse in the immediately preceding round of negotiations.³⁷ There was also an indication of a half-life effect in the fact that after the first round there was increasing movement away from arbitration in favor of the conciliation board-strike option.³⁸

Similarly to K & B, A & K had trouble finding a stable relationship between any of the variables examined and the dependent variables across three rounds of bargaining.³⁹ The low R^2 s suggested that the equations had not fully captured all the key elements that effect the settlement process.

Common threads were interwoven in Kochan and Baderschneider's and Anderson and Kochan's articles. Both approached the problem of interference with the bargaining process by trying to identify factors that cause the negotiations to break down. Both recognized that bargaining is a complex situation that involves economic, political, organizational, and interpersonal characteristics. K & B were able to include more of these variables because their data were collected in personal interviews. A & K, constrained by the available data, were forced to use more objective measures of the environment. Both articles found evidence of the narcotic effect. Neither article, however, took account of the natural heterogeneity of bargaining units that may cause reusage of the procedure. In both cases the authors were more concerned with the general observable tendency of reusage than with whether the compulsory arbitration procedure, in and of itself, led to addictive behavior. Both authors mention the problem scholars have had in using economic and political environmental characteristics. In both cases this is

attributed to the offsetting influence of these variables on party decision-making that interferes with their ability to predict behavior. Yet, in both cases, the authors estimated aggregate functions. In neither instance did the authors try to estimate the effect of these variables on the parties individually.

In addition, when taking into account factors that might cause impasses, neither empirical article explicitly stated that expectations concerning the arbitrators award may influence the decision. If the parties perceive an outcome differential exist, then this factor should be entered into any equation that tries to predict the probability of an impasse. There are two possible explanations for excluding such a variable. One, a differential may not be perceived and therefore not be important in the decision. Second, a differential if it does exist is difficult to measure and therefore is often excluded. This is one oversight to which this study addresses itself.

Wage Outcomes

Since the advent of compulsory arbitration, practitioners and scholars have tried to discern if compulsory arbitration leads to higher than average wage settlements. There are two different types of wage effects that can be attributable to compulsory arbitration. One wage effect is to see whether a particular form of compulsory arbitration

in general has increased the wage levels of covered employees.⁴⁰ Did wages of public sector employees in Michigan increase with the shift from conventional arbitration to final offer? Did Wisconsin police and firefighters do better after the procedure changed from factfinding to final offer arbitration? The second wage effect is to determine if the arbitration procedure results in higher wages for those who use the procedure than for those who negotiate their settlements. The theory predicts that as uncertainty declines, negotiated and arbitrated outcomes will converge. But what really happens? A study by the Boston Research Bureau found that in Massachusetts use was excessive and awards were running 14 percent higher than negotiated settlements.⁴¹ This thesis explores the effects on outcomes in a final offer environment, and therefore will concentrate on measuring the latter wage effect.

Wisconsin has used final offer arbitration as the final step in its impasse procedure since 1972. In a study by Stern, regression analysis and personal interviews were used to ascertain the impact of arbitration on bargaining outcomes.⁴² The dependent variable was the monthly maximum base salary of police patrolmen, firefighters, and deputy sheriffs. Included among the independent variables was the number of times arbitration had been used by the city or county during collective bargaining. All data pertained to outcomes in a compulsory arbitration environment. The

results of the study showed that although wages were significantly related to private sector wages and to median family income, they were not significantly related to arbitrating behavior.⁴³ Arbitration did not appear to pay dividends to public employees in Wisconsin's public safety sector.

A similar study was conducted by J. Joseph Loewenberg to examine compulsory arbitration experience in Pennsylvania. Starting in 1968, Pennsylvania used conventional arbitration as the final step in its impasse procedure. Loewenberg found that salary ranges were higher for those police units which negotiated settlements than for those which arbitrated. Overall, however, the salary increments were larger if they were a result of an arbitration decision than a negotiated settlement. For firefighters, arbitrated awards and negotiated awards were similar, as were the salary ranges of those who chose to arbitrate over those who negotiated.⁴⁴ This seems to imply that certain police units used arbitration to catch up with their counterparts in other jurisdictions. If the firefighter experience was representative, there would be no reason to expect arbitrated awards to be higher than negotiated awards once median salaries were equal.

Another attempt to measure the effects of final offer arbitration (FOA) on wage outcomes was undertaken by David E. Bloom, who measured the effect of FOA on the salaries of

municipal police officers in New Jersey. Although Bloom would have ideally liked to measure both the wage change due to the introduction of FOA and any differential between arbitrated and negotiated settlements in an FOA environment, data limitations confined him to the latter.⁴⁵

Bloom estimated the differential effect of FOA on arbitrated and non-arbitrated salaries as:

$$M^{AN} = M^A - M^N = (S_t^A - S_{t-1}^A) - (S_t^N - S_{t-1}^N)$$

M^A represented the salary change that resulted from arbitrated settlements and M^N represented negotiated changes. The subscript $t-1$ referred to the period preceding the establishment of FOA while t referred to the first period during which FOA procedures were in force. S denotes salary. Regression analysis that controlled for the biasing effects of non-random use was used to estimate M^{AN} .⁴⁶

The regression model postulated for the salary change for a given class of police officers in municipality i in period t was as follows:

$$M_{it}^{AN} = \alpha + \beta X_{it} + \gamma F_{it} + \varepsilon_{it}$$

where X_{it} is a vector of control variables, F_{it} is a dummy variable, 1 if arbitrated, 0 otherwise, and ε_{it} is a random error with zero mean and constant variance.⁴⁷ The control variables in X_{it} were those deemed important in determining the level of public sector wages in previous empirical studies.⁴⁸ Bloom also pointed out that because the dependent variables was a salary change, each variable

chosen for X_{it} must be entered in both its level and its change to ensure correct specification.⁴⁹

Data used for Bloom's study came from negotiations involving municipal police officers in New Jersey in which a request for mediation, factfinding, or interest arbitration was filed with the Public Employment Relations Commission (PERC) sometime during the fiscal year ending June 30, 1978. Although this ignored any group that settled without filing with PERC, Bloom believed that number to be small.⁵⁰ Other data were taken from files at the Rutgers University Institute of Management and Labor Relations, the New Jersey Municipal Salary Report, and several state and local reports.

Analysis of the average salary changes for arbitrated and non-arbitrated cases by individual job categories showed that, on average, these differences were positive, suggesting that arbitrated awards were larger than negotiated settlements.⁵¹ Bloom warned, however, that these changes may be associated with non-random use of FOA and therefore might be misleading. In fact, the ordinary least squares estimates of the regression model showed that none of the coefficients on the arbitration dummy variables were significantly different from zero. Bloom concludes from this that:

...there is no evidence that the institution of FOA procedures in New Jersey has been associated with abnormally high or abnormally low salary settlements.⁵²

Bloom took his study one step further by looking at who "won" or "lost" the FOA proceeding. Bloom found that although unions won more often (93 to 39), the results suggested that when the employer won an FOA proceeding the resulting salary was lower than it would have been if negotiated. In contrast, when the union won it did not achieve an "excessive" salary increase.⁵³ This type of evidence may be used in the future to determine the risk preferences of the parties.

Bloom's study must be read carefully. Although he concludes that "FOA did not result in abnormally high or abnormally low salaries" it must be kept in mind that what he actually found was that arbitrated awards were not significantly different from negotiated ones in an FOA environment. Although he makes this distinction earlier in the paper, it is obscured later on. He also cautions that his study only covers one year of experience with FOA in New Jersey. As Farber and Katz pointed out, due to initial differences in expectations about the behavior of arbitrators it may take time to learn about arbitrator behavior. Therefore studies that attempt to measure a long-run impact shortly after changes in procedures may be misleading.⁵⁴ Bloom's study, however, does lend credence to the belief that arbitrated and negotiated settlements converge, although it's surprising that this result is found in the first year of the FOA experience. It is possible that

Bloom's data set, limited to jurisdictions which requested mediation, factfinding, or arbitration, was too homogeneous, in that all settlements, negotiated or arbitrated, may have exhibited arbitrator influence.

ENDNOTES

¹For a recent bibliography of existing research see Division of Public Employee Labor Relations, U.S. Department of Labor, Current References and Information Services for Policy Decision-Making in State and Local Government Labor Relations: A Selected Bibliography (Washington, D.C.: Government Printing Office, 1971), p. 28. Also see a review of the literature contained in Thomas A. Kochan, Department of Labor Study, Ch. 2.

²Carl M. Stevens, "Is Compulsory Arbitration Compatible with Bargaining?," Industrial Relations, Vol. 5, No. 2 (1966), pp. 38-52.

³Ibid., p. 46.

⁴Ibid.

⁵Henry S. Farber and Harry C. Katz, "Interest Arbitration, Outcomes, and the Incentive to Bargain," Industrial and Labor Relations Review, Vol. 33, No. 1 (October 1979), pp. 55-63.

⁶Ibid., p. 55.

⁷Ibid., p. 58.

⁸Ibid., p. 60.

⁹Henry S. Farber, "An Analysis and Evaluation of Final Offer Arbitration," Working paper no. 242, Department of Economics, M.I.T., 1979.

¹⁰Farber and Katz, p. 63.

¹¹Ibid.

¹²Ibid., pp. 55-56.

¹³Ibid., p. 58.

¹⁴Ibid., p. 61.

- ¹⁵ Ibid., p. 63.
- ¹⁶ Thomas A. Kochan, p. 19.
- ¹⁷ Robert J. Hines, "Mandatory Contract Arbitration - Is it a Viable Process?," Industrial and Labor Relations Review, Vol. 25, No. 4 (July 1972), pp. 533-545.
- ¹⁸ Farber and Katz, p. 55.
- ¹⁹ For example, see George W. Taylor, Government Regulation of Industrial Relations (Englewood Cliffs, N.J.: Prentice Hall, 1948), p. 1.
- ²⁰ Farber and Katz, p. 63.
- ²¹ Farber and Katz, p. 56, f.n. 4.
- ²² Final Report of the Governor's Committee on Public Employee Relations (Albany, New York: 1966) p. 33 as quoted in Thomas A. Kochan and Jean Baderschneider, "Dependence on Impasse Procedures: Police and Firefighters in New York State," Industrial and Labor Relations Review, Vol. 31, #4, pp. 431-449.
- ²³ Kochan and Baderschneider, pp. 431-449.
- ²⁴ For a complete discussion of the New York Tabor Law, see Thomas A. Kochan et al., Dispute Resolution Under Fact-finding and Arbitration, (American Arbitration Association, 1979), pp. 9-13.
- ²⁵ Kochan and Baderschneider, pp. 432-437.
- ²⁶ Kochan and Baderschneider, p. 437. The predictive method is more experimental. A more conventional dummy variable regression was also estimated to test the stability of their estimates.
- ²⁷ Ibid., p. 440.
- ²⁸ Ibid., p. 447.
- ²⁹ Ibid., p. 438.

- ³⁰ Richard J. Butler and Ronald G. Ehrenberg, "Estimating the Narcotic Effect of Public Sector Impasse Procedures," Industrial and Labor Relations Review, Vol. 35, No. 1 (October 1981) pp. 3-20.
- ³¹ Ibid., p. 18.
- ³² John C. Anderson and Thomas A. Kochan, "Impasse Procedures in the Canadian Federal Service: Effects on the Bargaining Process," Industrial and Labor Relations Review, Vol. 30, No. 3, (April 1977), pp. 283-301.
- ³³ Ibid., p. 286.
- ³⁴ Ibid., p. 288.
- ³⁵ Ibid.
- ³⁶ Ibid., p. 291.
- ³⁷ Ibid., p. 291. Anderson and Kochan's test of the narcotic effect would be subject to the same criticisms by Butler and Ehrenberg as Kochan and Baderschneider's.
- ³⁸ Ibid., p. 292. Under the Canadian system bargaining units can choose either the arbitration or the conciliation-board and strike route. The method must be selected, however, prior to notification to bargain.
- ³⁹ Ibid., p. 294.
- ⁴⁰ For an example of this type of study dealing with final offer arbitration see James L. Stern et al., Final Offer Arbitration, (Lexington, Mass.: D. C. Heath, 1975), Ch. 6.
- ⁴¹ B. V. H. Schneider, "Public-Sector Labor Resolution - An Evolutionary Analysis," in Public Sector Bargaining, eds. Benjamin Aaron, Joseph R. Grodin, and James L. Stern, Industrial Relations Research Association Series (Washington, D.C.: Bureau of National Affairs, Inc., 1979), pp. 206-207.
- ⁴² James L. Stern et al., pp. 102-104.
- ⁴³ Ibid.

- ⁴⁴J. Joseph Loewenberg, "Compulsory Arbitration for Police and Firefighters in Pennsylvania in 1968," Industrial and Labor Relations Review, Vol. 23, No. 3, (April 1970) pp. 367-379.
- ⁴⁵David E. Bloom, "The Effect of Final Offer Arbitration on the Salaries of Municipal Police Officers in New Jersey," Working paper no. 129, Princeton University, November 1979.
- ⁴⁶Ibid., p. 10.
- ⁴⁷Ibid., p. 11.
- ⁴⁸Ibid., p. 32.
- ⁴⁹Ibid., p. 12.
- ⁵⁰Ibid., p. 13.
- ⁵¹Ibid., p. 16.
- ⁵²Ibid., p. 18.
- ⁵³Ibid., p. 19.
- ⁵⁴Farber and Katz, p. 63, f.n. 23.

CHAPTER THREE

Union-Management Decision Making

The main purpose of this thesis is to examine final offer arbitration and determine factors that lead to its utilization. In order to recognize factors that lead to impasses, one must understand the decision-making process of the union and of management. Arbitration costs time and money, yet a brief review of the record shows not only that numerous jurisdictions rely on arbitration, but some use it repeatedly.¹ Why do negotiators sometimes choose to negotiate while at other times they request arbitration? It is reasonable to believe that the choice made is not a purely random event, but is rather the result of systematic factors that influence the expectations of the parties and the environment in which bargaining takes place. This chapter explores the underlying utility functions of the parties, and examines factors that may influence their decision-making process. In addition, it presents a very general model of public sector wage determination.

Objective Functions of the Parties

The main parties involved in collective bargaining are the union and management. This study accepts the assumption that there is a basic economic conflict of interest between the two parties.² Each party has a set of goals it wishes to realize through the collective bargaining process. In

all cases, one party fulfills its goals at the expense of the other party.³ Labor relations experts have often tried to identify these goals and thereby identify the maximization function of the individual parties.⁴ It is generally accepted that business firms maximize profit and consumers maximize utility. It is not clear, however, what unions maximize. It has been suggested that unions maximize the wage bill, the wage rate per member, the utility of membership, rents generated from union monopoly power, membership size, the probability of the union's survival, the "economic welfare of the membership," and the difference between union receipts and expenditures.⁵ This wealth of ideas is proof that scholars have not yet selected an appropriate objective function. Recent studies have expanded the idea of welfare functions for union membership and union leaders. With respect to negotiations, the employee-member desires better terms and conditions of employment than could be achieved in the absence of the union.⁶ Union members seek to maximize their expected utility, where utility depends on the level of compensation s/he receives and the probability of retaining employment.⁷ The union leadership desires to stay in office as long as possible while maintaining the prestige of the union.⁸ In order to do so the union leader must act to keep the support of a majority of the membership by heeding their preferences in bargaining while safeguarding the integrity of the union as an organization. Therefore,

it seems reasonable to assume that union members want the union to maximize their expected real wages after adjustment for working conditions and that union leaders, in order to minimize the risk of being voted out of office, will center their bargaining behavior around this goal.⁹

Because public jurisdictions are not motivated by profit maximization, their maximization function is also unclear. With the growing public resistance to increased taxes, the bureaucratic budget-maximization literature does not fit today's municipalities.¹⁰ The cities are faced with a severe financial crisis due to the long term decline of the large cities, short run effects of the business cycle, and the new spending and tax limitation amendments.¹¹ This financial plight indicates that cost minimization would be a more realistic goal for public jurisdictions. Municipalities, however, walk a tenuous tightrope during contract negotiations. They serve both as the employer of public servants and as provider of government services. They aim to minimize the taxes of their citizens while maintaining both the quality and the quantity of services demanded by the public.

