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THE ANALYSIS OF UNION BEHAVIOR

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The Analysis of Union Behavior

ABSTRACT

There is now a substantial body of economic research that models the behavior of labor unions as maximization of a well defined objective function. This paper presents both a selective critical survey of this literature and a preliminary consideration of some important problems that have not been addressed in the literature to date. Particular emphasis is on work that is operational in the sense that it has an empirical component or is amenable to empirical implementation. Topics surveyed include 1) the general economic modus operandi of labor unions in the U.S. economy; 2) the structure of bargaining and the efficiency of labor contracts; 3) the bargaining process as it relates to the identification of union objectives; and 4) empirical studies of union objectives.

While much is learned from the existing literature, it is argued that a more general political/economic model of union behavior is needed. This model would derive the objective function of the union in a consistent fashion from the preferences of the workers and union leaders through a well defined political process. Three important issues that are central to the development of such a model are addressed: 1) The determination of the size of the union and the rules used for the allocation of scarce union jobs; 2) the aggregation of preferences when workers are heterogeneous; and 3) the union leadership as an entity capable of pursuing its own goals.

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I. Introduction and Overview

There is a large literature documenting the observed differences between the union and nonunion sectors in the U.S. economy. It is well known that union workers earn between five and twenty-five percent more than nonunion workers with the same observable characteristics, with the precise figure depending both on the occupation, industry, and other characteristics of the worker and on the level of aggregate economic activity.[1] There are also important differences between union and nonunion jobs in many other dimensions. Some of these are: 1) non-wage benefits make up a significantly larger share of total compensation in the union sector than in the nonunion sector (Freeman, 1981); 2) the structure of compensation in the union sector is such that the variance of earnings is lower than in the nonunion sector both overall and for workers in particular occupations and industries (Freeman, 1980b; Bloch and Kuskin, 1978); 3) Quits from union jobs occur at lower rates than quits from nonunion jobs (Freeman, 1980a); 4) the layoff rate and cyclical swings in employment are larger in the union sector than in the nonunion sector (Medoff, 1979); 5) Formal mechanisms for settling disputes between employers and their employees, often with arbitration as the ultimate recourse, are more common in unionized establishments;[2] 6) The role of seniority in determining the order of layoffs and preference for promotion is greater in the union sector (Abraham and Medoff, 1984a, 1984b); and 7) The working setting is more rigidly structured in the union sector (Duncan and Stafford, 1980).

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1. Lewis (1963) presents the first detailed empirical examination of the union-nonunion wage differential. Freeman and Medoff (1981a) and Lewis (1984) and elsewhere in this volume present recent surveys of the vast literature on this topic.

2. Card (1983) presents an interesting theoretical analysis of the role that grievance arbitration might play in the collective bargaining

Overall, there has been a tremendous amount of effort devoted to measuring the observed differences between union and nonunion jobs, and it is fair to say that this effort has been successful. However, there has been less success in understanding the reasons for these differences, and there is quite a bit of controversy about what these differences mean.[3] Are they accurate measures of the effects of unions, are they biased estimates of the effects, or are they statistical artifacts? How can these estimates be used to predict union response to changing economic conditions? Without a complete understanding of union behavior and how the outcomes of collective bargaining are determined it is difficult to answer these questions.

There is a substantial body of economic research, largely theoretical but with a recent empirical component, on the analysis of union behavior. It is the purpose of this chapter to survey this literature selectively and to place it in perspective so that analysts may begin to answer questions raised by the descriptive research on labor unions and to understand the role that unions play in the economy. The emphasis throughout is on work that is operational in the sense that it has an empirical component or is amenable to empirical implementation. No attempt is made to be exhaustive in reviewing the literature. The primary focus is on fitting the existing work into a coherent conceptual framework and on suggesting some directions for further research. In order to keep the analysis and discussion tractable, the presentation will be restricted for the most part to a discussion of the

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relationship.

3. The most attention has been paid to interpreting estimates of the union-nonunion wage differential. Does it actually measure the "effect" of unions on wages? Does unionization affect the wages of nonunion workers? Do unions organize the "better" workers? The extensive literature on this topic includes work by Lewis (1963), Rosen (1969), Schmidt and Strauss (1976), Lee (1978), Freeman and Medoff (1981a, 1981b), and Freeman (1984). See also the surveys by Lewis (1984) and elsewhere in this volume.

determination of wages and employment as these have been the focus of the vast majority of earlier research.[4]

In the next section, the stage is set with a working definition of a labor union and a brief description of the economic modus operandi of labor unions in the American economy. A number of examples of unions in various industries within the United States are presented in order to highlight the role that market and legal/political constraints play in determining the environment within which unions operate. It is argued that there are three actors or sets of actors that must be considered in any model of the operation of the union sector: 1) the firm; 2) the members of the union; and 3) the leaders of the union. As is appropriate for an economic model, it is be assumed that individuals (leaders as well as members) have well defined objective functions that they are maximizing. In addition, it is assumed that the firms are profit maximizers.

While the union members and their leaders may be maximizers, it does not necessarily follow that the union,as an organization, has a well defined objective function. The famous debate between Ross (1948), who took the position that unions cannot be analyzed fruitfully as maximizing a well defined objective function, and Dunlop (1944), who argued the opposite, is recounted briefly. Basically, it is concluded that Dunlop was right in that it is fruitful to analyze labor unions as maximizing a well defined objective function but that the internal structure of the union and its political process, emphasized by Ross, are important determinants of the objective function.

In order to continue with the analysis of union behavior the structure

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4. Of course this is at least partly because wages and employment are more easily quantifiable and measurable than such things as the particular terms of a grievance settlement procedure or a seniority preference provision.

of bargaining needs to be considered carefully. In this context the structure of bargaining refers to the set of issues that are determined directly through the bargaining process.[5] Two polar examples of bargaining structure that have played a prominent role in the literature on wage and employment determination are discussed in section III. The first is where the parties bargain only over the wage leaving the firm to determine employment according to the labor demand schedule. The second is where the parties bargain over both the wage and the employment level. The optimal wage/employment outcomes of the union and the firm are derived in each of these cases. The more realistic intermediate, case where work rules and the like provide partial control over employment, is also addressed briefly.

Section III also contains a discussion of the efficiency of labor contracts as it is related to the bargaining structure. It has been argued that efficiency is strongly affected by the degree to which the parties bargain (either explicitly or implicitly) over employment as well as wages.[6] It is concluded that if only the wage is negotiated and the employer is free to set employment then a bargain will never be efficient. On the other hand, if both the wage and employment are bargained then the contract could be efficient. It is further argued that problems of asymmetric information and incentive compatibility make it likely that most unions can bargain over the the wage but that they can control employment imprecisely at best. Thus, it is concluded that labor contracts are not likely to be efficient in most

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5. Bargaining structure often has a different meaning in the industrial relations literature than that used here. In that context bargaining structure refers to the scope of the bargaining unit (the group of workers that bargain together). The scope of a bargaining unit can be defined by such things as industry, occupation, and location. The determinants and implications of bargaining structure defined this way is an interesting and important problem, but its analysis is beyond the scope of this chapter.