Combined with meeting budgets and maintaining services, most public officials are also concerned about the political repercussions of their actions. Where the primary negotiator is an elected official, public sector bargaining introduces accountability to management's side of the table. Therefore, as with unions, the objective function of the jurisdiction is complex.

Other than the immediate goals of wage outcomes and political expediency, environmental and historical precedents can also influence the decision-making process of the parties.¹² Because bargaining involves personal interaction, factors that interfere with communication either within the parties or between the parties can also effect the bargaining process. Given the varied goals of the parties, therefore, the decision to negotiate or arbitrate is based on the ability of a given choice to fulfill these goals and thereby maximize the utility the party receives from the final outcome.

This study assumes that the parties are attempting to realize their goals through the collective bargaining process. The procedure itself has no independent value or utility associated with it. Assuming union and management negotiators are rational decision-makers, the decision to arbitrate or negotiate is based on the utility differential the parties perceive as arising from the outcomes associated with the choice of procedure. If the negotiators perceive a higher level of utility associated with having an arbitrated award, they will want to arbitrate. If the utility from a negotiated settlement is perceived to be greater, the negotiators will pursue that option. The parties, therefore, must set their priorities and then decide which procedure maximizes the expected utility of their respective group.

Whether negotiation or arbitration is actually observed, however, is not governed solely by the choice of an

individual party. It is the result of a joint choice by the two decision makers. Compulsory arbitration laws are written such that either party can request arbitration. Therefore, if either party feels its interests would be best served by going to arbitration, the negotiations will by definition break down. Observing the final outcome, therefore, does not always reveal the preferences of the individual parties. Formally filing the request for arbitration does not necessarily reveal the true preferences of the party. In some cases the party filing may have been forced to that position due to lack of good faith bargaining by the other party, a sort of public sector boulderism. The preferences of the parties are in fact known only when a settlement is the result of negotiations. Only when both parties perceive a negotiated settlement to be in their best interest will negotiations be observed. Arbitration, however, will be observed if either or both parties feel it is in their best interest. Therefore, models of behavior in a compulsory arbitration environment should take into account the joint nature of the decision.

A Utility Model

More specifically, consider two parties, the union ($j = 1$) and management ($j = 2$), each faced with a choice (y) to negotiate ($m = 1$) or arbitrate ($m = 0$).¹³ The procedure ($Y_j = m$) preferred by the party is dependent on the utility function of the party. Each party j with

attribute vector S_j faces m alternatives with characteristics X_{jm} .¹⁴ Each party has a utility function U_{jm} which can be represented by:

$$U_{jm} = \overline{U}(X_{jm}, S_j) + e(X_{jm}, S_j) = Z'_{jm}\beta_j + e_{jm} \quad (1)$$

where Z'_{jm} is a vector of independent variables describing characteristics X_{jm} and the attributes S_j , and β_j is a vector of taste parameters specific to decision maker j . The random disturbance term is e_{jm} for alternative m and party j . It represents the effect of unobserved factors in each trial, measurement error, or random utility behavior. The utility functions are assumed to be linear in the parameters. U_{jm} , therefore, measures the utility derived by party j from the characteristics of choice m . The utility differential between choosing to negotiate and choosing to arbitrate, therefore, can be represented by:

$$Y_j^* = U_{j1} - U_{j0} \quad j = 1, 2 \quad (2)$$

where Y_j^* is the utility differential for party j between negotiating U_{j1} and arbitrating U_{j0} . Assuming the parties desire to maximize their own utility, party j will select:

$$Y_j = 1 \text{ iff } Y_j^* > 0, \quad \text{i.e. } U_{j1} > U_{j0}. \quad (3)$$

In other words, party j will choose to negotiate ($Y_j = 1$) if and only if the utility differential between arbitrating and negotiating is greater than zero, that is, that the utility associated with negotiating (U_{j1}) is greater than

the utility associated with arbitrating (U_{j0}). Hence, each party individually will decide to negotiate when the utility associated with negotiating is greater than the utility associated with arbitrating, i.e., when $U_{11} > U_{10}$ for the union and $U_{21} > U_{20}$ for management. The parties will wish to arbitrate ($Y_j = 0$) when $U_{j1} < U_{j0}$ and therefore $Y_j^* < 0$. Because the observed negotiation or arbitration is a joint decision, negotiations will only take place when $U_{11} > U_{10}$ and $U_{21} > U_{20}$. Only when both parties prefer negotiations will a negotiated settlement be observed. If arbitration is observed, three states of the world could exist. Arbitration is observed when $U_{11} < U_{10}$, $U_{21} < U_{20}$ or $U_{11} < U_{10}$ and $U_{21} < U_{20}$. Hence, arbitration will be observed if either party feels it would be better off or if both parties perceive arbitration to be in their best interest.

The key, therefore, in determining when an impasse is more likely to develop is to capture factors that result in the utility from arbitrating being greater than the utility from negotiating. The utility differential will arise when one alternative is able to fulfill the goals and desires of the parties better than the other.

The Utility Differential

As noted when discussing the utility functions of the parties, utility is influenced both by the characteristics of the alternatives and the attributes of the individual parties. Several of the factors included in the utility

model are characteristics of the alternatives available to the parties and therefore directly affect the level of utility associated with a particular choice. Others are attributes of the parties and affect the utility function by influencing the environment in which bargaining takes place.

Outcome Differential

It was stated earlier that union members want to maximize their expected real wage after making adjustments for working conditions. Union leaders, therefore, wishing to remain in office, will tend to center their bargaining behavior around this goal. In addition, management is concerned with meeting its budget and maintaining services. Therefore, it is reasonable to believe that economic factors are important to the decision-making process of both parties. It follows that the expected settlement (W^*) is an important component in assessing the utility derived from a collective bargaining contract. Because this study concentrates on the utility differential between the choices, the more relevant variable is the expected differential between negotiated and arbitrated settlements. Consider the two parties, union ($j = 1$) and management ($j = 2$), each faced with a choice (Y_j) to negotiate ($m = 1$) or arbitrate ($m = 0$). Each choice has associated with it an expected outcome (W_{jm}^*). The difference in the expected settlement between the two choices ($W_{j1}^* - W_{j0}^*$) will affect the

utility the parties derive from the choice. In other words, if the expected negotiated settlement (W_{j1}^*) is greater than the expected arbitrated settlement (W_{j0}^*), that difference in settlements ($W_{j1}^* - W_{j0}^*$) can be expected to affect the utility the parties derive from the choice of procedure. For the union, the utility from negotiating is an increasing function of the differential, $\frac{\partial U_{11}}{\partial (W_{11}^* - W_{10}^*)} > 0$ and the utility from arbitrating is a decreasing function of the differential, $\frac{\partial U_{10}}{\partial (W_{11}^* - W_{10}^*)} < 0$. For management, the utility from negotiating is a decreasing function of the differential, $\frac{\partial U_{21}}{\partial (W_{21}^* - W_{20}^*)} < 0$ and the utility from arbitrating is an increasing function of the differential, $\frac{\partial U_{20}}{\partial (W_{21}^* - W_{20}^*)} > 0$. Neither party knows with certainty what the arbitrator's decision (W_{j0}) will be. It is reasonable, however, that the parties will form expectations about the arbitrator's decision. These may be determined by some notion of a "fair" settlement and they may or may not be equal.¹⁵ Farber and Katz believe, however, that

It is reasonable to believe that over time the parties learn about the arbitrator's behavior both through their own experience and, indirectly, through the experience of others. This learning will have two effects on the parties' prior distributions of the arbitrators expected behavior. First, it is expected that the means of the prior distributions will converge to a common value. Second, the variance of the distributions will converge to a common value and fall as the parties form more accurate expectations of the arbitrators behavior.¹⁶

Political Pressure

Recently, several authors have emphasized the political nature of the wage setting process.¹⁷ Anthony Downs suggests that "the main goal of every party is the winning of elections... Thus all its actions are aimed at maximizing votes."¹⁸ If this theory is correct then it follows that elected officials may be more susceptible to political pressure than their appointed counterparts. Elected public officials may feel they're in a no win situation when dealing with public sector unions. If they don't give in to the union, they alienate public sector employees, a politically active group. If they do give in, other voters, increasingly aware of the cost of public services, may hold their elected officials responsible. Elected officials, therefore, may attempt to shift the political costs of a contract settlement from themselves to the arbitrator - a person without a constituency.¹⁹ This increased political pressure is one reason given for the move to the more professional city manager in municipal government.

Political pressure, therefore, will be positively related to the utility management gains from arbitrating, as long as the responsibility for the settlement is in the hands of an elected official. The union, however, can exert political pressure on an elected official during negotiations in order to influence the outcome in its

favor. When the political climate is favorable for the union, therefore, the union is expected to gain more utility from negotiating than arbitrating.

Relationship Patterns

The relationship between the parties involved in collective bargaining often dictates the negotiating strategy, the overall attitude of the negotiators, and the ability and willingness of the parties to compromise.²⁰ If the union distrusts management or if the negotiations in the past were employer-dominated, the utility the union receives from negotiating a settlement will be diminished. Collective bargaining is a very personal and sensitive device used by the parties to establish the terms of a contract. Anything that interferes with cooperative behavior on either side will cause the procedure to break down.

Negotiator Experience

Good faith negotiations are necessary to bring about an agreeable contract. As in any collective bargaining situation, however, public sector bargaining sessions have their share of give and take, outrageous demands, bluffing, and grandstanding. Part of the expertise involved in being a good negotiator is to be able to wade through the extraneous material, recognize the contract zone being dealt with, and bring about a mutually-agreeable settlement. Lack of bargaining skill or experience on

either side may cause negotiations to break down prematurely.²¹ The more experience the parties have, the better they should be at negotiating and the stronger their respective bargaining power. Experience, therefore, should increase the utility associated with bargaining due to the advantage the experienced party has at the bargaining table.

Intraorganizational Conflict

Before the parties are able to provide a united front at the bargaining table they must resolve all intraorganizational conflicts.²² Management is often treated as a single interest group pursuing an agreed-upon set of goals. In fact, management is made up of a number of different and often conflicting groups that may have diverse objectives or priorities in mind at the start of negotiations.²³ With the importance of wage comparability in the public sector, management not only has to settle differences among their own ranks, but also among managers in other jurisdictions. For management the development of wage targets or other "strike points" is an essential part of the internal planning that takes place prior to or during the initial stages of bargaining.²⁴ The union must also reconcile the different priorities of its membership before going to the bargaining table. Ideally, employees represented by a single bargaining unit share the same community of interest. Reasonable bargaining units, however, may have differences of opinion among members concerning bargaining priorities

and negotiating tactics. The conflict between wages now and wages later (retirement) has split many unions. The less successful the union and management are at solving their intraorganizational disputes the less likely they will be able to solve the problems between them. The presence of intraorganizational conflicts will decrease the utility gained from negotiating a settlement due to the inability of the parties to set their priorities and then work to achieve them.

Past Arbitration Behavior

Many feel that parties that arbitrated in the past are more likely to arbitrate in the future.²⁵ Called the narcotic effect in the literature, it presumes that relying on an arbitrator during one set of negotiations leads to further reliance on the procedure. Evidence regarding the narcotic effect is inconclusive and it seems to depend on how strict your definition of the narcotic effect is. The major evidence against the hypothesis is that the majority of contracts are settled between the parties without using a third party.²⁶ Studies, however, that follow the same bargaining units over time have found increased dependence on arbitration. The fact that parties have gone to arbitration in the past, however, may be more an indication of management-union hostility or employer-dominance than an addiction to the process itself. If management-union hostility or employer-dominance exists, the utility gained

from negotiations is quite small, especially for the union. Therefore, if one of the parties found it in its best interest to arbitrate in the last series of contract talks, it is reasonable to believe that the forces that caused the party to choose arbitration in the past may still be present. Regardless, therefore, if the parties are addicted to the process itself or if continued use signals underlying interorganizational conflicts, the presence of a positive narcotic effect indicates a low level of utility associated with bargaining and therefore is a good indicator of future behavior.

Cost of Arbitration

Certain factors, inherent in arbitration laws, must also be considered during the decision-making process. The rationale behind the use of compulsory arbitration as a dispute-settling technique is that it imposes costs on the parties.²⁷ Like the strike in the private sector, the parties should be willing to compromise their positions and reach a negotiated settlement in order to avoid the cost involved in arbitration.

Arbitration costs money. In most states the cost of arbitration is split between the parties. This cost can be quite substantial, especially for small bargaining units and small jurisdictions. In a study investigating cost in Pennsylvania, where the municipality shoulders most of the

burden , costs were deemed a "very important" consideration for almost 23 percent of respondents from municipalities under 10,000 in population. Only 10 percent of the larger municipalities felt the same.²⁸ The costs for a single arbitration, however, ranged from \$156 - \$25,000, with \$5,000 to \$10,000 being a representative average. The existence of monetary cost, therefore, should decrease the utility gained from an arbitrated settlement.

Another cost involved in arbitration is uncertainty. If the parties are risk averse, each will be willing to settle for less in negotiations than the expected arbitration award.²⁹ The larger the costs, or the more risk averse the parties, the greater the disutility associated with the choice. As time passes, however, the parties may be better able to predict an arbitrator's behavior, thereby reducing the uncertainty and therefore the cost of going to arbitration.

All of the above factors may influence the utility differential arising from the choice of procedure and therefore influence the decision made by the individual parties. The magnitude of these effects and the ability to measure them will be of major importance in trying to predict behavior. Due to its complexity, one factor, the expected outcome differential, requires further comment.

Expected Outcome Differential

To analyze the effect of the compulsory arbitration procedure on outcomes, information on outcomes in both a non-compulsory arbitration environment and a compulsory arbitration environment would ideally be needed. Because bargaining laws are state laws, however, covering all appropriate bargaining units in the state, no instate control group can be identified.³⁰ This study, therefore, measures the differences between arbitrated and negotiated settlements among bargaining units all of whom are covered by a compulsory arbitration law. It compares what a party actually received with what it could have expected to receive if it had chosen the other option open to it.

Collective bargaining agreements cover numerous issues, and countless tradeoffs and package deals are all part of the collective bargaining ritual. Trying to construct an index, however, of marginal changes in wage and non-wage benefits covered in collective bargaining agreements would be very complicated and beyond the scope of this study.³¹ For this reason, this study uses wages as the sole measure of bargaining outcomes.

In order to isolate the wage differential attributable to final offer arbitration, this study first takes account of other factors that influence the annual percentage change in wages within a jurisdiction. Various factors other than the impasse procedure affect wage outcomes. Traditional

labor theory holds that in a purely competitive market, wages are determined by the interaction of supply and demand. Firms will hire labor until the marginal revenue product is equal to the wage. Most labor markets, however, are not perfectly competitive. Unionization introduces an imperfection into the market. Unionization imposes conditions of a bilateral monopoly, making wages indeterminate. Union contracts lead to wage rigidities because jurisdictions do not have sole control over wages and working conditions and therefore cannot follow market conditions. Another problem, inherent in the public sector, is the difficulty of measuring output.³² If output cannot be measured, then the simple model of wage determination under perfect competition breaks down due to the inability to define marginal product. Therefore, any model of wage determination in the public sector must go beyond simple demand and supply conditions.

Theories of wage determination under collective bargaining in the private sector rely heavily on the concept of bargaining power.³³ Bargaining power is the motivational force that persuades the parties to compromise their goals in order to reach an agreement. Sources of bargaining power are varied. The parties can derive bargaining power from economic conditions, structural and organizational factors, and the negotiations process itself. The key characteristic of the process affecting bargaining outcomes is the strike.

The ultimate source of power is the ability and willingness of the union to strike, and of management to take a strike.

In the public sector, the right to strike is curtailed. The leverage a party might have due to a superior economic position is removed. Arbitration, in fact, tends to equalize the bargaining power between the parties. If either the employer or the union is dominant in negotiations, the other party has the ability to force third party intervention. If arbitration is invoked, then wage determination proceeds according to the desires of an arbitrator in accordance with the arbitration statute of the state.³⁴ Therefore, under arbitration, wages are not set by supply and demand conditions, but by the arbitrator's perception of a fair award given the demand and supply conditions.

The influence of the arbitrator is not confined, however, to arbitrated awards. Negotiated awards may also be affected by the compulsory arbitration law. The threat of arbitration is always available to be used by the parties. The more certain the parties are of the arbitrator's behavior, the more the threat of arbitration will be used by the parties, and the more negotiated settlements will reflect the arbitrator's preferences even without reliance on the procedure.

The criteria used in determining arbitration awards, therefore, are relevant to both arbitrated and negotiated

wages. Factors that traditionally affect private sector wages, such as demand and supply conditions, are included, as are wages paid to other employees performing similar services in comparable communities. Arbitrators are charged to take into account cost of living, the interest and welfare of the community, and the financial situation of the jurisdiction. Any model, therefore, that attempts to explain public sector wages under collective bargaining must include market forces, institutional characteristics, and other factors that affect both the arbitrator's decision and the collective bargaining process.

Market Forces

Wages paid public employees are not totally isolated from the market. They are influenced by the supply and the demand for factors in the labor market.³⁵ The demand for labor is a derived demand for services. Therefore, any change in the demand for services, due to a change in taste or in financial conditions, affects the demand for labor. The supply of labor to the public sector is governed primarily by wages paid in the private sector. Assuming some degree of labor mobility, public sector labor supply is affected not only by private sector wages in the community, but also public sector wages in comparable communities. The importance of this market is reinforced by the instructions of most compulsory arbitration laws for arbitrators to take into account the wages, hours, and working conditions of comparable cities.

Other market conditions can also affect wage outcomes. The level of unemployment in the community can affect both wage offers and wage demands.³⁶ Areas experiencing low employment may have fewer job applications and therefore need to entice potential employees with higher pay. In good times workers may feel less content with their jobs and threaten to find work elsewhere, unless placated with large increases in compensation. Changes in the employment picture, or financial shocks due to plant closings or extended layoffs, may also affect wages paid within a jurisdiction.

Institutional Factors

Outcomes under collective bargaining are not only an interaction between supply and demand but are also a result of the power relationship between the parties. Although arbitration dilutes the role played by bargaining power in public sector labor negotiations, its importance does not disappear. To the extent that political or interpersonal factors affect that power relationship between the parties, they will also affect the wage settlement.

Various factors affect the bargaining power of the two parties. The more powerful and acceptable the public sector union, the more bargaining power it will have, and the more successful it will be at the bargaining table. Interference from state or federal governments may alter

the relative bargaining power of the parties and therefore affect outcomes. Local government cannot ignore federal directives on wages. Any government incomes policy, such as wage and price guidelines or wage and price controls, must be taken into account during negotiations. The effect of wage and price policies, however, will depend on whether they are voluntary or mandatory, and their effectiveness in changing the expectations of union membership.

Public sector collective bargaining takes place in a political setting. Several studies have tried to determine what affect this political atmosphere has on the wage setting process.³⁷ Ehrenberg hypothesized that city managers may be more efficient in producing fire protection services from a given number of fireman than a mayor. This was based on his belief that city managers would have more professional training and be removed from the political pressures of an elected official. If city managers are more efficient, and given that the demand for labor is a derived demand, then the reduced demand for labor would put downward pressure on wages.

Public sector wage determination is influenced therefore, by a wide array of variables. In order to model public sector wage determination it is necessary to take account of as many of these factors as possible. In the next Chapter an attempt will be made to model both the decision-making process presented earlier and public sector wage determination.

ENDNOTES

- ¹For a discussion of the monetary cost involved in arbitration see James L. Stern et al., Final Offer Arbitration (Lexington, Mass.: D.C. Heath, 1975), pp. 25-27.
- ²Although the fundamental conflict is economic, there are a multiple of diverse factors that affect the collective bargaining process. For example, see Richard E. Walton and Robert B. McKersie, A Behavioral Theory of Labor Negotiations (New York, N.Y.: McGraw-Hill, 1965).
- ³Henry S. Farber and Harry C. Katz, "Interest Arbitration, Outcome, and the Incentives to Bargain," Industrial and Labor Relations Review, Vol. 33, No. 1 (October 1979) pp. 56-57.
- ⁴Henry S. Farber, "Individual Preferences and Union Wage Determination: The Case of the UMW," Journal of Political Economy (October 1978), pp. 923-942.
- ⁵Donald C. Martin, An Ownership Theory of the Trade Union, (Berkeley, Calif.: University of California Press, 1980) pp. 1-5. For other work on union bargaining goals see Atherton N. Wallace, Theory of Union Bargaining Goals (Princeton, N.J.: Princeton Univ. Press, 1973), pp. 3-30.
- ⁶Richard N. Block, "Union Organizing and the Allocation of Union Resources," Industrial and Labor Relations Review, Vol. 34, No. 1, (October 1980) p. 105.
- ⁷Farber, pp. 927-928.
- ⁸Block, p. 106.
- ⁹Richard N. Block and Daniel H. Saks, "Union Decision-Making and the Supply of Union Representation: A Preliminary Analysis," School of Labor and Industrial Relations Reprint No. 166, Michigan State University, 1979-1980, p. 221.
- ¹⁰For a discussion of the principle of bureaucratic maximization see, for example, William Niskanen, "Non-market Decision Making: The Peculiar Economics of Bureaucracy," American Economic Review, 58 (May 1968), pp. 293-305.

- ¹¹David Lewin, Peter Feuille, and Thomas Kochan, Public Sector Labor Relations (Glen Ridge, N.J.: Thomas Horton & Daughters, 1977), pp. 18-20.
- ¹²Thomas A. Kochan and Jean Baderschneider, "Dependence on Impasse Procedures: Police and Firefighters in New York State," Industrial and Labor Relations Review, Vol. 31, No. 4 (July 1978), p. 43.
- ¹³For a complete discussion of the model presented, see Dale J. Poirier, "Partial Observability in Bivariate Probit Models," Journal of Econometrics 12 (1980), pp. 209-217.
- ¹⁴George Judge et al., Theory and Practice of Econometrics, (New York, N.Y.: John Wiley & Sons, 1980), pp. 593-596.
- ¹⁵Henry S. Farber and Harry C. Katz, "Interest Arbitration Outcomes, and the Incentives to Bargain," Industrial and Labor Relations Review, Vol. 33, No. 1 (October 1979), p. 57.
- ¹⁶*Ibid.*, p. 59.
- ¹⁷Ronald G. Ehrenberg, "Municipal Government Structure, Unionization, and the Wages of Firefighters," Industrial and Labor Relations Review, Vol. 27, No. 1 (October 1973) pp. 36-48. Also Walter Fogel and David Lewin, "Wage Determination in the Public Sector," in Public Sector Labor Relations, pp. 326-327.
- ¹⁸Anthony Downs, An Economic Theory of Democracy (New York, N.Y.: Harper and Row, 1957), p. 35. Quoted in Fogel and Lewin, p. 326.
- ¹⁹Kochan and Baderschneider, p. 434.
- ²⁰For a discussion on how relationship patterns and attitudinal structuring affect collective bargaining, see Walton and McKersie, Ch. 6.
- ²¹Kochan and Baderschneider, p. 436.
- ²²Walton and McKersie, Chs. 1 and 10.

- 23 Neil W. Chamberlain and James W. Kuhn, Collective Bargaining, 2nd ed., (New York, N.Y.: McGraw-Hill, 1965) pp. 217-222.
- 24 Thomas A. Kochan, Collective Bargaining and Industrial Relations, (Homewood, Illinois: Richard D. Irwin, 1980), Ch. 7.
- 25 Hoyt N. Wheeler, "Compulsory Arbitration: A 'Narcotic Effect'?", Industrial Relations, XIV (February 1975), pp. 117-120.
- 26 Kochan, pp. 210-211.
- 27 Carl M. Stevens, "Is Compulsory Arbitration Compatible with Bargaining?", Industrial Relations, Vol. 5, No. 2 (1966), pp. 38-52.
- 28 Stern et al., p. 26.
- 29 Farber and Katz, p. 56.
- 30 Thomas A. Kochan et al., Dispute Resolution Under Fact-finding and Arbitration, (American Arbitration Association, 1979), p. 70.
- 31 An attempt to construct an index of wage and nonwage benefits was undertaken in Thomas A. Kochan and Richard N. Block, "An Interindustry Analysis of Bargaining Outcomes: Preliminary Evidence from Two Digit Industries," Quarterly Journal of Economics (August 1977), pp. 431-452.
- 32 D. F. Bradford, R. A. Malt, and W. E. Oates, "The Rising Cost of Local Public Services: Some Evidence and Reflections," National Tax Journal, (June 1969), pp. 185-186.
- 33 Chamberlain and Kuhn, Ch. 7.
- 34 The following is an example of criteria used in determining arbitrated awards. Taken from article 423.239, Section 9, of Michigan's Public Act 312, factors include:
 - a) The lawful authority of the employer.
 - b) Stipulations of the parties.
 - c) The interest and welfare of the public and the financial ability of the unit of government to meet those cost.

- d) Comparison of the wage, hours and conditions of employment of the employees involved in the arbitration with the wages, hours, and working conditions of other employees generally in public and private employment in comparable communities.
- e) Average consumer prices for goods and services, commonly known as cost of living.
- f) Overall compensation presently received by the employees.
- g) Changes in any of the foregoing circumstances during the pendency of the arbitration proceeding.
- h) Such other factors, not confined to the foregoing, which are normally or traditionally taken into consideration in determination of wages, hours, and conditions of employment through voluntary collective bargaining, mediation, factfinding, arbitration or otherwise between the parties, in the public service or in private employment.

³⁵ Roger W. Schmenner, "The Determination of Municipal Employee Wages," The Review of Economics and Statistics (February 1973), pp. 83-90.

³⁶ Kochan, Collective Bargaining, pp. 38-39.

³⁷ Ehrenberg, pp. 36-48.

CHAPTER FOUR

Estimating Equations and Empirical Methodology

The last chapter presented a theoretical framework for evaluating factors that affect the parties' ability to reach a negotiated settlement. It was claimed that economic, political, and demographic factors influence the decision of the parties to negotiate or arbitrate. One of the factors, discussed in detail, was the expected differential between negotiated and arbitrated settlements. This chapter explores the empirical methodology and estimating equations necessary to investigate the probability of a negotiated settlement. First, data sources and descriptions are given. This is followed by an explanation of the bivariate probit model used to estimate the probability of negotiating. In addition, the variables used to estimate the probability of negotiating and the wage equation are introduced and explained.

There are several problems in estimating an empirical model of the decision to negotiate. First, the decision cannot be treated as a simple dichotomous dependent variable. The decision to arbitrate or negotiate is not the choice of an individual decision maker, but the joint choice of two decision makers. Either party can request arbitration. Merely observing arbitration, therefore, is not enough to reveal the preferences of the individual parties. Second, although organizational and interpersonal factors

are important in the decision-making process, they are difficult to measure and difficult to proxy. This study, therefore, relies on observable phenomena to predict behavior. Third, measuring bargaining outcomes is difficult due to the inability to monetize all aspects of the bargaining package. This study, therefore, uses wage outcomes as the sole measuring of bargaining outcomes.

The Data

This study uses data from negotiated contracts and arbitrated awards in Michigan's public safety sector. Negotiations between police and fire employees and their employers are used to test a model of union-management decision-making. Contract disputes involving public safety employees are covered by Michigan Public Act 312. Act 312 dictates that impasses in bargaining be solved through compulsory arbitration. The original act, passed in 1969, legislated conventional arbitration on all issues. The act was amended in 1972 to provide final offer arbitration on economic issues.

The data for this study were obtained from copies of both negotiated contracts and arbitration awards on file at the Michigan State University Labor and Industrial Relations Library and the Michigan State University Archives and Historical Collections. Contracts were available for the entire period of final offer arbitration in Michigan from 1973 to 1980. 1980 was dropped from the sample, however,

due to lack of observations. Multiyear contracts became increasingly common in the public sector in the 1970s. In order to insure the independence of the data set only one year of information from each contract was included in the sample. Hence, if Ann Arbor signed a three year contract in 1975 covering 1975-1977, only information from 1975 was used. If for some reason, however, all data were not available for 1975 then either 1976 or 1977 was used instead. The final sample included 337 cases from 116 different cities.

The data used in this study came from a choice-based sample. There was the possibility, therefore, of oversampling arbitrated and/or negotiated outcomes. Although a precise measure of the percentage of negotiations that resulted in an arbitration award was not available, a best guess for the period from 1973 to 1979 was approximately fifteen percent.¹ Of the cases used in the study, 240 were negotiated and 97 were arbitrated. Arbitrated cases, therefore, were twenty-nine percent of the sample. This indicated an oversampling of arbitrated cases. It was decided, however, that the best procedure was to use all the arbitrated cases in the calculations, and then correct for the oversampling. The Manski-Lerman "weighted maximum likelihood" method was tried, but the results of the estimations did not change significantly.² Thus the fact that this is a choice-based sample does not appear to have caused appreciable bias in the results obtained.

The Problem of Partial Observability

Under collective bargaining in the uniformed public safety sector in Michigan, each party is faced with a binary choice to settle through negotiations or force the negotiations to arbitration. Strikes by public safety sector employees are illegal. Each decision, separately, is a case of a dichotomous dependent variable where the choice variable takes on a value of one if negotiation is desired and zero if the choice is arbitration.³ Taken separately, the decision of each party can be represented by:

$$\begin{aligned} Y_1^* &= X_1\beta_1 + \varepsilon_1 \\ Y_2^* &= X_2\beta_2 + \varepsilon_2 \end{aligned} \quad (1)$$

where Y_1^* and Y_2^* represent the choice made by the decision makers, X is a vector of factors that affect the decision, and ε_1 and ε_2 are the error terms of the respective reduced form equations.⁴ The error terms $(\varepsilon_1, \varepsilon_2)$ are assumed to be distributed as standard bivariate normal, with correlation ρ . Y_1^* and Y_2^* , however, are not observable. Therefore,

$$Y_1 = \begin{cases} 1 & \text{if } Y_1^* > 0 \\ 0 & \text{if } Y_1^* \leq 0 \end{cases} \quad Y_2 = \begin{cases} 1 & \text{if } Y_2^* > 0 \\ 0 & \text{if } Y_2^* \leq 0 \end{cases} \quad (2)$$

The probability of a party choosing negotiation, $Y = 1$, is defined as the conditional probability that the event occurs, given the set of explanatory variables. In order to assure that the predicted probability is within the $(0, 1)$

interval, a probit equation could be used to estimate each equation.⁵ Implicit in this model, however, is the ability to observe Y_1 and Y_2 .