6. See, for example, Hall and Lilien (1979), McDonald and Solow (1981), Ashenfelter and Brown (1983), and MaCurdy and Pencavel (1984).

cases.[7]

Given an objective function for the union, the profit function of the firm, the structure of the bargain, and the constraints posed by the economic environment, it is necessary to specify the process by which the parties bargain and reach agreement. This is the focus of section IV. The general framework for collective bargaining between the union and the firm is that they attempt to reach agreement, but if they do not agree then there is a strike where the union withholds its labor. The workers suffer the loss of wages and the firm suffers loss of output and profits. These costs of disagreement provide the incentive for the parties to reach agreement. A complete analysis of the bargaining process is beyond the scope of this study, but some simple models that have proven useful in empirical work are presented briefly.[8]

In section V a number of empirical studies that implement models of the outcomes of collective bargaining and that are consistent with the general framework are presented and discussed. These studies, though restricted to a small number of industries, present fairly clear evidence regarding systematic variation in the wage/employment bargains struck by unions and employers. The interpretation that is given to these results is that labor unions weight employment relatively heavily compared to wages in reaching an agreement. An alternative interpretation is that employers resist union wage demands successfully, resulting in what appears to be a relatively high weight on employment when, in fact, the union would have preferred higher wages and less employment. With regard to the efficiency of labor contracts, some seemingly

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7. Of course, this issue can only be settled empirically. A discussion of some attempts to do just that (Ashenfelter and Brown, 1983; MaCurdy and Pencavel, 1984) are contained in section V.

8. See the chapter by Kennan elsewhere in this volume for a more detailed discussion of strikes.

conflicting empirical results are reconciled and conclusions are drawn regarding the extent to which unions in one setting can control employment in addition to wages.

While much is learned from these studies, the sort of ad hoc objective function for a labor union proposed by Dunlop and characteristic of most of the studies reviewed in section V misses a central feature of labor unions: their basically political nature. In order to understand the behavior of labor unions fully it is necessary to follow Ross's lead in considering the political process that a union uses to make decisions. Given an understanding of the internal operation of the union, it is possible to derive an objective function for a union from the preferences of the members and leaders that can be used for the empirical investigation of union behavior. Because such a model is derived from the behavior of individual economic agents in a consistent fashion, it will be more likely to yield reliable predictions regarding the effects of changes in important economic variables on union behavior.

The development and empirical implementation of a general political/economic model of union behavior is no simple task, particularly since unions differ in the institutional framework governing the political process. All that are fixed across different settings are the preferences of the workers and some general principles relating worker preferences and the political process to the objective function of the union. The agenda for future research on union behavior must include theoretical and empirical analyses of these principles. The final sections of this chapter contain preliminary discussions of three problems that are central to this effort. These discussions are meant to illustrate our current understanding of these problems and to suggest directions for further research rather than to present complete solutions.

Section VI focuses on an issue that is central to the analysis of union behavior and that has been neglected by virtually all researchers: the determination of the size of the union. The size of the union determines who the voting membership are and what their preferences over various wage-employment combinations are. It is argued that the size and composition of the union depend crucially on the rule used for the allocation of scarce union jobs among the membership (random, worksharing, seniority, productivity, etc.) and whether the union can restrict membership.

In section VII the problem of heterogeneity in preferences among workers is discussed in the context of a very simple model of union behavior, where a single issue is being decided (wages) and the democratic process operates perfectly. The central issue is how the diverse preferences of the workers are reconciled into a coherent objective function for the union. The median voter model of preference aggregation, its limitations, and its implications for union behavior are discussed with heterogeneity in a number of dimensions, including seniority and productivity. The dynamic implications of the median voter formulation for the size of the union are also addressed.

In section VIII the union leadership is introduced as an entity capable of pursuing its own goals. This is achieved through relaxation of the assumption of perfect democracy. First, the polar opposite of the perfect democracy model is considered by assuming that the leadership of the union is a dictatorship constrained only by the possibility that workers will leave the union and by the behavior of the employer.[9] Second, a more realistic intermediate case is discussed where there are costs that must be borne by an insurgency and where the ultimate success of an insurgency is uncertain. A

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9. The classic reference for this model of union behavior is Lewis (1959). Dunlop (1944) discusses the "membership function" as a constraint on union behavior.

model of leadership behavior is discussed where the leadership is attempting to maximize a well defined objective function (e.g., employment, dues revenues) subject to the constraints of attracting members (a membership function as in Dunlop, 1944), a labor demand function, and the probability of a successful insurgency. This probability is modeled as a function of the preferences of the members, the policies adopted by the leadership, and the costs (monetary and otherwise) of an insurgency. It is concluded that the leadership will generally adopt a postion close to that preferred by the median voter unless the costs of an insurgency are very high. Thus, the oft-cited median voter model of union behavior may be of descriptive significance in a broader range of settings than is suggested by its rather stringent set of underlying assumptions.

II. Setting the Stage

For the purposes of the discussion here, a labor union can be considered to be a group of workers who bargain collectively with employers regarding the terms and conditions of employment.[10] These workers will generally not bargain themselves but will have as agents union leaders who are elected as representatives of the workers both in the bargaining and in the administration of the contract. While the union will obviously be concerned with a wide range of employment related issues, virtually all economic research on the behavior of unions has focused on the determination of wages and employment. Thus, the discussion here will concentrate on these dimensions of union behavior, and other issues will be discussed largely as

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10. Note that this definition excludes such cartels as the organizations of doctors, lawyers, barbers, or other tradesmen who organize in order to further their own interests through mechanisms other than collective

they are relevant to understanding union wage and employment policy.

It is useful at this point to make clear the conception of the general mode of operation of a labor union in the American economy that is at least implicit in most economic research on labor unions. Unions are fundamentally organizations that seek to create or capture monopoly rents available in an industry. These rents could come from product market imperfections or from regulation of the industry. Alternatively, the union could organize a significant portion of the labor in a competitive industry and act as a monopolist in the sale of labor, creating and capturing rents from the product market. Entry by low cost nonunion firms would be prevented by the threat to organize new entrants.

Good examples of unions which have historically operated in each of these modes are easy to find. The United Automobile Workers (UAW) is a union that thrived in the past on its ability to exploit market imperfections that existed in the American automobile industry and to ensure that the entire industry was organized. Recently, they are having considerable difficulty maintaining their position due to the increased competitiveness of the automobile industry that resulted from the shift in preferences of American consumers toward types of automobiles that are produced in other parts of the world. However, the workers in other countries (excluding Canada) are not unionizable by the UAW so that the UAW can no longer control the supply of labor in the automobile industry broadly defined.[11]

Another example is the airline industry.[12] The various unions in that industry were able to achieve high wages with little resistance from the

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bargaining.

11. See H. Katz (1983, 1984) for more detailed analyses of the history and problems of the UAW and the automobile industry.