In public sector impasse procedures, the individual decision cannot always be observed. Because the observed arbitration or negotiation is a result of a joint choice between the two parties, individual decisions are not always observable. Negotiations will be observed when both parties feel it is in their best interest to negotiate. Because either party can file a request for arbitration, arbitration is observed if either party feels it would be better off by arbitrating. If arbitration is observed, three states of the world could exist: the union could desire arbitration, management could prefer arbitration, or both parties could desire arbitration. The inability to observe Y_1 and Y_2 at all times, prevents estimation of the model by a simple dichotomous dependent variable probit equation.

Partial observability of this type, however, can be represented by a single binary variable:

$$Z_i = Y_{1i} Y_{2i} \quad i = 1, 2, \dots, n. \quad (3)$$

where $Z_i = 1$ if and only if $Y_{1i} = Y_{2i} = 1$.⁶ The probability of negotiations taking place is the probability that $Z_i = 1$, that both parties agree that negotiating an agreement maximizes their utility. The distribution of Z_i is given by:

$$\begin{aligned}
P_i &= P_r(Z_i = 1) = P_r(Y_{1i} = 1 \text{ and } Y_{2i} = 1) = F(X_i\beta_1, X_i\beta_2; \rho) \\
1-P_i &= P_r(Z_i = 0) = P_r(Y_{1i} = 0 \text{ or } Y_{2i} = 0) = 1-F(X_i\beta_1, X_i\beta_2; \rho),
\end{aligned} \tag{4}$$

where the variances of ε_1 and ε_2 have been normalized to equal unity, ρ is the correlation between ε_1 and ε_2 , and $F(X_i\beta_1, X_i\beta_2; \rho)$ denotes the cumulative distribution function of the bivariate standard normal distribution.

The model is estimated using an iterative maximum likelihood technique. The maximum likelihood method consists of selecting the value of the parameters, $\hat{\beta}$ s, that make the data most probable.⁷ This is accomplished by writing the probability density of the data for a given parameter value β and finding the value of β , $\hat{\beta}$, that maximizes the likelihood function. Equivalently, the logarithm of the likelihood function can be maximized.

$$\begin{aligned}
L(\beta_1, \beta_2, \rho) &= \sum_{i=1}^n \{Z_i \ln [F(X_i\beta_1, X_i\beta_2, \rho)] \\
&\quad + (1 - Z_i) \ln [1 - F(X_i\beta_1, X_i\beta_2, \rho)]\}
\end{aligned} \tag{5}$$

Initial values are chosen for the parameters and maximization is performed using nonlinear optimization techniques.

This study uses the bivariate probit technique set out above to analyze the decision-making process of unions and of management. The logarithm of the likelihood function is maximized, with the numerical optimization performed using the Davidon, Fletcher, and Powell (DFP) algorithm.⁸

Estimating Equation

The theoretical framework discussed in the preceding chapter stated that the decision to arbitrate or negotiate is based on the utility differential arising from the outcomes associated with the choice of procedure. Factors such as expected outcomes, political pressure, and the bargaining relationship that affect the utility differential will influence the value that each party attributes to a particular decision. These factors, however, often affect each party differently. Factors that increase the union's resistance may decrease management's resistance.⁹ The bivariate probit equation used in this study results in separate union and management estimates for each of these factors. The variables used to capture the effect that these factors have on the probability of negotiating are as follows:

Wage Differential (WDIF)

The expected outcome differential is believed to affect the utility the parties derive from their choice of procedure. An expected wage differential is used as a measure of the effect of the outcome differential on the probability of negotiating. If W_N is the outcome that would occur under negotiations, while W_A is the outcome that would occur under arbitration, the outcome differential is $W_N - W_A$.

$$\begin{aligned}
W_N &= X\beta_N + U_N \\
W_A &= X\beta_A + U_A \\
D &= W_N - W_A
\end{aligned}
\tag{6}$$

The wage determination equations are based on observable variables. The parties, therefore, share the same information and therefore perceive the same negotiated wage. The parties will also share like expectations concerning the arbitrator's award. The perceived differential, therefore, will also be the same. Although this is improbable in times of uncertainty, it is not unreasonable to believe that as the parties learn about an arbitrator's behavior they will be able to predict the outcome.¹⁰ In addition, the expected differential $E(D)$, not the actual differential D , is used in the probit equation.

$$\begin{aligned}
E(D) &= E(W_N - W_A) = X(\beta_N - \beta_A) \\
\hat{E}(D) &= X(\hat{\beta}_N - \hat{\beta}_A)
\end{aligned}
\tag{7}$$

Therefore the bivariate probit is

$$\begin{aligned}
Y_1^* &= \tilde{X}\delta_1 + E(D)\gamma_1 + \varepsilon_1 \\
Y_2^* &= \tilde{X}\delta_2 + E(D)\gamma_2 + \varepsilon_2
\end{aligned}
\tag{8}$$

This reflects the assumption that the city and the union react to the expected differential. Neither party knows the error terms or has any "inside information" that allows it to be a better predictor of outcomes. This assumption is important because it allows estimation of the wage equations

by ordinary least squares (OLS). Because Y_1^* and Y_2^* do not depend on U_A or U_N , Z does not depend on U_A or U_N ; Z depends only on $\tilde{X}$, X , ε_1 , and ε_2 . Hence there is no selection bias as long as $(\varepsilon_1, \varepsilon_2)$ are independent of (U_A, U_N) , and therefore the wage equations can be estimated OLS. Assuming that larger wage settlements increase the utility of the union membership, a positive differential is expected to increase the probability of the union negotiating. For management, due to its desire to minimize cost, a positive wage differential is expected to decrease the likelihood of a negotiated outcome.

The wage data used to estimate the differential are taken directly from the negotiated contracts and arbitrated awards. The first step in estimating the differential is to estimate a wage equation for each subset of the data set.¹¹ This produced four sets of estimates; arbitrated 1973-75, negotiated 1973-75, arbitrated 1976-79, negotiated 1976-79. The data representing cases that had been arbitrated 1973-1975 are then substituted into an equation containing the estimated coefficients from the negotiated 1973-1975 subset. This gives a measure of what the outcomes would have been if the case in question had been negotiated instead of arbitrated. The fitted values from this equation are then compared to the fitted values from the arbitrated cases in 1973-75 to determine the differential. The same technique is repeated to determine the differential for all

subsets of data. The differential in all cases measures negotiated wages minus arbitrated wages.

City Size (SIZE)

City size is also included in the estimating equation. City size captures several phenomena that influence the decision-making processes of the parties. City size is used to proxy the effects of intraorganizational disputes, monetary cost, and bargaining power on the probability of negotiating. Several authors have noted that larger cities tend to utilize compulsory arbitration more than their smaller counterparts.¹² What independent pressure, however, does size exert on the union or on the municipality?

Large cities have several advantages in dealing with unions. They definitely have the money and resources available to carry out proper negotiations. Although they deal with large bargaining units, the size of any one bargaining unit is small relative to the size of city government. Therefore, large cities should have a superior bargaining position compared to the unions they deal with. Large cities are subject to intraorganizational disputes. Large cities, however, often have strong leadership and therefore should be able to solidify against the union and against increased wage expenditures. On the whole, it is reasonable to expect that the larger the city the more

likely it will want to retain its bargaining position by negotiating, rather than to relinquish its control to an arbitrator.

The union facing a large city at the bargaining table must try to counteract the seemingly superior position of management. Large bargaining units are not without power. The inability to strike, however, greatly curtails the options available to them. For the union, therefore, arbitration is often the way to balance employer-dominated sessions.¹³ Large unions should have the resources available to pay for the arbitrator, employee representatives, and lawyers necessary to carry out successful arbitration. In addition, large unions are also faced with intraorganizational disputes. The larger the bargaining unit the greater the chance that conflicts within the union will remain unsolved at the time of negotiations. These pressures on the union, therefore, should lead to a negative relationship between city size and the probability of negotiating.

Data for city size were taken from the 1970 Census of Population. Interim Census data were not used due to the limited coverage of population changes in small jurisdictions. City size, therefore, is a cross sectional variable measuring population as of 1970.

Union Affiliation (UAF)

One common problem often associated with public sector collective bargaining is inexperience on the part of the negotiators.¹⁴ If negotiators are not experienced in public sector bargaining or do not have knowledge of the arbitration procedure, their lack of expertise can cause negotiations to break down prematurely. Earlier studies have tried to link lack of experience with a decrease in the probability of negotiating a settlement. This study uses union affiliation as a measure of bargaining experience.

Two types of unions are present in the public safety sector. Traditional public sector unions, such as the Fraternal Order of Police (FOP) and the International Association of Firefighters (IAFF), represent the majority of bargaining units. Mixed unions, however, are organizing in increasing numbers.¹⁵ Mixed unions are traditional private sector unions that are now moving into the public sector. Although mixed unions have more experience with collective bargaining, they are often not familiar with the subtleties and intricacies of public sector bargaining. Also their lack of experience in dealing with arbitration can influence their negotiating strategy. The presence of mixed unions is expected to decrease the probability that the union will negotiate a settlement.

Management, however, faces different problems in dealing with an inexperienced union. It will probably

try to manipulate the union and take advantage of its inexperience. Union inexperience, therefore, would increase the expected utility of management from negotiating and increase the desire of management to negotiate a settlement.

Information on union affiliation was taken directly from the contracts and arbitration proceedings of the respective parties. A dummy variable is used to measure the effect of mixed unions on the probability of negotiating. The dummy variable is equal to one for a mixed union and zero otherwise.

Government Structure (GS)

The role played by government structure in wage determination was explored by Ronald Ehrenberg. Ehrenberg's hypothesis was that a city manager had more professional training than a mayor and therefore should be more efficient at producing fire protection services from a given number of firemen.¹⁶ This professional training and experience should also be beneficial in dealing with the union. In addition, the fact that a city manager is free from the political pressure of re-election should increase the probability of the city negotiating. It will not be necessary for the city manager to "pass the buck" to the arbitrator because s/he fears retaliation from the voters.

The presence of a city manager, however, reduces the ability of the union to use political leverage at the

bargaining table. The union will not be able to threaten management with retaliation by the voters. One more weapon will be removed from the union arsenal. The presence of a city manager is expected to decrease the probability of the union accepting a negotiated settlement.

To capture the effect of political pressure on the decision making process, a dummy variable is included representing the type of city government. The dummy takes on a value of one if the municipality has a city manager and zero otherwise. Information concerning government structure was taken from the Municipal Yearbook, 1970-1978, published by the International City Management Association.

Past Arbitration Behavior (PAB)

A dummy variable is also included to account for the past arbitration behavior of the parties. The variable takes on a value of one if the parties arbitrated their last settlement and zero otherwise. Information on past arbitration behavior was taken from a log of Act 312 kept by the Michigan Employment Relations Commission. The log recorded all actions taken under Act 312, the Final Offer Arbitration Act. This variable is included to measure the possibility of the narcotic effect. Evidence of a narcotic effect will result in past arbitration behavior having a negative impact on the probability of negotiating.¹⁷ There is no reason to believe that past arbitration experience will influence the union or management in different ways.

Interpretation of this variable, however, must be done carefully, due to the inability of this study to measure all the interpersonal factors that may cause the parties to be repeat performers.¹⁸

Time (TIME)

A time trend is also introduced into the estimating equation to discern if negotiating behavior changes over time. Assuming that the parties learn over time, and that they are capable of recognizing which choice is in their best interest, the overall direction of frequency over time yields valuable information. Several jurisdictions have accused arbitrators of giving excessively high awards or always finding in favor of the union.¹⁹ If this is true, then the frequency of arbitration being preferred by the union should increase over time. Management, however, should desire to negotiate all settlements. Due to the fact that the desires of one party can dictate the procedure chosen, the frequency of arbitration should increase. Farber and Katz also predicted an increase in the use of arbitration as parties become more certain of arbitrator behavior and therefore lost their desire to negotiate.²⁰ Frequency studies, however, have begun to show an overall decrease in the use of arbitration. Over time, fewer parties are going to the final stages of the impasse procedure. Both parties, therefore, must increasingly feel that negotiating is in their best interest. The passage of

time, therefore, is expected to increase the probability of negotiating for both the union and management.

The preceding variables are used to estimate an equation measuring the probability of the parties negotiating. The use of the bivariate probit model allows signs to be determined for each of the parties. The expected signs of the coefficients of the explanatory variables are as follows:

		<u>Expected Sign</u>	
		<u>Union</u>	<u>Management</u>
WDIF:	wage differential between negotiated and arbitrated outcomes	+	-
SIZE:	city size, 1970	-	+
UAF:	dummy variable for union affiliation; 1 if mixed; 0 otherwise	-	+
GS:	dummy variable for government structure; 1 if city manager, 0 otherwise	-	+
PAB:	dummy variable for past arbitration behavior; 1 if arbitrated last contract, 0 otherwise	-	-
TIME:	time trend	+	+

The Wage Equation

The theoretical model of the wage equation, introduced in the last chapter, combined the classic approach to wage determination with the institutional approach of wage setting under collective bargaining. Factors affecting the

demand and supply for labor were included, as were factors that influenced the bargaining power of the parties. This section explores the dependent variable, the percentage change in wages and the independent variables used to test the effect of the aforementioned factors on the annual percentage change in wages.

The dependent variable in this model is the annual percentage change in wages. This variable was chosen because the major interest in this study is the exploration of the role the arbitration procedure plays in salary increases within jurisdictions. The annual percentage change in wages is calculated as $\frac{W_t - W_{t-1}}{W_{t-1}}$, where W_t is the annualized salary found in the present contract and W_{t-1} is the annualized salary in the previous year.

Because each jurisdiction has a unique way of calculating its cost of living allowance (COLA), and COLA adjustments are made at varying times during the length of the contract, cost of living allowances are not included in the percentage change in wages. The base salary used in all cases represents the maximum salary of the patrolman or firefighter. All percentage wage changes, therefore, also apply to this rank. Although a simple examination of the average wage changes would tell us if arbitrated outcomes were larger than negotiated ones, the difference could be the result of non random use of the procedure. In order to determine the influence of the arbitration procedure on the

percentage change in wages, other factors that influence the change in wages must be taken into account. The independent variables used to capture other factors influencing wage outcomes are as follows:

Per Capita Money Income

Per capita money income is used as an indicator of the financial well being of the community.²¹ Money income is the current income of residents of an area, excluding non-market imputations such as the rental value of owner occupied housing and food grown and consumed on farms. Municipalities with higher per capita incomes are perceived as being better able to afford wage increases. Therefore, the percentage changes in wages and per capita money income are expected to be positively correlated.

Change in per capita income is a trend variable used to measure a change in the financial condition of the city.²² Because this study looks at the percentage change in wages in a given year, the rate of change in the financial condition of the government, not only the direction, is relevant.²³ We expect a direct relationship between the percentage change in wages and the percentage change in per capita money income.

Data on per capita money income were taken from the Michigan Statistical Abstract for the relevant year. Change in per capita income is the percentage change, $\frac{PY_t - PY_{t-1}}{PY_{t-1}}$,

for each jurisdiction, where PY_t is per capita income in the contract year, and PY_{t-1} is per capita income in the previous year.

Consumer Taste

Consumer taste can also affect the demand for public services. This study uses the property tax rate in the community as one indicator of taste for public services. If voters "vote with their feet", individuals with a higher preference for public services should live in relatively high tax areas.²⁴ These individuals should be willing to pay the cost of public services. Therefore, property tax rates are expected to be positively correlated with the dependent variable. Information on property tax rates was taken from the Michigan Statistical Abstract for all jurisdictions, for all relevant years.