12. Kahn (1980) presents a description of collective bargaining in the airline industry.

airlines because the airlines knew that fares and routes were regulated and that the regulatory agency would pass through any increases in costs to the flying public. All airlines flying a particular route were required to offer the same fare. The primary harm to the airlines from high wages resulted from the likelihood that fewer people and less freight would fly at higher prices as consumers switch to other modes of transportation. However, this sort of intermodal substitution is certainly more difficult for consumers than substitution among airlines. With the recent deregulation of the airline industry, new entrants who are nonunion can undercut the prices of the established union airlines resulting in substitution of nonunion airlines for union airlines by fliers. Once again, the unions no longer control the supply of labor in their industry. Note that exactly the same analysis can be applied to the International Brotherhood of Teamsters (IBT) with regard to the recent deregulation of the trucking industry.[13]

A final example concerns the United Mine Workers (UMW) and the bituminous coal industry. This industry was characterized by a fragmented and competitive product market. The product was differentiated largely on the basis of location, as coal has a very high weight to value ratio making transportation relatively expensive. The UMW organized virtually the entire industry in key locations so that these firms as a group had local market power. The union exercised that market power by raising wages uniformly. New entry by large firms was discouraged by the threat of unionization of the new entrants. The changing (declining) role of coal in the economy and the rise of strip mining has reduced the ability of the UMW to make a credible threat of organization upon entry of new firms. The result has been a declining

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13. See Levinson (1980) for a description of collective bargaining in the trucking industry.

position for the UMW within the coal industry.[14]

These examples have been selected to highlight the importance of the market and institutional constraints within which unions operate. They truly set the bounds on what unions are able to achieve. Essentially, the tradeoff is one of wages versus employment. In situations where the union is able to gain market power by one means or another, they may be able to raise wages without substantial consequences for employment. On the other hand, as the examples show, such market power may be a fragile thing. An important focus of this study is the analysis of how a labor union that is faced with a given set of constraints makes decisions regarding its wage and employment policy.

The wage-employment outcomes of collective bargaining are determined by the behavior of three actors: 1) the firm, 2) the union workers/members, and 3) the union leaders. The first step toward an economic analysis of bargaining outcomes is defining the objectives of each of these actors. It is straightforward to model the firm as a profit maximizer. The union members can be assumed to have standard utility functions of the sort usually used in the analysis of individual behavior. For the purpose of this analysis, workers' utility is assumed to be function of income/consumption.[15] That the union leaders have an objective function that deviates in any way from the objectives of the union as a whole is a relatively controversial and undeveloped notion.[16] Most analysts have ignored any independent role for the

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14. See Farber (1978b, 1978c) for a more detailed analysis of the wage policy of the UMW and its long term implications.

15. It is standard in labor economics to have utility be a function of leisure (the complement of hours of work) as well as of income. Leisure is ignored here as not being central to the analysis of union behavior. Little is lost through this simplifying assumption. Oswald (1982) presents an analysis of union objectives where leisure is an explicit argument in the workers' utility functions.

16. At this point it is impossible to be explicit about the the objectives of the union as a whole. Indeed, this depends crucially on the preferences of workers and leaders as well as on the political process that governs the

preferences of union leaders and have considered the union to be a reflection of the members preferences alone.[17] Nonetheless, it seems reasonable that union leaders have well defined objectives and that they are constrained by the political process of the union.[18]

Early debate over the behavior of labor unions revolved around the issue of whether it is useful to model unions as having a coherent objective function that they attempt to maximize. This debate can be interpreted as turning on the relative importance of economic and political considerations in the determination of union wage policy. The relevant economic considerations are the constraints imposed by the labor market and employer response to the wage bargain (the labor demand schedule). The relevant political considerations are the way in which the preferences of the workers, the preferences of the union leaders, and the market constraints interact to yield the wage policy (objective function) of the union as a whole.

Ross (1948, p.8) took the position that the wage policy of unions ". . . is not to be found in the mechanical application of any maximization principle." Ross goes on to argue (p.14) that ". . . the typical wage bargain (with certain significant exceptions) is necessarily made without consideration of its employment effect." Ross claims further (p.14) that the economic environment in the collective bargaining relationship operates ". . . at the second remove . . . [I]t generates political pressures which have to be reckoned with by the union leader." Indeed, these internal political pressures are central to understanding the behavior of unions in Ross's framework. These pressures have two sources. The first is differences in

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union.

17. Exceptions to this are Ross (1948), Berkowitz (1954), Atherton (1973), Martin (1980), and Faith and Reid (1983).

18. Some possible maximands for the leaders are the size of the union, dues revenues, and dues revenues net of the costs of running the union.

interests between necessarily heterogeneous workers. The second, and perhaps more important in Ross's estimation, is the difference in interests between the workers and the union leaders. Ross is not clear on the precise nature of the interests of the workers, but he argues (p. 16) that organizational survival is the ". . . central aim of the leadership."

In contrast to Ross's view of union behavior is the view, taken by Dunlop (1944, p.4) and most economic analysts since, that " [a]n economic theory of a trade union requires that the organization be assumed to maximize (or minimize) something." While he goes on to say that the standard case is one of wage bill maximization subject to the constraint imposed by the labor demand function, the force of his argument is that union behavior is amenable to analysis using the economists standard tools of optimizing behavior. Indeed, much subsequent work on the behavior of unions has been aimed at presenting alternatives to the wage bill as the appropriate maximand for the union.[19]

It is clear that a truly useful analysis of union behavior must address both economic and political factors. It seems appropriate to consider the union as a whole to be attempting to maximize a well defined objective function constrained by product and labor market considerations. It is likely that the behavior of both the leadership and the rank-and-file are affected by labor and product market considerations as they affect employment and the size of the union. At the same time the political considerations are central in determining exactly how the preferences of the workers and the preferences of

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19. The list of such studies is too numerous to detail here. Some of the more influential work includes that of Fellner (1949), Simons (1944), Cartter (1959), and Pen (1959). Surveys of the literature are contained in Atherton (1973) and Oswald (1983). Recently some empirical work has emerged that implements models of union wage determination in order to investigate the nature of the union objective function. This work is discussed in more detail in section V.

the leaders interact with each other and with the economic environment to yield the objective function for the union.

III. The Structure of Bargaining and the Efficiency of Labor Contracts

Two types of bargaining structures will be considered. The first type is where the union and the employer bargain over the wage leaving the employer free to set employment. The second type is where the union and the employer bargain over both the wage and employment. These are polar cases of a more general model where the parties bargain over the wage and some aspects of employment. For example, it may be the case that the parties agree on a set of work rules that specify manning requirements or minimum crew sizes. Such work rules do not actually control the level of employment. They are closer to a specification of the capital-labor or output-labor ratio.

Consider first the preferences of the employer. Let the firm's profits be a function of wages and employment holding product market conditions and the cost of capital constant. This function is

$$(1) \qquad \Pi = \Pi(W,L)$$

where W is the wage rate and L is the level of employment. A higher wage raises costs which will make the employer, who faces a downward sloping demand curve for the product, raise price and reduce output. Thus, profits are monotonically declining in the wage ($\Pi_W < 0$). With regard to employment, there is a unique optimum level of employment conditional on the wage. Partially differentiating the profit function with respect to L and setting the result (Π_L) equal to zero yields the familiar downward sloping demand curve for labor. This relationship,

$$(2) \qquad L = L(W),$$

defines the profit maximizing employment level at any wage. As the wage rises

employment will fall not only because of the reduction in output caused by higher prices but also because the employer can substitute capital for labor in the production process.

It is useful to ask what the isoprofit curves of the employer look like in wage-employment space. Their slope is simply

$$(3) \qquad \frac{dW}{dL} = - \frac{\Pi_L}{\Pi_W} .$$

While Π_W is always negative, the sign of Π_L depends on the values of W and L. The labor demand function was derived by setting $\Pi_L = 0$, and it is clear that Π_L is negative (positive) if the wage-employment pair lies above (below) the labor demand schedule. Thus, each isoprofit curve is concave from below and has zero slope at the point where it crosses the labor demand schedule. Curves closer to the horizontal (L) axis represent higher profit levels. Figure 1 contains a representation of isoprofit curves with these properties along with the associated labor demand schedule.

While it seems that the firm would prefer a wage that is as low as possible, it is constrained by the need to attract workers to the firm. Assuming that the workers have alternative jobs available at a wage W_a, the employer must pay at least that much or no workers will accept employment with the firm. Thus, the optimal wage from the firm's point of view is W_a and the optimal employment level is $L(W_a)$. In terms of the isoprofit diagram in figure 1, this pair is defined by the tangency between an isoprofit curve and a horizontal line at W_a. No isoprofit line yielding more profit will allow the firm to pay the wage (W_a) required to attract workers. This is precisely the outcome that would occur in a competitive labor market with no union. Note further that this wage-employment pair is optimal from the employer's standpoint regardless of the structure of the bargain.

In order to begin the discussion of the union's behavior, all questions

of how the union's objective function are derived from the preferences of the workers and union leaders through the political process are deferred until later. Assume that the union has a well behaved objective function of the form

$$(4) \qquad U = U(W,L)$$

where both W and L have a positive effect on union utility. Consider first the case where the parties bargain only over the wage and leave the employer to select the level of employment. In this case the optimal wage (W^*) from the union's point of view results from maximization of this objective function with respect to wages subject to the constraint implied by the labor demand function. Transformation of the first order condition for a maximum yields

$$(5) \qquad \frac{U_W}{U_L} = - L'(W) \ .$$

which implies that the optimum is where the union's marginal rate of transformation of employment for wages is equal to the slope of the labor demand schedule. The union has negatively sloped indifference curves in wage-employment space, and the highest indifference curve the union can reach when constrained by the labor demand schedule is that one which is tangent to the labor demand schedule. This is illustrated in figure 2.

In the case described here, where bargaining takes place only over the wage rate and the employer has discretion over employment, the bargaining conflict is apparent in the firm wanting to pay a wage W_a to the workers while this is the absolute minimum that the union can accept and still remain in existence (attract members).[20] It must be true that the optimal wage from the union's point of view is larger than W_a.

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20. If there are costs of union membership then the minimum survival wage required by the union will be higher than W_a by the amount necessary to cover these costs.

In the case where the employer and the union bargain over both the wage and the level of employment, the employer will prefer the same combination $(W_a, L(W_a))$ as in the earlier case. However, the optimal wage-employment bargain from the union's point of view is affected by the structure of the bargain. The union would like as high a wage and employment level as possible. The question is what the constraints on these values are. Clearly, the union cannot force the employer to continue operation with negative profits or profits less than some minimum. Denote this minimum profit level by Π_0. The problem for the union is to maximize its utility with respect to W and L subject to the constraint that

$$(6) \qquad \Pi \geq \Pi_0$$

where the profit function is defined in equation (1). On this basis the optimal wage-employment bargain from the union's point of view is defined implicitly by the equality of the union's marginal rate of substitution of employment for wages and the employer's marginal rate of substitution of employment for wages along with the minimum profit constraint defined in equation (6). The first condition is

$$(7) \qquad \frac{U_W}{U_L} = \frac{\Pi_W}{\Pi_L} .$$

Geometrically, the optimum is defined by the tangency between an indifference curve of the union and the firm's isoprofit line denoting profits of Π_0. This is shown in figure 3.

Aside from the obvious difference in the most preferred bargains from the union's point of view as a function of the structure of the bargain, there is another aspect of the problem that is highlighted. It is clear that where the parties bargain over both the wage and employment the most preferred position of the union is efficient in the sense that neither the firm nor the union can be made better off without making the other party worse off.[21]

However, where the parties bargain only over the wage the most preferred position of the union is not efficient.

An important lesson can be drawn from this. Bargaining over the wage alone will not generally permit an efficient outcome.[22] In this case the union is acting as a simple monopolist and the standard sort of inefficiency arises. The employer will act conditionally on the bargained wage and select an employment level that is on the firm's labor demand schedule. The locus of efficient bargains (the contract curve) is derived in a straightforward fashion as the set of tangencies between the union's indifference curves and the firms isoprofit curves. Recall that the labor demand schedule is the locus of points that lie on isoprofit curves at points of zero slope in wage-employment space. Thus, if the indifference curves of the union are downward sloping everywhere in wage-employment space then no tangency between isoprofit and indifference curves will lie on the labor demand schedule and a simple wage bargain can never be efficient. Figure 4 contains a graphic representation of the contract curve (CC) along with the labor demand schedule (DD).[23]

If the parties can bargain over employment (either explicitly or implicitly) as well as the wage, then any wage-employment outcome is feasible. This includes inefficient and well as efficient bargains. The economist's presumption is that where enough policy instruments exist for an efficient

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political nature of the union. What is at issue is efficiency regarding the profit function of the firm and the objective function of the union as a whole. The preferences of the workers and the union leaders are considered only indirectly through the union objective function. There may be important distributional consequences within the union that would suggest different definitions of efficiency.

22. This notion has a long history. See, for example, Leontief (1946) and McDonald and Solow (1981).

23. Note that the contract curve can have any slope. It is drawn is figure 4 with a negative slope for no particularly compelling reason. The shape of the contract curve will be discussed further in section V.

outcome the outcome will, in fact, be efficient. However, given our relative lack of understanding of the bargaining process, the efficiency of labor contracts must remain an empirical question. The conclusion is that bargaining over both wages and employment is a necessary but not sufficient condition for an efficient labor contract.

Do unions and employers bargain over employment as well as wages? There are examples of declining industries or industries/occupations with declining employment as a result of technological change where employment guarantees have been negotiated. However, it is difficult to think of examples of industries with stable or growing employment where such guarantees have been negotiated.[24] The more common situation is either no control over employment or the negotiation of work rules that attempt to control the capital-labor or labor-output ratio. One well known example is the set of work rules which existed for many years in the longshoring industry and specified minimum crew sizes and sometimes included the requirement that workers actually handle individual pieces of cargo regardless of the technology in use.[25] If fully effective, work rules could lead to an efficient outcome depending on the nature of the technology and the product demand function. It is an empirical issue as to whether work rules in a particular situation are a sufficient instrument to remedy the inefficiency inherent in the standard wage

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24. Oswald (1984) presents evidence regarding the extent of explicit and implicit agreements concerning employment in ongoing collective bargaining relationships based on examination of a sample of contracts and a survey of large unions. The results are consistent with the view that bargaining over employment is uncommon.

25. With the advent of containerized cargo, the requirement that workers actually handle each piece of cargo resulted in "stripping and stuffing" where each container was unpacked and repacked on the dock. The result was a reduction in both the quantity of shipping and employment in the ports where the union maintained such rules. The unions were forced to modify their rules in the end.