Another variable used to measure the demand for services is the median value of housing.²⁵ Assuming the more valuable the home the more police or fire protection desired, median value of housing and the percentage change in wages will be positively correlated. Information on the median value of housing is collected during Census years. The median value of housing, therefore, is a cross sectional variable measuring housing values in 1970. Data were taken from the Census report on the median value of housing for Michigan jurisdictions as reported in the Michigan Statistical Abstract.

Consumer Price Index

In recent years, the consumer price index (CPI) has played an increasingly important role in contract negotiations. Consumers, especially in times of high inflation, are concerned about the purchasing power of their paychecks. Unions, therefore, often center their wage demands around the percentage change in CPI. Past increases in CPI are also frequently cited in arbitration cases to prove the relative financial situation of the employees. Therefore, the greater the increase in CPI, the larger the expected percentage change in wages.

In addition to large wage increases during inflationary times, unions have also won another means of protection — the COLA clause. Prior to the 1970s, cost of living allowances (COLA) were not prevalent in the public sector. This was due both to the near universality of one year contracts and the absence of recurrent high inflation years. Recently, however, several jurisdictions have added COLAs to their contracts. An exogeneous variable, therefore, is included in the equation to record the presence of a cost of living clause in the contract. Where a COLA clause exists, it is reasonable to believe that the negotiated percentage changes in wages, excluding the COLA, will be less than in contracts without a cost of living adjustment.

Private Sector Wages

Local municipalities that do not keep pace with alternative job opportunities find it difficult to retain or attract competent employees. The pool of labor from which they choose will be bid away by other employers. Therefore, the relative pay position between public and private employees can be very important.²⁶ In addition, Michigan Act 312, Section 9(d), instructs arbitrators to compare the wages, hours, and conditions of employment between the employees involved in the arbitration and employees in private employment in comparable communities. This study uses the percentage differential between public sector wages and wages paid by the private sector in comparable communities as an explanatory variable.²⁷ The annual earnings of manufacturing production workers in Michigan is used as a measure of the opportunity cost of public employment. In the case of private sector wages, comparable communities were chosen on the basis of labor market area. For the purpose of economic analysis, Michigan is broken down into nine labor market areas by the Michigan Employment Security Commission. This study uses these nine labor market areas as the geographical boundaries for alternative work opportunities. The annual wage paid police or fire employees in the city in question is compared to the annual earnings of manufacturing production employees in the relevant labor market area. Large

discrepancies between wages would indicate an incentive for a change in wage structure. If public sector workers are relatively well-paid compared to private sector employees, small increases are expected. If public sector employees, however, are relatively underpaid large increases are expected, to prevent desertion to the private sector.

Public Sector Wages

Individuals employed in the public sector also compare their wages to public sector employees in different cities. The pay rates of cities in the same geographic area or cities sharing similar living and working conditions may attract discontented employees. Arbitration panels are also instructed by Act 312 to consider wages of "comparable cities" in determining public sector awards.²⁸ Wage levels of similar occupations in comparable communities are used to formulate a differential between wages paid in the city in question and wages paid in comparable communities. In order to choose "comparable communities", this study relies on the breakdown used by the Michigan Municipal League. For the purpose of its annual wage surveys, the Michigan Municipal League breaks down the State of Michigan into three geographic regions: the Detroit area, the lower section of the lower peninsula, and the upper lower peninsula and upper peninsula. The regions are further broken down by city size. Wage rates are collected for a variety of occupations, including firefighter and patrolman.

This study uses an average wage figure calculated from the cities within the given region and in the relevant size distribution to determine the comparable public sector wage for the specified occupation. The differential measures the percentage difference between the city in question and the comparable cities. If the public sector employees are relatively better off than their counterparts in other cities, small increases can be expected on comparability grounds. If workers are underpaid, however, catch-up increases are to be expected.

Unemployment Rate

The level of unemployment in the community can affect both wage offers and the expectations of union members. The higher the rate of unemployment in the area, the less the leverage of the union and the smaller the expected wage increase.

The change in the unemployment rate is also used to pick up any new trends or changes in the financial well being of the community. Decreases in the unemployment rate signal a tighter labor market and are expected to result in more generous settlements.

Data used for the unemployment rates are annual figures for Michigan counties. The percentage change in unemployment is $\frac{UNP_t - UNP_{t-1}}{UNP_{t-1}}$, where UNP_t is the rate of unemployment for the present year and UNP_{t-1} is the rate for

the previous year. Data on unemployment rates are collected by the Michigan Employment Security Commission.

Federal Directives

Contract negotiations do not take place in isolation. At times, actors other than the main two parties can affect the outcome. Due to the importance of federal transfers to local treasuries, local governments cannot ignore federal directives on wages. Government wage and price controls or wage and price guidelines are expected to limit the gains in the public sector. During part of the time period of this study, voluntary wage and price guidelines were in effect. A dummy variable is included equalling one if wage guidelines were in effect and zero otherwise. Although voluntary guidelines are not strictly adhered to, their presence should decrease the percentage change in wages for public sector employees.

Multi-year Contracts

Several of the observations used in the sample are taken from the second year of a contract settlement. In order to measure the difference in wages due to the fact that the observation is not from the first year of a contract, a dummy variable is included. The dummy takes on a value of one if the observation is from the second year of the contract, and zero otherwise.

The final equation used for estimating the percentage change in wages is as follows:

$$\dot{W} = \beta_0 - \beta_1 \text{COLA} - \beta_2 \text{UNP} - \beta_3 \text{NUNP} + \beta_4 \text{PTR} + \beta_5 \text{MVH} + \beta_6 \text{CPI} + \\ \beta_7 \text{PY} + \beta_8 \text{NPY} - \beta_9 \text{PBDIF} - \beta_{10} \text{PVWD} - \beta_{11} \text{WPG} - \beta_{12} \text{DMY}.$$

where,

- $\dot{W}$: annual percentage change in wages
- COLA: dummy variable if COLA clause present. 1 if COLA, 0 otherwise.
- UNP: unemployment rate in county.
- NUNP: percentage change in unemployment in county.
- PTR: property tax rate.
- MVH: median value of housing, 1970.
- CPI: percentage change in CPI for twelve months preceding contract.
- PY: per capita income.
- NPY: percentage change in PY.
- PBDIF: wage differential between jurisdiction in question and public sector wages paid in other comparable communities.
- PVWD: wage differential between wages paid by jurisdiction and wages paid in private manufacturing in the same labor market area.
- WPG: dummy variable for presence of wage and price guidelines. 1 if guidelines, 0 otherwise.
- DMY: dummy variable for using an observation other than the first year. 1 if second, 0 otherwise.

The wage equation is estimated using ordinary least squares on four subsets of data: negotiated 1973-75, arbitrated 1973-75, negotiated 1976-79, arbitrated 1976-79.²⁹ The estimated coefficients from these equations

are then used to estimate the wage differential included in the bivariate probit analysis. The results of both the wage equation and the probability of negotiating are given in the following chapter.

ENDNOTES

- ¹ From October 1969 to December 1971, a period of conventional arbitration in Michigan, approximately 19.3 percent of negotiations culminated in an arbitration award. See Mollie Bowers, "A Study of Legislated Arbitration and Collective Bargaining in the Public Safety Services in Michigan and Pennsylvania", Cornell University Ph.D. dissertation, 1974, p. 180. MERC reports that the incidence of awards under the final offer law from 1973-1976 is 16.3%. See Thomas A. Kochan et al., Dispute Resolution under Fact-Finding and Arbitration, (American Arbitration Association, 1979), p. 27. More recently, however, the estimates have dropped to approximately 10%.
- ² C. F. Manski, and J. R. Lerman, "The Estimation of Choice Probabilities from Choice-Based Samples", Econometrica, Vol. 45, No. 8, (Nov. 1977), pp. 1977-1988.
- ³ Morley Gunderson, "Retention of Trainees, A Study with Dichotomous Dependent Variables", Journal of Econometrics, 2 (1974), pp. 83-84.
- ⁴ Dale J. Poirier, "Partial Observability in Bivariate Probit Models", Journal of Econometrics 12 (1980), pp. 209-217.
- ⁵ R. S. Pindyck and D. L. Rubinfeld, Econometric Models and Economic Forecasts (New York, N.Y.: McGraw-Hill, 1976), pp. 245-247.
- ⁶ The entire discussion and modeling of bivariate probit model is taken from Poirier, pp. 209-217.
- ⁷ Carlos Daganzo, Multinomial Probit, (Academic Press, 1979), p. 21.
- ⁸ Explanation of the DFP Algorithm can be found in M.J.D. Powell, "Recent Advances in Unconstrained Optimization", Mathematical Programming, 1 (1971), pp. 26-57.
- ⁹ John C. Anderson and Thomas A. Kochan, "Impasse Procedures in the Canadian Federal Service: Effects on the Bargaining Process", Industrial and Labor Relations, Vol. 30, No. 3, (April 1977), p. 288.

- ¹⁰ Henry S. Farber and Harry C. Katz, "Interest Arbitration, Outcomes, and the Incentive to Bargain", Industrial and Labor Relations Review, Vol. 33, No. 1 (October 1979), pp. 57-59.
- ¹¹ The original plan was to pool the arbitrated and negotiated cases for the entire sample period, using dummy variables to capture the difference in wages due to the choice of procedure. F-tests conducted on the validity of pooling, however, indicated that negotiated cases were significantly different than arbitrated ones. F-tests were also conducted across time periods. The data were split into two time periods, 1973-75 and 1976-79. This split was utilized to capture the effect of final offer arbitration immediately following the passage of the law versus the later years. Results of the F-tests indicated that negotiated and arbitrated cases in 1973-75 were distinctly different than negotiated and arbitrated cases in 1976-79. Because of the results of the F-tests, pooling of the data was rejected. The data, therefore, was split into four subsets, negotiated 1973-1975, arbitrated 1973-75, negotiated 1976-79, and arbitrated 1976-79 for the purpose of estimating the wage equation.
- ¹² Thomas A. Kochan and Jean Baderschneider, "Dependence on Impasse Procedures: Police and Firefighters in New York State," Industrial and Labor Relations Review, Vol. 31, No. 4, (July 1978), p. 434.
- ¹³ Ibid., p. 436.
- ¹⁴ Ibid.
- ¹⁵ Several police units in Michigan are represented by the International Brotherhood of the Teamsters, Local 214. The presence of mixed unions among firefighters is not prevalent, however, due to their strong national organization.
- ¹⁶ Ronald G. Ehrenberg, "Municipal Government Structure, Unionization, and Wages of Firefighters", Industrial and Labor Relations Review, Vol. 27, No. 1 (October 1973), p. 40.
- ¹⁷ Willard Wirtz, Address before the National Academy of Arbitrators in Chicago, Feb. 1, 1963, in the Daily Labor Report, No. 23, (Feb. 1, 1963), pp. F1-F4.

- ¹⁸ Richard J. Butler and Ronald G. Ehrenberg, "Estimating the Narcotic Effect of Public Sector Impasse Procedures," Industrial and Labor Relations Review, Vol. 35, No. 1 (October 1981), pp. 3-20.
- ¹⁹ B.V.H. Schneider, "Public Sector Labor Resolution - An Evolutionary Analysis, in Public Sector Bargaining eds. Aaron, Grodin, and Stern, IRRA Series, (Washington, D.C.: Bureau of National Affairs, Inc., 1979), pp. 206-207. Also in David Bloom, "The Effect of Final Offer Arbitration on the Salaries of Municipal Police Officers in New Jersey," Working paper No. 129, Princeton University, 1979.
- ²⁰ Farber and Katz, p. 63.
- ²¹ In the original model, state equalized value and the level of intergovernmental transfers were also included as measures of ability to pay. Both variables were insignificant, and fearing multicollinearity might be present, were dropped from further estimation.
- ²² The change in state equalized value was also included in the original model as a trend variable. The coefficient, however, was not significantly different from zero and therefore dropped. The threat of multicollinearity is high among the variables used to capture the financial status of the jurisdiction. Therefore, per capita income and the change in per capita income were chosen as the best measures of ability to pay.
- ²³ For a discussion on the importance of including both levels and changes, see David E. Bloom, "The Effect of Final Offer Arbitration on Salaries of Municipal Police Officers in New Jersey", Working paper No. 129, Princeton Univ., 1979.
- ²⁴ Charles M. Tiebout, "A Pure Theory of Local Government Expenditures", Journal of Political Economy, (Oct. 1956), pp. 416-424.
- ²⁵ For the use of median value of housing as a demand variable, see Ehrenberg, p. 37.
- ²⁶ The level of private sector wages was also included in the original model. The coefficient, however, was not significantly different from zero, and therefore was dropped.

- 27 The level of public sector employees was also included in the original model. The variable was dropped because its coefficient was insignificant.
- 28 Other variables that might affect bargaining power were included in the original equation. The percentage of area employees unionized, although theoretically important, had to be dropped due to insufficient data. The only measure of union penetration available were Freeman and Medoff's study of private sector unionism by SMSA. Due to the disaggregated nature of the rest of the data set, their data were not acceptable.
 This study could not find any indication of wage rates being influenced by the type of city government. Type of city government, therefore, was dropped from the model.
 The coefficient on city size was also insignificant. There was no indication that unions in large cities received a different percentage increase than their small city counterpart.
- 29 Ordinary least squares is used to estimate the wage equations under the assumption that (U_A, U_N) is independent of $\varepsilon_1, \varepsilon_2$). For a discussion of this problem see pp. of this thesis. In addition, an explanation of the rationale for using the four subsets of data is discussed in f.n. 11.

CHAPTER FIVE

Estimation Results

The wage equation in this model was formulated to capture factors that influence wage outcomes during collective bargaining. Several factors, including economic, demographic, and political characteristics, were analyzed in an attempt to explain the relationship between these factors and wage outcomes. The purpose of this test was to see if the percentage change in wages was sensitive to the choice of bargaining procedure. The results indicate that factors that affect wage outcomes do not necessarily affect both arbitrated and negotiated outcomes in the same way. In certain situations, discussed below, both the sign and significance of the coefficient vary with the choice of procedure. Results also indicated that behavior may change over time. Factors that were important in the years immediately following implementation of the law may diminish in latter years and vice versa. Taking into account, however, all the factors that influence the percentage change in wages, this study suggested that outcomes under arbitration, especially in the long run, were not significantly different from outcomes under negotiations in a compulsory arbitration environment. It must be kept in mind, however, that the model itself was much better at explaining the percentage change in wages in the initial years of the law than after several years experience with the procedure.