26. Some attempts at tests of the structure of the bargain by Ashenfelter and Brown (1983) and MaCurdy and Pencavel (1984) are discussed in section V.

contract.[26]

Why do virtually no labor contracts specify an efficient combination of wages and employment? A convincing argument can be made that efficient labor contracts are not feasible. Consider two types of efficient contracts. The first is an incentive compatible efficient contract where the employer, left to his own devices, would hire the efficient quantity of labor. This form of an efficient contract would specify that workers be compensated directly by employers at some wage rate which would imply a level of employment consistent with the labor demand schedule. In order to ensure "enough" employment, this wage rate is likely to be low in the sense that the union needs more revenue at that employment level to yield an efficient outcome. The firm would then, as a supplement to wage payments, make a lump sum payment to the union which is not contingent on employment. The union leaders would then have to distribute the lump sum payment to the members of the union. Two political problems for the union arise. First, the union may not have any mechanism to restrict membership so that anyone may claim a share of the lump sum payment.[27] More importantly, the internal political process of the union may be such that those members with a controlling voice are those members who will be employed even when the wage rate is considerably above the efficient wage. These members would prefer an inefficient bargain with a higher wage and no lump sum transfer unless the union would make larger lump sum payments to these workers. However, it is likely that the union will have difficulty finding a stable mechanism for making different lump sum payments to different

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27. The problems that arise in such a distribution are identical to those that arose recently when the government of Alaska wanted to make lump sum distributions to their residents from royalties received for North Slope oil. At first they established a rather lengthy residence requirement for eligibility, but new arrivals challenged this in court and won. A much shorter requirement was imposed, and a much smaller royalty was paid to many

members. These considerations suggest that the political process that governs the union may preclude incentive compatible efficient contracts.[28]

One could argue that efficient contracts that are not incentive compatible are feasible. This is the second type of efficient contract. In this type of contract the wage is set above the opportunity wage so that no lump sum payments are required and the employment level is set (either explicitly or implicitly) at the efficient level where the value of marginal product of labor is less than the wage rate. However, the employer left to his own devices would prefer to reduce the level of employment. Clearly, the employer will either have to be entirely precluded from adjusting the size of the workforce or have to be monitered very closely. Neither of these options is likely to be feasible. Given that demand will vary over time and that it would be exceptionally costly to the firm not to be able to adjust the size of the workforce in response to demand shifts, the firm will require some discretion in setting employment. In addition, it is likely that shifts in demand will be very difficult for the union to moniter so that the employers will have the opportunity to "cheat" on any labor agreement by reducing employment and output below the efficient level while claiming that there has been a demand shift. In more formal terms, there is asymmetric information regarding the state of product demand, and this will force the use of incentive compatible contracts.[29]

Overall, incentive compatible efficient contracts, where workers are

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more individuals.

28. Consistent with this argument is the fact that it is difficult (if not impossible) to think of examples of unions (or firms) compensating workers on any basis other than time worked or output.

29. Chatterjee (1982) presents a formal analysis of the difficulty in reaching efficient contracts where there is uncertainty. Grossman and Hart (1981) and Hart (1983), among others, present models of implicit contracts with asymmetric information more generally that are relevant to the arguments

paid in addition to compensation received on the basis of work performed, may not be feasible due to the political difficulties involved for the union in making the additional payments. On the other hand, incentive incompatible efficient contracts, which specify both the wage rate and the level of employment, may be precluded due to the asymmetric information held by the firm regarding the state of demand. We are likely to be left with inefficient labor contracts of the type generally observed, where the wage rate is determined through collective bargaining and the level of employment is set by the employer who is constrained to some extent by work rules.[30]

IV. The Bargaining Problem

The discussion in the previous section highlighted the most preferred outcomes of the union and the firm. These objectives are to some extent in opposition to each other, and the observed outcomes will not in general be precisely the most preferred outcome of either party. Some further structure is needed to specify how the preferences of the parties are translated into bargaining outcomes. In virtually all private sector collective bargaining relationships in the United States, if the parties cannot reach agreement on the terms of the contract a strike occurs. The workers lose income and the firm sacrifices output and profits. Fundamentally, disagreement imposes costs on both parties so that there is an incentive for the parties to reach agreement.[31]

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made here.

30. Virtually all existing applied work proceeds under the assumption that unions bargain over wages and the employer selects the employment level without any work rule constraints. Although analysis of union decision making regarding work rules is an important area for future research, the discussion in succeeding sections of this chapter does not take formal account of work rules.

The bargaining problem is essentially one of the determination of price in bilateral monopoly. It is well known that the solution to this problem is indeterminate in the most general case. An early determinate solution that has been widely cited is that proposed by Zeuthen (1930) as extended by Harsanyi (1956). This solution is based on the notion of sequential concessions made by the parties until agreement is reached. The key to the model is an ad hoc process that determines which of the two parties will concede at any point. The details are not important here except to say that the solution has the property that it maximizes the product of the incremental utilities of the parties.[32] While the ad hoc concession rule is not convincing, the model is widely cited due to the fact that the solution is identical to the axiomatic model of bargaining outcomes derived by Nash (1950, 1953) so that Zeuthen seems to provide a process justification for the later "rigorous" Nash model.

The Nash model is probably the best known model of bargaining outcomes, and it has served as the basis for much work on axiomatic bargaining models. Essentially, a set of properties (axioms) that a solution should have are proposed, and the set of solutions that satisfy these axioms is derived. To the extent that the axioms are reasonable, the solution has appeal. Without going into any detail, the important axioms of the Nash model are 1) the

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31. This framework is directly applicable to collective bargaining in the private sector in the United States where the right to strike over economic issues in the setting of the terms of a collective bargaining agreement is largely unrestricted. In the public sector many jurisdictions have laws that prohibit some or all categories of public sector employees from striking. However, many of these jurisdictions have provided for arbitration of unresolved labor disputes involving public employees. Farber and Katz (1979) argue that arbitration imposes costs on the parties that have a similar effect in inducing agreement that the costs of a strike do. See also Crawford (1979), Farber (1980a), and Farber (1981a).

32. The incremental utility of a party is the difference between the utility of the proposed settlement and the utility if the parties failed to agree (the threat point).

solution should be Pareto efficient; 2) the solution should be symmetric in that if the sets of incremental utilities of the parties are symmetric then the incremental utilities of the two parties at the solution should be equal; 3) the solution should be independent of irrelevant alternatives in the sense that if all of the feasible outcomes of game A are contained in the set of feasible outcomes of game B and if the solution of game B is a feasible outcome of game A then it will also be the solution of game A; and 4) the solution should be unaffected by linear transformations of the utilities of the parties.[33] The strong result of Nash is that the only feasible solution that satisfies all of these axioms is the outcome that maximizes the product of the incremental utilities of the parties.[34]

The important point to note is that the Nash model and most other axiomatic models are normative rather than positive. They prescribe what an outcome ought to look like, and they are best considered prescriptions for arbitrators rather than a description of the likely outcomes of collective bargaining. Nonetheless, there have been some attempts to "test" the Nash-Zeuthen solution in the sense of seeing if actual negotiated agreements are consistent with the Nash model. A relatively crude empirical implementation of the model using aggregate data was done by de Menil (1971). Variables representing bargaining factors were found to be important, but little could be said about the precise form of the solution. Hamermesh (1973) implemented a test of the Zeuthen-Nash solution using disaggregated data, and he was not able to reach a definitive conclusion regarding whether the observed outcomes

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33. See Luce and Raiffa (1957) for a clear discussion of the Nash model and its axioms. Bishop (1963) and Roth (1979) present recent surveys of axiomatic bargaining models. Svejnar (1983) presents a generalization of Nash's model that relaxes the symmetry constraint.

34. In the case of symmetric utilities, this solution has the property that it results in an each party receiving an equal utility increment from the threat point.

were consistent with the predictions of the model. A problem that Hamermesh recognized with his analysis is that the test is based on the extent to which outcomes "split-the-difference" between the initial offers of the parties.[35] This approach has two problems: 1) the initial offers are subject to manipulation of the parties so that they are not good indicators of the threat point and 2) there is the implicit assumption that the utility functions of the parties are linear. Svejnar (1980) points out some of the problems with attempts to test the Zeuthen-Nash model, and he suggests an alternative that does not rely on information on the initial offers of the parties. However, it does require an explicit assumption regarding the form of the union's objective function. Indeed, a requirement of any implementation of the Zeuthen-Nash or any other particular solution to the bargaining problem is that a specification of the union's objective function must be assumed. The test then proceeds conditionally on this utility function. Most of the existing studies use a very simple assumption regarding the union utility function. The union is usually assumed to be a rent maximizer or to have a linear utility function. However, as is discussed in the next section, the existing evidence regarding union objective functions is not consistent with this view.[36]

An important weakness of the axiomatic models of bargaining is that they generally do not admit the possibility of strikes.[37] There exists a body of

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35. Bognanno and Dworkin (1975) and Bowlby and Shriver (1978) implement similar tests using disaggregated data.

36. It should be pointed out that all of the evidence discussed in the next section regarding union objective functions rely on arbitrary assumptions regarding the solution to the bargaining problem.

37. The game theoretic models of bargaining that allow noncooperative behavior or mixed strategies in repeated games do allow for strikes. However, the notion of mixed strategies in this context is not terribly appealing. Fudenberg, Levine and Ruud (1983) present an interesting empirical analysis of a game theoretic model of bargaining outcomes with noncooperative behavior that admits strikes.

literature that attempts to derive a determinate solution to the bargaining problem while at the same time admitting the possibility of a strike. These studies tend to rely on notions of relative bargaining power, bluffing, threats, investment, asymmetric information, uncertainty, and learning to explain the outcomes of collective bargaining. This literature is far too vast to survey here, but suffice it to say that most of the models do not have both the union and the firm behaving in ways fully consistent with optimizing behavior.[38] For example, while both parties may be attempting to optimize well defined objective functions, a determinate solution might be derived by imposing ad hoc rules for predicting the behavior of the other party or for learning about important facts.

Two models of industrial disputes that have been widely cited and have served as the basis for much further analysis are those of Hick's (1964) and Ashenfelter and Johnson (1969). The Hicks model is well known for presenting a graph in wage-strike space of an upward sloping employer "concession schedule" and a downward sloping union "resistance curve". It is the intuitive appeal of this diagram, which seems to mirror the concession process that leads to agreement, rather than the precise behavioral underpinnings of the model that accounts for the popularity of the Hicks model.[39] The union resistance curve gives ". . . the length of time [the workers] would be willing to stand out rather than allow their remuneration to fall below the

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38. See the chapter by John Kennan elsewhere in this volume. Examples of models of the sort described here include Pen (1952), Bishop (1964), Cross (1965), Shackle (1957), Hicks (1963), Ashenfelter and Johnson (1969), and Johnston (1972). Bishop (1963) and Coddington (1968) presents surveys of some of this work.

39. Hicks does not interpret the diagram as representing concessionary behavior. It is, in his view, an ex ante representation rather than a dynamic view of the concession process. See Comay, Melnik, and Subotnik (1974) for an attempt at empirical estimation of employer and union concession schedules. Farber (1980b) presents a more detailed discussion of Hicks's model than there is room for here.

corresponding wage." (Hicks, 1963, p. 142.) This curve is downward sloping because the sacrifice involved in accepting a lower wage is larger so that workers will be willing to endure a longer strike to avoid such a reduction. The employer concession schedule is defined more precisely by Hicks. It is the sequence of wage-strike pairs such that " . . . the expected cost of the stoppage and and the expected cost of concession . . . just balance." (Hicks, 1963, p. 141.) This is upward sloping by construction because at a higher wage the cost of concession is higher and a longer strike is also more costly. Clearly, the employer concession schedule is based on equality of total costs rather than the sorts of marginal considerations that would signify an optimizing model. While it may seem natural to interpret the intersection of the resistance curve and the concession schedule as the likely outcome of bargaining, there is no reason to think that this will be true.

Ashenfelter and Johnson (1969) develop what could be considered a logical reformulation of the Hicks model. They argue that the union has a "concession schedule" in wage-strike space that is downward sloping and represents the minimum wage (increase) acceptable to the union at after a strike of a given length. It is downward sloping because it is likely that the privations endured by the workers as a strike wears on will reduce their militancy and make them willing to settle for less.[40] The innovation in the A-J model is that the employer is modeled as being a maximizer of the present discounted value of profits subject to the constraint implied by the union concession schedule. Essentially, the employer determines the optimal strike length by equating the marginal cost of continuing a strike (marginal foregone

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40. Ashenfelter and Johnson claim that an important element of their model is that the union leadership plays a central role both in mediating between the employer and the rank-and-file and in helping to enlighten the rank-and-file regarding what is a realistic demand. However, this does not seem central to their analysis.

profits) with the marginal benefit of continuing a strike (marginal decrease in the present value of the wage bill). The model explains not only the optimal strike length but also the wage outcome and whether a strike occurs at all. A number of important results can be derived from this model, and Ashenfelter and Johnson use the model to help specify and interpret the estimates of an aggregate time series regression analysis of strike activity in U. S. manufacturing.[41] Farber (1978a) implements a structural version of the model using microeconomic data on individual bargains both across firms and over time.[42] The strength of the A-J model is that it allows the firm to act in a manner fully consistent with profit maximization while yielding a determinate and plausible analysis of the the outcome of collective bargaining. The weakness of the A-J model is that the behavior of the workers/union is naive and not derived from an optimizing model of individual or union behavior.

As should be clear from the discussion in this section, there is a long way to go toward a realistic and empirically tractable model of the outcomes of collective bargaining that allows for fully rational behavior on the part of all the actors. Progress has been made generally by denying full rationality at some point in the bargaining process and by assuming particularly simple forms for the union objective function. The latter is crucial because it seems that without a specification of the union objective function it is not possible to identify the process that leads to a particular

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41. Pencavel (1970) presents a similar analysis for Great Britain.

42. See Farber (1977) and Farber (1981b) for other microeconomic analyses using the A-J model. Hamermesh (1970) presents an early analysis of the outcomes of collective bargaining using microeconomic data though without an explicit model of the process by which the agreement is reached. Farber (1980b) presents an extension of the A-J model that introduces uncertainty about the union concession schedule and derives the optimal set of offers for the firm to make in this situation.

bargaining outcome. At the same time, what led to the discussion in this section is that it does not seem possible to identify the objectives of the union without specifying a priori what the process that leads to a particular bargaining outcome. Indeed, for the investigations of union objectives surveyed in the next section, this dilemma is "solved" by assuming a very simple bargaining rule: the union can impose whatever settlement it wishes.

V. Empirical Investigations of Union Objectives

There has recently been great interest in estimating models of union behavior based on maximization by unions of well defined objective functions. Some of these, including studies by De Menil (1971), Rosen (1970), and Nickell and Andrews (1983), use aggregate data to estimate reduced form models of wage-employment determination in the union sector. While interesting in their own right, these studies are limited in the degree to which they can shed light on the nature of union objectives and the process by which agreement is reached. More interesting in this regard are some recent studies using disaggregated data that focus on the nature of the union objective function as it affects wage and employment determination. These studies include Farber (1978b, 1978c), Dertouzos and Pencavel (1981), Carruth and Oswald (1983), Pencavel (1984a, 1984b), Ashenfelter and Brown (1983), and MaCurdy and Pencavel (1984). What these studies have in common is that they focus on particular industries and they solve (avoid?) the difficult problem of the solution to the pure bargaining problem in similar ways. Farber (1978b, 1978c) and Carruth and Oswald (1983) analyze the objectives of unions in the U. S. and British coal industries respectively. All of the other studies focus on the objectives of the International Typographer's Union (ITU) in its relationships with American newspapers. All of the studies assume that the

union can impose whatever settlement it wishes on the firm so that the observed wage outcome represents the outcome that is most preferred by the union. The studies differ in what they assume about the structure of the bargain and in the extent to which the union objective function is derived from the preferences of the members and the political process within the union.