The Wage Equation

Descriptive Statistics

As stated earlier, the data for this study were taken from over three hundred negotiated cases and arbitrated awards in Michigan's public safety sector. More than one hundred different jurisdictions were represented during the years 1973-1979. The following tables give the mean and standard deviations of the variables used in the study, by year. (Table I and Table II)

Although caution must be used in drawing inferences from grouped data, several trends in the data can be recognized.¹ Certain variables reflected the economic situation in Michigan during the 1970s. The effects of the oil embargo and subsequent recession can be seen in the variables measuring the unemployment rate, change in unemployment rate, consumer price index, per capita income, and change in per capita income. Communities that resort to arbitration tend to share certain characteristics. The average level of wages is consistently higher for those districts that arbitrate, as is per capita income. The median value of housing is greater for those who chose arbitration from 1973-76, but this finding is reversed from 1977-79. On the whole, groups that arbitrate are less likely to be covered by a Cost of Living Allowance than those who negotiate. There is very little difference between public sector wages in comparable communities and

TABLE I

NEGOTIATED DATA: MEANS

(Standard Deviations in Parenthesis)

	1973	1974	1975	1976	1977	1978	1979
Cost of Living Allowance	.222 (.428)	.433 (.504)	.379 (.494)	.405 (.497)	.290 (.460)	.390 (.492)	.417 (.504)
Unemployment Rate	.066 (.025)	.074 (.029)	.142 (.033)	.096 (.023)	.086 (.020)	.074 (.017)	.084 (.022)
% Δ Unemployment	-.147 (.115)	.208 (.148)	.752 (.249)	-.228 (.097)	-.118 (.070)	-.155 (.057)	.127 (.122)
Property Tax Rate	56.25 (7.57)	55.48 (7.10)	53.69 (6.84)	57.35 (6.70)	55.62 (10.24)	57.54 (7.65)	57.97 (8.03)
Median Value of Housing	17533 (6135)	16867 (5937)	17190 (6618)	19278 (7652)	17753 (5360)	17998 (6152)	17608 (6138)
Consumer Price Index	.056 (.009)	.114 (.006)	.079 (.006)	.055 (.005)	.075 (.009)	.068 (.007)	.125 (.009)
Per Capita Income	4329 (1117)	4838 (1123)	4906 (1332)	5842 (1593)	6203 (1190)	7014 (1641)	7342 (1880)
% Δ Per Capita Income	.097 (.013)	.096 (.015)	.034 (.038)	.114 (.022)	.122 (.020)	.121 (.022)	.111 (.030)
Public Sector Wage Differential	.014 (.059)	-.013 (.076)	-.007 (.599)	.014 (.075)	.017 (.093)	.015 (.092)	.012 (.30)
Private Sector Wage Differential	-.033 (.086)	.194 (.141)	-.013 (.110)	-.044 (.127)	-.092 (.135)	-.100 (.136)	-.503 (.151)
Wage and Price Guidelines	1.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.00 (0.00)	.026 (.162)	1.00 (0.00)	1.00 (0.00)
Multiyear Contract	.111 (.323)	.267 (.449)	.241 (.435)	.095 (.297)	.421 (.500)	.305 (.464)	.125 (.338)
% Δ Wages	.066 (.017)	.080 (.025)	.080 (.348)	.079 (.031)	.066 (.022)	.075 (.025)	.092 (.080)

TABLE II
ARBITRATED DATA: MEANS
(Standard Deviations in Parenthesis)

	1973	1974	1975	1976	1977	1978	1979
Cost of Living Allowance	.200 (.422)	.308 (.480)	.148 (.362)	.294 (.470)	.333 (.483)	.333 (.516)	.333 (.577)
Unemployment Rate	.055 (.005)	.080 (.017)	.126 (.023)	.094 (.017)	.081 (.017)	.076 (.014)	.075 (.006)
% Δ Unemployment	-.154 (.090)	.289 (.145)	.665 (.223)	-.217 (.111)	-.126 (.066)	-.130 (.056)	.126 (.096)
Property Tax Rate	54.38 (6.40)	55.32 (5.75)	57.46 (6.07)	55.78 (4.50)	60.26 (7.38)	67.50 (8.02)	57.94 (3.90)
Median Value of Housing	19610 (7347)	18077 (8791)	20003 (10716)	20882 (9899)	15314 (4542)	16883 (12592)	15567 (5832)
Consumer Price Index	.052 (.009)	.115 (.004)	.078 (.007)	.053 (.003)	.074 (.011)	.066 (.003)	.129 (.000)
Per Capita Income	4647 (1272)	5243 (1994)	5641 (2526)	7473 (6941)	5794 (1139)	7644 (5058)	7704 (1940)
% Δ Per Capita Income	.089 (.012)	.094 (.017)	.039 (.029)	.122 (.019)	.117 (.021)	.110 (.022)	.110 (.012)
Public Sector Wage Differential	-.101 (.073)	.001 (.057)	-.010 (.081)	.030 (.097)	.000 (.066)	-.034 (.055)	.119 (.109)
Private Sector Wage Differential	-.634 (.127)	-.045 (.110)	.015 (.123)	-.031 (.072)	-.034 (.150)	-.092 (.022)	-.119 (.159)
Wage and Price Guidelines	1.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Multiyear Contract	0.00 (0.00)	.077 (.277)	.074 (.267)	0.00 (0.00)	0.00 (0.00)	.17 (.408)	.333 (.577)
% Δ Wages	.091 (.050)	.102 (.040)	.093 (.032)	.064 (.028)	.070 (.025)	.061 (.033)	.076 (.034)

the jurisdictions in question, for both arbitrated and negotiated cases. Private sector wages, however, are consistently greater than public sector wages for both arbitrated and negotiated cases over all years.

The data on the dependent variable showed that the percentage changes in arbitrated wages were on average greater than in negotiated wages in 1973, 1974, 1975, and 1977. The percentage changes in negotiated wages were greater than in arbitrated wages in 1976, 1978, and 1979. Except for 1979 this change appeared to be due to variation in arbitrated awards while negotiated awards remained relatively consistent. The discrepancy in 1979, however, is due to a severe outlier in the data set. Removal of this outlier changes the mean of the percentage change in negotiated wages from .092 to .076.

Estimation Results

The wage equations are estimated using ordinary least squares. Separate regressions were run on each of the four subsets of data. The estimation results are given in Tables III and IV. The following is a brief discussion of those results.

Cost of Living Allowance (COLA)

COLA was a dummy variable that tested for the effect of a cost of living clause in the contract. The variable took on the value of one if a COLA clause was present, and zero otherwise. The presence of a COLA clause was considered

an additional benefit to the employees and therefore should correspond to a lower annual wage increase. The coefficient on COLA was expected to be negative. This finding is confirmed in three out of four data subsets. Only in negotiated cases from 1973-75 did contracts with COLA clauses receive larger percentage changes in wages than contracts without COLAs. This difference, however, is not significantly different from zero. One possible explanation for this finding would be that parties who were strong enough to bargain for a COLA clause in the early seventies may have been powerful enough to win above average wage settlements. The negative relationship, however, is dominant over time and significant in arbitrated cases 1973-75 and negotiated cases 1976-79. These negative coefficients support the idea of package bargaining, that is, that the parties are willing to trade off one benefit for another. This phenomenon occurs in both the bargaining process and in the arbitration procedure.

Unemployment Rate

The unemployment rate was used as an indicator of both the demand for labor and the overall economic condition of the area. Low unemployment rates were expected to induce higher annual percentage changes in wages. The coefficient on unemployment, however, is positive and significant during 1973-1975 for both negotiated and arbitrated cases. The coefficients are not significantly different from zero for the years 1976-1979.

TABLE III
WAGE EQUATION: 1973 - 1975
(Dependent Variable: The Percentage Change in Wages)

<u>INDEPENDENT VARIABLES</u>	<u>ESTIMATED COEFFICIENTS</u> <u>(Standard Errors in Parenthesis)</u>	
	<u>NEGOTIATED</u>	<u>ARBITRATED</u>
Constant	.107 (.043)	-.019 (.093)
Cost of Living Allowance	.002 (.006)	-.017 (.013)*
Unemployment Rate	.350*** (.108)	.620** (.310)
% Δ Unemployment	-.052*** (.016)	-.041* (.028)
Property Tax Rate	-.95E-03** (.41E-03)	.25E-04 (.91E-03)
Median Value of Housing	.45E-06 (.99E-06)	.21E-05* (.14E-05)
Consumer Price Index	.037 (.260)	.799* (.537)
Per Capita Income	.21E-05 (.49E-05)	-.79E-05 (.59E-05)
% Δ Per Capita Income	-.068 (.110)	-.080 (.230)
Public Sector Wage Differential	-.187*** (.055)	-.149* (.095)
Private Sector Wage Differential	.062** (.034)	-.136*** (.050)
Wage and Price Guidelines	-.023 (.019)	.024 (.044)
Multiyear Contract	-.030*** (.007)	.019 (.022)
R ²	.47	.39
No. of Observations	77	50
Mean of Dependent Variable	.077	.095
F-Statistic	4.8***	2.0**

* significant at .10 level; one tailed test.

** significant at .05 level; one tailed test.

*** significant at .01 level; one tailed test.

TABLE IV

WAGE EQUATION: 1976 - 1979

(Dependent Variable: The Percentage Change in Wages)

<u>INDEPENDENT VARIABLES</u>	<u>ESTIMATED COEFFICIENTS</u> (Standard Errors in Parenthesis)	
	<u>NEGOTIATED</u>	<u>ARBITRATED</u>
Constant	.127 (.048)	.138 (.077)
Cost of Living Allowance	-.010* (.006)	-.001 (.009)
Unemployment Rate	-.048 (.190)	.220 (.317)
% Δ Unemployment	-.017 (.039)	.041 (.057)
Property Tax Rate	.12E-03 (.43E-03)	-.89E-03* (.66E-03)
Median Value of Housing	-.28E-06 (.77E-06)	-.50E-06 (.99E-06)
Consumer Price Index	.090 (.223)	.99E-03 (.340)
Per Capita Income	.85E-07 (.29E-05)	.16E-05 (.17E-05)
% Δ Per Capita Income	-.442*** (.144)	-.255 (.268)
Public Sector Wage Differential	-.082** (.037)	-.098* (.069)
Private Sector Wage Differential	.021 (.026)	.016 (.046)
Wage and Price Guidelines	.0089 (.0078)	-.006 (.014)
Multiyear Contract	-.016** (.007)	.004 (.025)
R^2	.17	.195
No. of Observations	163	47
Mean of Dependent Variable	.076	.067
F-statistic	2.56**	.686

* significant at .10 level; one tailed test.

** significant at .05 level; one tailed test.

*** significant at .01 level; one tailed test.

Several explanations can be offered for the positive coefficient on the unemployment rate. First, the unemployment rate used in this study was the unemployment rate for all public and private sector employees in the relevant county. Therefore, the possibility exists that it does not adequately reflect the market conditions in the public sector. A second explanation can be based on expectations. High unemployment rates in the period immediately preceding the wage contract may induce expectations that unemployment in the future will decline. One must also remember that union contracts are long term commitments. Contracts negotiated prior to the 1974 recession in Michigan would have carried their stated wage increments through periods of high unemployment.

The change in the unemployment rate was used to capture changes in the financial situation in the community. It may also influence the expectations of union members. Large changes in unemployment rates influence the tax base of the community and consequently influence the ability of the jurisdiction to pay wage increases. The coefficient on the percentage change in unemployment is negative across most of the sample, but only significant for negotiated and arbitrated cases in 1973-1975. During this period, the fact that unemployment was increasing at an increasing rate led to reductions in wage increases.

Property Tax Rates

The property tax rate was used in this study as a measure of the willingness to pay. People living in high tax areas were expected to do so because they have a preference for public services. Therefore, they should be willing to pay more for those services. The results, however, when significantly different from zero, are negative. Property tax rates are negatively related to wages increases in negotiated cases in 1973-75 and arbitrated cases from 1976-79. In these cases, high-tax areas had lower percentage changes in wages. The negative relationship in 1973-75 could result from the fact that high tax rate cities had more bargaining power and were able to keep wage increases in line. Arbitrators, on the other hand, may have been susceptible to the union's argument that high tax areas had the ability to pay for the wage hike. During the 1976-1979 time period, arbitrators, more aware of the financial problems of the cities and the varied demands on city budgets, were no longer swayed by the union's arguments. In fact, high-tax areas could probably effectively argue that they were close to their millage limit, and therefore further expenditures were not feasible. Also, in the latter time period the level of public sector wages in high-tax areas might not have supported large increases on comparability grounds.

Median Value of Housing

Median value of housing was also used as a measure of demand for public services. People in expensive homes should be more willing to pay for police and fire protection. The coefficient on median value of housing is positive from 1973-1975, but only significant for arbitrated cases. Arbitrators, therefore, seemed to take into account the median value of housing when setting wages in the early period following passage of final offer arbitration in Michigan. This relationship, however, is not observed during 1976-1979. The coefficient for 1976-1979 is negative and insignificant. Several situations could account for the switch to a negative sign. For one, police and firefighters continually demand premium pay for high-risk jobs. The risk in low income areas is greater than in high income areas. Also people able to afford homes in areas with high median values are also able to afford substitutes to publicly provided police and fire protection. The increasing use of such devices as burglar alarms and smoke detectors could decrease the demand for police and fire protection.

Per Capita Income

Another variable used to measure the financial status of the community was per capita income. Jurisdictions with higher per capita incomes were expected to pay more to their public sector employees. In most cases the sign on

per capita income is positive but insignificant. Per capita income did not appear to be a strong determinant of wage changes in either arbitrated or negotiated cases. In arbitrated cases from 1973-1975, however, the sign on the coefficient is negative. This corresponded to a preliminary finding by Ernst Benjamin in a study of arbitrated cases in Michigan.² He found that the percent awarded was lower in wealthier communities. He suggested that arbitrators may have a slight tendency to try to level salaries by raising lower salaries more than higher ones.

Change in per capita income was used to reflect changes in the financial situation of the community. The coefficient is negative for all data subsets. It is significant, however, only for negotiated cases in 1976-79. In that subset, changes in the rate of change in per capita income have a negative effect on wage increments. This result is counterintuitive. Because this study uses only wage outcomes as the dependent variables, this finding could be the result of unions in growing communities demanding non-wage fringe benefits during this time period.

Consumer Price Index

The consumer price index (CPI) is usually used during negotiations and arbitration hearings as a measure of what has happened to employee purchasing power over the previous year. Also, due to its wide use in private sector labor

negotiations, it is a good indicator of private sector wage increases. The coefficient on CPI is positive for all subsets, but only significant for arbitrated cases during 1973-1975. It is reasonable to assume that arbitrators relied on CPI information when determining wage increases. What is unusual is that there is not a stronger correlation in the other subsets of data. In the 1976-1979 subsample the relationship could be hidden due to the exclusion of Cost of Living increments from the dependent variable. In other words, arbitrators did not award large increases due to inflation, but instead awarded average increases plus Cost of Living Allowances (COLA). The employees would be protected but it would not show up as part of the percentage change in wages. Employees, of course, can also negotiate COLA clauses to protect them against inflation. The increased use of COLA clauses after 1975, therefore, could account for the insignificance of the CPI coefficient.

Public and Private Sector Wage Differentials

Comparability is often mentioned as one of the key determinants of public sector wages. Federal employees have used the prevailing wage principle for years.³ Michigan Public Act 312 directs arbitrators to use comparability with both the public and the private sector in determining wage increases.⁴

The public sector wage differential in this study measures the difference in wages between employees of the unit in question and employees doing the same jobs in comparable communities. If the level of wages in the jurisdiction is higher than those in comparable communities; the differential will be positive. A positive differential was expected to correlate negatively with the percentage change in wages. The coefficient on the public sector wage differential is negative and significant for all data subsets. Public sector comparability, therefore, appears to be a strong factor in determining wages under both negotiations and arbitration.

The private sector wage differential measures the disparity between wages paid to public sector employees and the wage levels of private sector employees in the same labor market area. The importance of this variable in part reflects the degree to which the parties perceive private sector jobs and public sector jobs as substitutes. The coefficient on the private sector wage differential is positive and significant for negotiated cases in 1973-1975, negative and significant for arbitrated cases in 1973-1975, and negative and insignificant for both subsets in 1976-1979. The fact that negotiated cases in 1973-1975 exhibited a positive correlation between wage differentials and increases in salary indicates the strong influence of bargaining power in negotiated settlements. Unions that

were strong enough or that shared some common characteristics that led to wages above those in the private sector were able to enhance their position further by negotiating an advantageous settlement. In situations, however, where these cases were taken to arbitration, management was able to present a viable case which resulted in lower wage increments. Hence, the negative and significant coefficient on arbitrated cases, 1973-75.