The conceptual underpinnings of this literature date at least to the work of Dunlop (1944), Leontief (1946), Fellner (1947), and Cartter (1959) all of whom present models of union behavior where the union attempts to maximize a well defined objective function. In this early work the firm is assumed to maximize profits and the structure of the bargain is assumed to be such that the parties bargain over the wage while the employer is free to set employment according to the labor demand function of the firm/industry. Thus, the union is assumed to be a utility maximizer with respect to wages subject to the constraint embodied in the labor demand function. Dunlop (1944) argued that the appropriate maximand for the union is the wage bill although he entertained some alternatives, including rent maximization.[43] The others are less explicit about the particular maximand. No attempt is made in this early literature to derive the union objective function from the preferences of the individual workers or the political process within the union.[44]

Oswald (1982) presents a model of a "utilitarian" union that has an objective function that looks very much like rent (in utility units) maximization. In this model all of the workers within the union are assumed

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43. The wage bill is defined as the product of employment and the wage rate while rents are defined as the product of employment and the difference between the union wage and the opportunity wage of the workers.

44. More recently, Atherton (1973) attempted an extension of the early literature to account for individual preferences and the internal politics of the union, but the results are not entirely successful.

to be identical (a common assumption) and the utility function of the union is simply the sum of the utilities of the individual workers. There is no explicit political model presented that would yield such a simple form for the union objective function. However, the empirical studies of Farber (1978b), Carruth and Oswald (1983), and Ashenfelter and Brown (1983) are based on empirical specifications that are more or less consistent with a utilitarian union. For this reason, it is worth considering in a bit more detail. Its objective function is

$$(8) \qquad V = LU(W_u) + (M - L)U(W_a)$$

where V is the union objective function, $U(\cdot)$ is the utility function of the representative worker as a function of the wage rate, L is union employment, M represents the membership of the union, W_u is the union wage, and W_a is the opportunity wage of the workers.[45] Essentially, L of the union members will be earning W_u and M-L will be earning W_a. The union objective function can be rewritten as

$$(9) \qquad V = L[U(W_u) - U(W_a)] + MU(W_a).$$

Clearly, the last term is simply a constant from the standpoint of union wage/employment policy. The relevant maximand is $L[U(W_u) - U(W_a)]$. If the individual utility function is linear in wages then maximization by a utilitarian union is simply rent maximization. If the utility function is linear and the opportunity wage available to the workers is zero then objective function is the wage bill. Given a nonlinear individual utility function, the objective function is rents in utility terms rather than dollar terms. If the alternative utility is zero then the union objective function is simply "total" utility.[46]

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45. Consideration of the determination of the size of the union is deferred to section VI. For the time being M is considered to be exogenously determined.

Another general form for the union objective function that has been used as the foundation of some of the recent empirical work (Dertouzos and Pencavel, 1981; Pencavel, 1984a) is a modified Stone-Geary utility function. This objective function has the form

$$(10) \quad V = \alpha [W_u - W^*]^{\delta} [L - L^*]^{\gamma}.$$

The relative value of δ and γ is an indicator of the relative importance of wages and employment in union objectives. The quantities W^* and L^* can be interpreted as the absolute minimum wage and employment levels that the union can tolerate. One interpretation of W^* is as the opportunity wage of the workers (Pencavel, 1984a). This is because it is unlikely that a union can survive if it negotiates a wage below the opportunity wage of the workers. There is no equally clear interpretation for L^*. This model also has some interesting special cases. If $\delta=1$, $\gamma=0$, and $W^*=0$ then the objective is wage maximization (Simons, 1944). If $\delta=1$, $\gamma=1$, $L^*=0$, and $W^*=W_a$ then the objective is rent maximization. Finally, if $\delta=1$, $\gamma=1$, $W^*=0$, and $L^*=0$ then the objective is the wage bill. The advantages of the Stone-Geary utility formulation include its tractability and flexibility. Its disadvantage for the purposes of this analysis is that there is no pretense of its being derived from the preferences of the individual workers through the political process that governs the union.

A final objective function that has been used (Pencavel, 1984a, 1984b), but which will not be presented here in any detail, is the augmented addilog utility function. Again, this is a relatively flexible functional form that has many interesting special cases. It shares advantages and disadvantages with the Stone-Geary, though it is probably a bit less tractable in estimation

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46. Assuming that the individual utility can be normalized, one could define $U(W_a) = 0$ for a single value of W_a. However, as W_a changed over time $U(W_a)$ would differ from zero.

and a bit more flexible.

How are the models implemented, and what is found when the models of union behavior are implemented using disaggregated data? It is worth going through a number of the empirical studies in some detail paying particular attention to assumptions regarding the structure of the bargain, the specification of the union objective function, and the central findings.

Farber (1978b) estimates a model of wage and employment determination in the bituminous coal industry in the United States in the period from 1948-1973. It is argued that the United Mine Workers (UMW) had cartelized the industry and could impose whatever wage it wished on the essentially competitive firms in the industry who would be free to set the employment level according to the labor demand schedule. It is further assumed that all of the members of the union are identical except that they are of different ages so that they prefer different mixes between wages and fringe benefits in the compensation package. A median voter argument is used to derive the optimal mix in the compensation package as that preferred by the median aged member of the union.[47] Each worker is assumed to have the same probability of having a union job so that the expected utility of a given worker is

$$(11) \quad E(U) = \frac{L}{M}U(T_{ui}) + \left[1 - \frac{L}{M}\right]U(T_a)$$

where L is union employment, M is the membership of the union, T_{ui} is the total compensation per manhour of the i^{th} worker on the union job, and T_a is the alternative compensation level per manhour available to each worker. Essentially, total union compensation is a weighted average of the wage and per capita expenditures on fringe benefits where the weights are a function of

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47. This analysis raises important issues of how to deal with multiple objectives for a labor union. Blair and Crawford (1981) show that the median voter equilibrium proposed by Farber does not exist in general. The problem of aggregation of heterogeneous preferences and the median voter model in particular are discussed in section VII.

the age of the worker. The quantity L/M represents the probability that a worker will be employed on a union job.

Farber argues that the union will act as if it is maximizing the expected utility of the median aged member of the union subject to the constraint imposed by the industry labor demand function. Thus, the level and mix of compensation will be set so as to maximize E(U) as defined in equation (11) substituting T_{um} for T_{ui} where m is the index of the median aged member. Given the assumption of exogeneity of the size of the union (M), multiplication of the expected utility in equation (11) by M yields exactly the utilitarian objective function proposed by Oswald in equation (8). In other words, Farber's objective function for the UMW would be the same as the objective function of a utilitarian union that had all members with preferences identical to those of the median aged member. Farber assumes that each individual had a constant absolute risk aversion utility function, and a measure of average hourly earnings elsewhere in the U.S. economy was used as a proxy for T_a. On this basis the first order conditions for the optimal level and mix of compensation were derived. The model is implemented using Full Information Maximum Likelihood (FIML) to estimate the first order conditions directly, the labor demand function, and a set of other relationships defining the labor and product markets for coal.