Wage and Price Guidelines

The presence of wage and price guidelines was expected to exert downward pressure on wage increases for public sector employees. The coefficients on wage and price guidelines, although mixed in sign, are insignificant in all subsets. Moral suasion does not appear to be a strong factor in influencing either negotiated or arbitrated wage settlements.

Multiyear Contracts

The coefficient on the dummy variable, included when the second year of wage data was used, is negative and significant for negotiated cases in 1973-75 and 1976-79. Negotiated contracts tend to be front-loaded over the life of the contract, that is, wage increases are larger in the first year of the contract than in the second. The coefficients for the arbitrated cases are not significant. Therefore, wage increases in multiyear arbitrated settlements

tend to be evenly distributed. This is true over both sample periods.

The above discussion explores the effects of various independent variables on arbitrated and negotiated outcomes in a compulsory arbitration environment. By evaluating the wage equations in their entirety, several additional observations can be made.

Several factors affect arbitrated cases differently from negotiated cases. This is especially evident during the 1973-75 time period, for which the signs of the coefficients are different for over half the independent variables. In some cases, variables that were significant in determining negotiated wages played only a secondary role in arbitrated settlements. Property tax rates are significant in negotiated cases and insignificant in arbitrated cases. The public sector wage differential is significant at the .01 level in negotiated cases but only significant at the .10 level in arbitrated cases. On the other hand, the Consumer Price Index is significant for arbitrated cases, as is the presence of a COLA clause, while neither variable is significant in determining negotiated wages during 1973-75. Both negotiators and arbitrators took into account unemployment, although to varying degrees. On the whole, more factors seem to influence negotiated outcomes strongly during the 1973-75 time period, while arbitrators seem to rely on comparability, unemployment,

and the consumer price index. The two equations in 1976-79 also show a large number of sign changes, but a general lack of significance for the arbitrated equation leads to problems in drawing inferences.

The model used in this study is much better at capturing factors that affect negotiated wage outcomes than arbitrated ones. The F-statistics for the negotiated samples are 4.8 in 1973-75 and 2.56 in 1976-79. Both are significant at the .05 level in a one tailed test. The F-statistics for the arbitrated samples are 2.0 in 1973-75 and .68 in 1976-79. Although the F-statistics for the arbitrated sample is significant in 1973-75 at the .05 level, the F-statistic for the 1976-79 sample is not significant.

In general, the problem the model has in identifying factors that affect wages under arbitration is a function of both the model itself and the arbitration procedure. The arbitration procedure by its very nature introduces another unknown into the bargaining procedure: the arbitrator. Although the arbitration law sets out the various factors that are to be taken into consideration in determining wages, the weight given those factors is controlled by the arbitrator. The model used in this study relies upon observable phenomena to proxy supply and demand conditions, and upon institutional factors. The variance introduced into the system by the personal behavior of an

arbitrator is not taken into account. This results in a model that is a better indicator of negotiated wages than of arbitrated ones.

The fit of the model also varies over time. The model is better able to explain outcomes during 1973-75 than in 1976-79. Low R^2 s are not unexpected due to the cross sectional nature of the data set. Although the entire data set contains data from 1973-1979, in only 40 cases are three or more observations available for a single jurisdiction. Nevertheless, the R^2 s in 1976-79 are low relative to their 1973-75 counterparts.

The inability of the model in general to explain wage determination during the 1976-79 time period can also be attributed to the introduction of the arbitrator into the bargaining process. Not only does the presence of the arbitrator interfere with the ability of the model to predict arbitrated settlements, but is also influences the ability of the model to predict negotiated outcomes. In dealing with collective bargaining in a compulsory arbitration environment, the arbitrator's influence can easily go beyond arbitrated awards. The threat of going to arbitration is present in each negotiation. Therefore, the actions of arbitrators must be taken into account during the negotiation process. This phenomenon is not captured by the wage equation in this model. It is reasonable to believe that the parties would need time to be able to predict the

behavior of the arbitrators. Therefore, the influence of arbitrators' action would be more prevalent over time, or in the 1976-79 time period. Hence, the decrease in the explanatory power of the model during 1976-79.

The above findings have a direct influence on the main purpose of this exercise - the formation of a wage differential attributable to the choice of bargaining procedure. Because of the role played by the arbitrator in both negotiated and arbitrated cases, it is difficult to formulate a meaningful differential due to choice of procedure. Theoretically, if the arbitrator influences both negotiated and arbitrated settlements, no differential will exist.⁵ The empirical results of this paper support this hypothesis with one minor adjustment. In examining the formulated wage differentials (See Table V) negotiated settlements appear to be lower during 1973-75 than arbitrated awards, but larger than arbitrated awards in 1976-79. None of the differentials, however, is significant. Therefore, arbitrated and negotiated settlements are not significantly different from each other. It should be remembered, however, that the equation representing negotiated settlements in 1973-75 was significantly different from the estimated equation for arbitrated awards in 1976-79.⁶ This implied that arbitrators used slightly different criteria in determining wage outcomes than did the parties when negotiating. Over time, however, as the arbitrators'

TABLE V
WAGE DIFFERENTIALS: MEANS
(Standard Deviations in Parenthesis)

YEAR	NEGOTIATED ¹	ARBITRATED ²
1973	-.029 (.024)	-.021 (.025)
1974	-.016 (.037)	-.024 (.025)
1975	-.019 (.034)	-.010 (.029)
1976	.007 (.018)	.005 (.012)
1977	-.004 (.023)	.011 (.012)
1978	.018 (.015)	.029 (.007)
1979	.009 (.017)	.008 (.006)

¹Differential between estimated negotiated settlement and what outcome would have been if arbitrated.

²Differential between what outcome would have been if negotiated and estimated arbitration award.

influence became widespread and as the parties learned, not only were the outcomes similar, but the means of determining them were too. As the parties learned and as the differences between arbitration and negotiation disappeared, the frequency of arbitration in Michigan also declined.⁷ The use of arbitration, however, has not totally disappeared. Some jurisdictions continue to find it in their best interest to resort to arbitration. This introduces the possibility of other factors existing that influence the choice of procedure. The next section considers what affect these factors might have on the decision to arbitrate or negotiate.

The Probability of Negotiating

As stated in the last section, a significant differential was not observed between arbitrated and negotiated wage outcomes. The parties, therefore, must not base their decision to negotiate or arbitrate solely on expected outcome differentials. Chapter Two laid out several other factors that could affect the utility of the parties and, therefore, their choice of procedure. Political factors, intraorganizational problems, or union-management hostilities could all affect decision-making. This section examines the results of the bivariate probit equation estimated to identify factors that affect the decision to arbitrate or negotiate.

Estimating Procedures

Estimating a bivariate probit equation is a very involved procedure. Therefore, a brief explanation of the procedure and the problems encountered with it will be discussed prior to the reporting of results. As stated earlier, estimating a bivariate probit equation entails jointly estimating the reduced form equations representing management and union decision-making. The model estimates

$$P(Z_i = 1) = F(X_{1i}\beta_1; X_{2i}\beta_2; \rho) \quad (1)$$

where Z_i is the probability that a negotiation is observed, as a function of the factors influencing the union ($X_{1i}\beta_1$) and management ($X_{2i}\beta_2$). ρ is the cross correlation between the error term of the union's decision making equation and management's.

The model used in this paper bases the decision to negotiate for each party on six variables: the expected wage differential, city size, government structure, union affiliation, past arbitration behavior, and time. (See Table VI) The use of the bivariate probit model allows estimation of the effects of all variables on each of the parties. For example, the model estimates both how city size affects the decision of management and how city size affects the union's decision.

One major problem was encountered in the estimating procedure and two in the interpretation of the results. Regardless of the initial value of ρ set in the equations,

ρ tended to go to one before the function was maximized. For this reason, ρ was set equal to zero and removed from the iterative process. This allowed convergence to be achieved. Afterward various values of Rho were used, and the likelihood values were checked. The likelihood values increased as Rho approached one. The likelihood value at Rho equal to zero was -176.12882, and at Rho equal to .99 it was -176.12712. Therefore, ρ was not significantly different from zero by the likelihood ratio test.⁸

Another problem inherent in the bivariate probit model is the inability to determine unambiguously which estimates represent the decision-making function of which party. Two sets of coefficients are obtained during estimation for each variable. Sets of estimates must be assigned to one party or the other based on theoretical justification and/or previous empirical studies. In addition, estimates of the standard errors of the coefficients are not easily obtained.⁹

Descriptive Statistics

As mentioned earlier, the variables used are: the wage differential, city size, union affiliation, government structure, past arbitration behavior, and time. The means and standard deviations of these variables are available in Table VI. The wage differential was discussed earlier. Of the other variables, data on city size show that in the sample used in the study, cities that arbitrated are

TABLE VI
NEGOTIATED AND ARBITRATED DATA: MEANS
(Standard Deviations in Parenthesis)

Variable Name	Negotiated 1973-75	Arbitrated 1973-75	Negotiated 1976-79	Arbitrated 1976-79	Entire Sample 1973-79
Wage Differential	-.0201 (.0337)	-.0160 (.0275)	.0087 (.0199)	.0112 (.01325)	-.0012 (.0276)
City Size	54863 (173466)	41863 (42932)	32842 (39005)	83686 (219985)	46303 (121396)
Union Affiliation	.0519 (.2234)	.1600 (.3703)	.0859 (.2811)	.1277 (.3373)	.0950 (.2936)
City Manager	.6883 (.4662)	.7400 (.4430)	.7362 (.4420)	.7447 (.4408)	.7270 (.4462)
Past Arbitration Behavior	.1169 (.3233)	.3200 (.4712)	.1534 (.3615)	.3830 (.4914)	.2018 (.4019)
Time	2.142 (.7731)	2.340 (.7982)	5.399 (1.027)	4.894 (.8656)	4.130 (1.756)

smaller in the 1973-75 time period but larger than those that negotiated in the 1976-79 time period. This reinforces the idea that the smaller and weaker unions may have used arbitration in the early period to win catch-up wage increases. That phase is now over, and larger unions, more prone to intraorganizational problems, are a larger part of the 1976-79 sample. It is also interesting to notice that cities with city managers are equally represented in both negotiated and arbitrated cases, but cities that bargained with a mixed union are found more often in the arbitrated cases of the sample than the negotiated ones.

Estimation Results

The bivariate probit equation was estimated to determine the effect various factors would have on the probability of negotiating a settlement. The motive behind this specification was to explore the decision making processes of the individual parties and to understand why they preferred one procedure over the other. The results of this equation are reported in Table VII and Table VIII. In addition, the latter part of the chapter compares the results from Table VII with the previous findings in this area. In order to do this, a measure of the overall impact of each variable on the probability of observing negotiations was calculated. The results of this exercise are presented in Table IX. In interpreting all the results in this chapter, the reader must remember that the dependent

variable took on a value of one if the parties negotiated and zero if arbitration was observed. Also, the sets of coefficients in Table VII were assigned to their respective parties on the basis of the significant variables. Based on previous theoretical and empirical research in this area, it was expected that city size, union affiliation, and government structure would be negatively correlated to the union's decision to negotiate (see page 78). The consistency of the results with the stated hypothesis effectively assigned this set of coefficients to the union.

Wage Differential

The coefficient on the wage differential was expected to be positive for the union and negative for management. Therefore, a positive differential arising from negotiations should act as an incentive for the union to negotiate but have a negative impact on management. The results, however, show the wage differential to be negative for the union and positive for management. Both estimates, however, are insignificant. Several explanations can be offered to explain this result. As stated earlier, the estimated differential was not significantly different from zero. It is reasonable to believe that due to the small magnitude of the differential, its influence over the decision-making functions of the parties is also very small. In addition, arbitration proceedings take time. Management has more to gain by delaying an award because during the arbitration

TABLE VII

BIVARIATE PROBIT RESULTS

(Dependent Variable: Choice Variable - Negotiate or Arbitrate)

<u>INDEPENDENT VARIABLES</u>	<u>ESTIMATED COEFFICIENTS</u> (Standard Errors in Parenthesis)	
	<u>UNION</u>	<u>CITY</u>
Constant	.401 (.334)	4.820 (2.410)
Settlement Differential	-3.121 (3.90)	7.790 (8.200)
City Size	-4.538E-06*** (2.244E-06)	2.277E-06 (2.641E-06)
Union Affiliation	-.495** (.291)	-.404 (.516)
Government Structure	-.314* (.214)	.378 (.360)
Past Arbitration Behavior	8.974 (7.541)	-5.660*** (2.460)
Time	.199*** (.060)	.108 (.113)

* significant at .10 level; one tailed test.

** significant at .05 level; one tailed test.

*** significant at .01 level; one tailed test.

hearing, management faces no increase in labor costs. Employees continue to work under the old contract. The new contract may or may not include retroactivity. Even if the employer is forced to pay retroactive wage increases, the time value of money causes management to achieve a net gain by dragging out the process. Therefore, the small possible gains to be achieved through arbitrating may not be enough to offset the cost and uncertainty of the process. The differential could also be insignificant because of measurement problems. The standard deviation of the differential is large. It could be that if a well-measured significant differential was present, its affect on the decision-making functions of the parties could also be established. An alternative explanation could be that the estimated coefficients representing the union have been mistaken for management's and vice versa. This would definitely explain the seemingly reversed signs. The estimates, however, were assigned to the parties on the basis of the significant variables. There is no legitimate basis for believing the estimates are reversed. The only conclusion that can be drawn from the present model is that the expected outcome differential is not a good indicator of behavior for either party.

City Size

The coefficient on city size is negative and significant for the union and positive but insignificant for the city.

Unions in large cities tend to negotiate settlements less frequently than do their small city counterparts. This result was expected and was based on the fact that city size proxies several phenomena, including intraorganizational problems, monetary cost, and bargaining power. For the city, the coefficient is positive. Although insignificant, the positive correlation was expected because large cities have a large degree of bargaining power and were expected to exercise it through bargaining rather than to relinquish it to an arbitrator.

Union Affiliation

The coefficient on union affiliation is negative for both parties. It is significant only for the union. The presence of mixed unions tends to decrease the probability of the union settling through negotiations. This supports the hypothesis that the inexperience of mixed unions in dealing with public sector bargaining may result in the break down of negotiations. The coefficient for management is also negative, although insignificant. Therefore, having to deal with a mixed union does not significantly influence management's behavior. To the extent that it does, the effect is negative. This could be because jurisdictions are more uncomfortable or have more communication problems when dealing with the International Brotherhood of the Teamsters (the most prevalent mixed union) than with most other public sector unions.

Government Structure

The coefficient on government structure is negative and significant for the union. The presence of a city manager decreases the probability of negotiating. Because a city manager is removed from the political pressure of re-election, it decreases the bargaining power of the union. The union, therefore, is more likely to resort to arbitration. For management, the coefficient is positive, but not significant. This supports the hypothesis that city managers will try to take advantage of their experience and expertise to bargain an advantageous settlement rather than turn the negotiations over to an arbitrator.

Past Arbitration Behavior

The coefficient on past arbitration behavior is positive but insignificant for the union. Using arbitration in the previous round of contract talks does not seem to affect the union's behavior in the future. To the extent that it does, the effect is positive. Arbitrating in the previous round increases the probability of negotiating. The coefficient for the city, however, is negative and significant. The city, therefore, has a tendency to resort to arbitration if arbitration has been used in the previous round. The results imply that it is the city that forms the dependency.

The results on past arbitration behavior are interesting, because they differ from previous findings. They indicate an apparent fallacy in connecting repeat performances with union decision-making. Although this finding may at first seem counterintuitive, it has its basis in previous literature. Thomas Kochan recognized that unions often used arbitration on a one-time basis to "catch-up" with other jurisdictions with regards to wages and benefits.¹¹ This first-time usage appears during the 1973-75 time period of this study. Because arbitrators relied heavily on comparability during the early years of final offer arbitration (Table III), this strategy resulted in catch-up increases for these parties. Once unions had caught-up, however, they were willing to return to the negotiating game. Hence, the positive coefficient on past arbitration behavior. Cities, however, forced to meet comparable wages in the previous arbitration award, may be more willing to go before an arbitrator. They realize there is no room to argue catch-up or comparability (having met those conditions previously), and therefore, they may be able to win a more favorable award from the arbitrator. This strategy may be particularly successful in bad economic times when city budgets are stretched and cities are able to present a legitimate ability-to-pay argument.

The positive correlation for the union and the negative correlation for management also finds theoretical support

in a study by Farber and Katz.¹² Farber and Katz claim that the ability of the parties to reach a settlement depends on the relative risk preferences of the parties. They assume that unions are more risk averse than management. It is this risk aversion that creates a contract zone and allows a settlement to be reached. Risk aversion also leads unions to present more reasonable offers during arbitration than do management. Even if unions "win", therefore, the settlements do not differ significantly from what they could have gotten in negotiations. When the arbitrator finds in favor of management, however, the settlement tends to be highly in its favor. Management, therefore, has little to lose and more to gain through arbitration. Consequently, it is more likely to undertake the risk of arbitration. Hence, the negative correlation between past arbitration behavior and the city's negotiating behavior.

Time

The coefficients on time are positive for both parties. It is only significant for the union. Time, therefore, has a positive impact on the probability of negotiating. This indicates that over time the union will increasingly prefer negotiating. This result conforms well to the established fact that the use of final offer arbitration in Michigan is declining.¹³

Several variations of the model were tested because of the insignificance of several variables. Multicollinearity

was observed between the wage differential and time. Because the differential was of key interest in this study, time was dropped from the equation. (See Table VIII). This resulted in an increase in the significance level of the wage differential for the city and resulted in a sign change on the wage differential for the union. The wage differential for the union, however, was still insignificant. The explanatory power of the equation, however, dropped with the removal of time.

The Dominant Party

The use of the bivariate probit equation provided interesting information about the behavior of the individual parties. It must be remembered, however, that either party may cause the negotiations to break down. It is important, therefore, to determine which party, if either, dominates the process. The variables used in the model seem to fit union decision-making better than management's. More coefficients are significant on the union side. This corresponds to the belief in the profession that the union dictates whether a settlement will be negotiated or arbitrated. Unions are usually the party that request arbitration.¹⁴ Although negotiations are by no means one-sided, the union action may be easier to capture using variables exogeneous to the procedure. The union may be the more active party and therefore easier to model.

TABLE VIII

PROBIT EQUATION WITHOUT TIME

(Dependent Variable: Choice Variable: Negotiate or Arbitrate)

<u>INDEPENDENT VARIABLES</u>	<u>ESTIMATED COEFFICIENTS</u> <u>(Standard Errors in Parenthesis)</u>	
	<u>UNION</u>	<u>CITY</u>
Constant	1.282 (.214)	4.502 (.924)
Settlement Differential	3.440 (3.185)	11.980* (6.768)
City Size	-.639E-05*** (.220E-05)	.201E-05 (.248E-05)
Union Affiliation	-.494* (.284)	-.325 (.508)
Government Structure	-.346* (.210)	.356 (.352)
Past Arbitration Behavior	17.869 (14.41)	-4.885*** (.989)

* significant at .10 level; one tailed test.

** significant at .05 level; one tailed test.

*** significant at .01 level; one tailed test.

Management not only acts on exogenous factors, but reacts to the union. This reaction is not easily captured.

In order to determine the existence or intent of union domination, it is necessary to estimate the overall impact of each variable on the probability of negotiating. With $\rho = 0$, the bivariate probit model implies that the probability of observing negotiations ($Y = 1$), given X , is

$$P(Y = 1|X) = F(X\beta_1) \cdot F(X\beta_2) \quad (2)$$

where F is the standard normal cumulative distribution function; X = vector of explanatory variables, the sample matrix; and β_1 and β_2 are the coefficients for the union and the city, respectively. The effect of the variables on the probability of negotiating can be calculated by taking the derivative of P with respect to X .

$$\frac{\partial P(Y = 1|X)}{\partial X} = F(X\beta_2) \cdot f(X\beta_1) \cdot \beta_1 + F(X\beta_1) \cdot f(X\beta_2) \cdot \beta_2 \quad (3)$$

where f is the standard normal density. The results in Table IX give the best estimates of the effect of each variable on the probability of negotiating.

The results closely parallel the union's decision-making function. All signs correspond to their union counterparts. The coefficient on the wage differential is negative. The earlier insignificance of this variable, however, reinforces the view that economic variables are not an importance factor in determining behavior. The earlier finding that larger cities tend to arbitrate more

TABLE IX
ESTIMATES OF JOINT EFFECTS
(Dependent Variable: Choice Variable - Negotiate or Arbitrate)

INDEPENDENT VARIABLE	ESTIMATED COEFFICIENT (Standard Errors in Parenthesis)		JOINT EFFECT [#]
	UNION	CITY	
Constant	.401 (.334)	4.820 (2.410)	.443
Settlement Differential	-3.121 (3.90)	7.790 (8.200)	-.113
City Size	-4.54E-06*** (2.24E-06)	2.28E-06 (2.64E-06)	-.83E-06
Union Affiliation	-.495** (.291)	-.404 (.516)	-.138
Government Structure	-.314* (.214)	.378 (.360)	-.041
Past Arbitration Behavior	8.974 (7.541)	-5.660*** (2.460)	1.55
Time	.199*** (.060)	.108 (.113)	.052

[#] Joint effect was determined by taking $\frac{\partial P(Y=1|X)}{\partial X}$ for every observation in the sample, and average over the X's.

* significant at .10 level; one tailed test.

** significant at .05 level; one tailed test.

*** significant at .01 level; one tailed test.

often than smaller cities was borne out by this study. In the overall results, city size was negatively correlated with the probability of negotiating. The coefficient on union affiliation was also negatively related to the probability of negotiating. Contract talks between management and mixed unions broke down more often than talks between city officials and traditional public sector unions.

Assuming that mixed unions have less experience in public sector bargaining, this breakdown is expected. Kochan and Baderschneider recognized that lack of experience would lead to break downs in negotiations, but they could not find empirical proof of their hypothesis.¹⁵ The presence of a city manager also has an overall negative impact on the probability of negotiating. When bargaining takes place between a city manager and a union, it is more likely that the negotiations will result in an impasse. This arises from the union's desire to equalize bargaining power by resorting to arbitration. The coefficient on past arbitration behavior is positive. This indicates that there is no narcotic effect associated with the final offer arbitration procedure. This conclusion is contrary to the results found in Kochan and Baderschneider's study of behavior under the New York Taylor Law.¹⁶ Kochan and Baderschneider cited the bargaining histories of several larger cities as well as the conditional probabilities connected with the behavior of their sample. Their results supported the presence of a narcotic effect. The results

of Ehrenberg and Butler more closely parallel the results of this thesis.¹⁷ Ehrenberg and Butler attribute their results to their use of superior econometric techniques that enabled them to control for heterogeneity. In other words, the reason large cities may be repeat performers is not that they are addicted to the process but that they are large and therefore exhibit organizational, structural, and political characteristics that cause negotiations to break down.

ENDNOTES

- ¹G. S. Maddala, Econometrics (New York, N.Y.: McGraw-Hill, 1977), pp. 66-67.
- ²Ernst Benjamin, "Final Offer Arbitration Awards in Michigan, 1973-77," Institute of Labor and Industrial Relations, Univ. of Michigan - Wayne State University, 1978.
- ³Charles Field and Richard Keller, "How Salaries of Large Cities Compare with Industry and Federal Pay," Monthly Labor Review, Nov. 1976.
- ⁴See Michigan Public Act 312 cited in Chapter 3, f.n. 34, p. 51.
- ⁵Henry Farber, "An Analysis and Evaluation of Final Offer Arbitration," working paper no. 242, Department of Economics, M.I.T., 1979.
- ⁶See results of F-test, reported in Ch. 4, f.n. 11, p. 74.
- ⁷Michigan Employment Relations Commission and Benjamin, p.2. and 7A.
- ⁸Likelihood ratio test:

$$\frac{-176.12882 - (-176.12712)}{.00170} * 2 = .00340$$
 Critical value $(.95)_{\chi^2_1}^2 = 3.84.$
- ⁹Using the DFP Algorithm, several preconditions must be met before standard errors can be estimated. The inverted matrix of second derivatives is needed for an estimate of the asymptotic variances of the estimates. Therefore, the matrix must be nonsingular. Also, the second derivative can be evaluated at several step sizes from the point of convergence. If a local maximum has not been found, the resulting standard errors will not be consistent.
- ¹⁰Paul F. Gerhart and John E. Drotning, "Do Uncertain cost/benefit estimates prolong public sector disputes," Monthly Labor Review, Sept. 1980, pp. 26-27.

- ¹¹ Kochan et al., Dispute Resolution Under Factfinding and Arbitration, (New York, N.Y.: American Arbitration Association, 1979), p. 70.
- ¹² Henry S. Farber and Harry C. Katz, "Interest Arbitration, Outcomes, and the Incentive to Bargain," Industrial and Labor Relations Review, Vol. 33, No. 1 (Oct. 1979), pp. 55-63.
- ¹³ Information from Michigan Employment Relations Commission.
- ¹⁴ Ibid.
- ¹⁵ Thomas Kochan and Jean Baderschneider, "Dependence on Impasse Procedures: Police and Firefighters in New York State," Industrial and Labor Relations Review, Vol. 31, No. 4, (July, 1978), pp. 431-449.
- ¹⁶ Ibid.
- ¹⁷ Richard J. Butler and Ronald G. Ehrenberg, "Estimating the Narcotic Effect of Public Sector Impasse Procedures," Industrial and Labor Relations Review, Vol. 34, No. 1 (Oct. 1981), pp. 3-20.

CHAPTER SIX

Conclusions

This thesis explored the impact of final offer arbitration on the bargaining process and wage outcomes. Data from Michigan's public safety sector were used to investigate if final offer arbitration biased outcomes or systemically interfered with the collective bargaining process. The study followed Michigan's experience with final offer arbitration from its onset in 1973 until 1979. The thesis was conducted in two parts. First, a model of public sector wage determination was tested to determine if negotiated wages differed from arbitrated wages in a compulsory arbitration environment. Second, factors that affected the decision-making process of unions and management were tested in order to identify factors that might lead to impasses.

The model of public sector wage determination used in this study indicated that arbitrated wages were not significantly different from negotiated wages under final offer arbitration. The case was stronger during the 1976-79 time period than 1973-75. During 1973-75, although no significant wage differential was observed, several differences in the way salaries were determined were observed. Arbitrators did not necessarily use the same information as negotiators in formulating their awards. In fact, the decrease in the explanatory power of the model implied that arbitrators were basing their decisions on something outside the model. The

problem became worse in the 1976-79 time period where the significance level of the negotiated equation dropped and the equation used to model arbitral decision-making totally failed to identify factors that influenced outcomes.

Regardless of how these wages were determined, however, the fact remained that no significant wage differential could be observed. This empirical result conformed to the theoretical work done by Farber and Katz, who suggested that as the parties learn about the arbitrator's behavior, wage outcomes will tend to converge. Assuming that this learning process takes time, it is reasonable to observe slight differences in the early stages of the law, and convergence in later years.

The main objective of this thesis, however, was not to measure the wage differential, but to determine what effect the wage differential and other variables had on the probability of negotiating. The main purpose was to identify factors that influenced the decision-making processes of the parties. A bivariate probit model was used to estimate the affect of these variables on the individual parties. This procedure was used in order to deal with the partial observability problem inherent in joint decisions. Previous studies in this area had not attempted to measure the effect of the variables on the preferences of the individual parties, but only the aggregate effect of the variables on observed behavior.

The results of the bivariate probit equation indicated that, as in previous studies, economic variables were not good predictors of behavior. Neither party based its choice on the expected wage differential between negotiating and arbitrating. City size, union affiliation, and government structure, variables that attempt to capture the underlying attitudes and pressures on the parties, were better predictors of union behavior. These variables, however, did not appear to influence the city's behavior. Dealing with a large city, dealing with a city manager, or being represented by a mixed union, all exerted negative pressure on the probability of the union preferring a negotiated settlement. This negative result most likely occurred due to the unions attempt to equalize what they perceived as an inferior bargaining position.

As in the previous literature, past arbitration behavior had interesting effects. The results of the bivariate probit equation indicated that while the union is not strongly influenced by its past arbitration behavior, the city is. Arbitration in the last round of bargaining exerted negative pressure on the probability of the city negotiating. Admittedly, however, although some heterogeneity was accounted for in the probability of negotiating equation, not all could be considered.

Arbitration processes are designed so that either party can request arbitration. If either party feels it

would be better off arbitrating its settlement, it can force the negotiations to impasse. The results of this thesis indicate that the union was the dominant party. Factors influencing the observed outcomes corresponded to the preferences of the union. Past arbitration behavior did not indicate the presence of an overall narcotic effect, and the positive coefficient on time indicated that as time passed the parties were better able to negotiate settlements. Negative pressure, however, was found in large cities, cities where the employees were represented by a mixed union, and cities with city managers.

Further research is called for in the area of final offer arbitration. In twenty states, public safety employees are covered by some form of compulsory arbitration law. Others are experimenting with limited right-to-strike provisions, while the majority of those remaining have yet to make a decision on how to deal with impasses in public-safety bargaining. Decisions are now being made, and will continue to be made in the future, as to what method of impasse resolution is "best". At this time, however, several important questions remain unanswered. Although the evidence shows that there is no differential between arbitrated and negotiated settlements in the presence of final offer arbitration, a measure of the bias introduced by the passage of a final offer law is not available. If passage of the law results in both negotiated and arbitrated

awards increasing by five percent, no differential is present, yet the law definitely affects outcomes. A final offer arbitration law may bring about labor peace, but the public is paying the price. Measurements of the bias would require a control group where final offer arbitration was not an option. In addition, other factors that influenced outcomes, other than differences in procedure, would have to be taken into account. The lack of adequate data, however, inhibits studying the experiences in different states, and in jurisdictions over time. In addition to the possible cost to the taxpayer, compulsory arbitration does tend to interfere with the collective bargaining process. Although the frequency of awards issued has declined over time, the influence of the arbitration procedure has not necessarily followed suit. The role of the arbitrator in fact seems to have increased. Jurisdictions continue to request mediators and arbitrators, yet settle without a formal award. In this situation, the parties use mediation or arbitration hearings to get an idea of the arbitrators opinion of a "fair" award. A settlement is then formulated around this figure. Also jurisdictions that do not themselves resort to arbitration can use arbitration awards in other jurisdictions as the basis of their settlement.

The decrease in significance of the 1976-79 wage equations in this study indicated the injection of a new

unknown - the arbitrator. Until a more accurate model of arbitrator behavior is established, the result of arbitrator-dominated negotiations will remain uncertain. Unfortunately, lack of adequate documentation hinders studies in this area, unless the time and money are available to conduct a survey. A greater effort to collect impasse data, at all steps of the arbitration procedure, would enhance work in this area. These questions and others must be answered before state legislatures can complete their cost-benefit analyses of final offer arbitration.

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