The central result of Farber's research on the UMW with regard to the union's objective function is that the workers appear to be quite risk averse, with a coefficient of relative risk aversion of 3.0 or more. Even if one does not accept the literal interpretation of the model, this result suggests that the union places substantial weight on employment in setting its compensation policy. The special case of risk neutrality, where the coefficient of relative risk aversion is zero and which would imply that the union is maximizing rents, is strongly rejected. In other words, the UMW seems to have

placed more weight on employment relative to compensation than rent maximization would imply.

Carruth and Oswald (1983) develop and estimate a model of the wage policy of the National Union of Mineworkers (NUM) in Great Britain over the period from 1950-1980. They adopt a utilitarian objective function for the NUM where all of the members of the union are identical with constant relative risk aversion utility functions. The union is assumed to maximize this objective function with respect to the wage rate subject to the constraint imposed by the labor demand function.[48] Government unemployment benefits are used as a proxy for W_a. The model is implemented using FIML to estimate the two equation system consisting of the labor demand schedule and a first order condition for a maximum of the union objective function.

The central finding with regard to the union objective function of Carruth and Oswald is that they find a significant degree of relative risk aversion (a coefficient of relative risk aversion of about .8), though less risk aversion than seems to be implicit in the compensation policy of the UMW in the United States. This difference in results may be due to the fact that Carruth and Oswald used government unemployment benefits to measure the alternative income available to workers while Farber used an actual earnings measure which is bound to be larger than unemployment benefits.[49] Such a systematic difference in alternative income measures is likely to produce the

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48. The source of the labor demand function in this case is a bit different than in the standard case. The British coal industry was nationalized over the entire period under investigation. The National Coal Board (NCB) was set up to run the industry. It is not clear exactly what the objectives of the NCB were so that it is difficult to argue that the sort of labor demand schedule a profit maximizing firm would have is appropriate for the British coal industry over this period.

49. Carruth and Oswald do find that alternative wages as measured by earnings elsewhere in the economy are a significant determinant of union wage policy, but it enters the worker's objective function in an ad hoc fashion. It is not clear how to interpret this result.

observed difference in the degree of risk aversion even if preferences are, in fact, identical. Nonetheless, even the lower degree of risk aversion found by Carruth and Oswald implies a greater weight on employment relative to wages than would be implied by rent maximization.

Dertouzos and Pencavel (1981) explore the wage policy of the International Typograhphical Union (ITU) in their relationships with newspapers in a number of American cities in the period from 1946-1965. The union local in each city negotiates its own bargain, and it is argued that within each city the members of the union are homogeneous. It is further argued that the union has a long and important democratic tradition so that there is little conflict between the goals of the leaders and the goals of the rank-and-file. On this basis, Dertouzos and Pencavel argue that the objective function of the union is that of a leader who ". . . is assumed to integrate the welfare of all the union members." (p.1167). There is no discussion of exactly how this integration takes place. It is assumed that the union objective function derived in this fashion is of the Stone-Geary form described in equation (10).[50] The union maximizes this objective function with respect to wages and employment subject to the constraint imposed by the labor demand function. The model is estimated by specifying a labor demand function along with the reduced form wage equation derived from the first order condition for a maximum of the objective function. The estimates presented are derived using FIML on this system of two equations.

The wage bargains struck by the Cincinnati Post with the ITU are examined in detail by Dertouzos and Pencavel. They find that the union placed a large weight on employment relative to wages. In the notation of equation

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50. Pencavel (1984a) presents a further analysis of similar data using the Stone-Geary objective function and the same set of assumptions.

(10), they estimated a value of γ greater than the value of δ. They are able to reject the special cases, imbedded in the Stone-Geary formulation, of rent maximization and wage bill maximization. They also carry out somewhat less detailed analyses of the wage bargains struck by the ITU in a number of other cities. They key result is that preferences seem to vary substantially across cities. More specifically, the weight on employment relative to wages as well as the minimum acceptable wage (W^*) and employment (L^*) levels are quite variable.

Pencavel (1984b) extends his earlier work with Dertouzos on the wage policy of the ITU to consider an addilog objective function for the union.[51] This has the advantage of being flexible and yielding a particularly simple form for the marginal rate of substitution that is equated to the slope of a particular specification for the labor demand schedule at the optimum. This relationship is solved for the wage and estimated directly using nonlinear two-stage least squares (NLTSLS) where employment is treated as endogenous along with the wage. Once again, Pencavel finds substantial variation in preferences across different locals of the ITU. Tentative evidence is found that the larger locals have an objective function that may approximate rent maximization. The others seem to place relatively more weight on employment. Wage bill maximization is rejected in all cases.

The set of studies that have been discussed thus far (Farber, 1978b, 1978c; Carruth and Oswald, 1983; Dertouzos and Pencavel, 1981; and Pencavel, 1984a, 1984b) all find that implicit in the union wage policies that were examined is a wage/employment policy that puts a relatively high weight on employment. Both the rent maximization hypothesis and the wage bill

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51. Pencavel (1984a) presents a further analysis of ITU wage policy using the addilog objective function.

maximization hypothesis are rejected in virtually every situation. Of course only a very few different settings have been examined: mineworkers in the coal industries in the United States and Great Britain and typesetters in the newspaper industry in the United States. Given the great differences that exist across industries both in the characteristics of workers and in the structure and institutions of collective bargaining, great care should be exercised in generalizing these results to other settings. This is particularly true in light of the evidence presented by Pencavel and Dertouzos (1981) and Pencavel (1984a, 1984b) that even within the ITU there is great variation across locals in the objective function of the union.

While the studies discussed above have focused on the nature of union objectives, a pair of studies by Ashenfelter and Brown (1983) (A-B) and by MaCurdy and Pencavel (1984) (M-P) have focused on the issue of the efficiency of labor contracts. Recall that it was argued in section III that an efficient contract would not be possible if all that was bargained over was the wage. Thus, an investigation of efficiency is, at least in part, an investigation of the structure of the bargain. Do unions and firms bargain over wages alone? Do they bargain over both wages and employment? If they bargain over wages and work rules, are the work rules sufficient to ensure that the outcome would be efficient? Both the A-B and the M-P studies use data on wages and employment from the ITU. The two studies use very different approaches to the problem and they come to essentially opposite conclusions.

Ashenfelter and Brown specify a union objective function that is the expected utility of the representative worker where each worker has the same utility function and the same probability of working on a union job. This is identical to the objective function used by Farber (1978b) and described above in equation (11).[52] It is also observationally equivalent to the utilitarian

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utility function proposed by Oswald (1982). The general form of the efficiency condition is contained in equation (7) as the equality of the union's marginal rate of substitution of employment for wages and the employer's marginal rate of substitution of employment for wages. Assuming, as A-B do, that the profit function is simply the difference between revenues and labor costs, the efficiency condition is

$$(12) \quad V_W/V_L = (W - R_L)/L$$

where V(W,L) is the union objective function, and R_L is the marginal revenue product of labor. In the specific case of the utility function used by A-B the efficiency condition is

$$(13) \quad [U(W) - U(W_a)]/U_W(W) = W - R_L$$

where U(•) is the utility function of the representative worker. If the workers are risk neutral so that the U(•) is linear, then the efficiency condition reduces to the equality of the marginal revenue product of labor with the alternative (opportunity) wage ($R_L=W_a$). In this case the union objective function is rent maximization, and employment is set at the same level it would be in the absence of the union. This is the key property used by the A-B analysis because it suggests that employment will not be a function of the actual wage (W) but only of the alternative wage (W_a) so that the contract curve (the set of efficient settlements) is vertical.[53] Ashenfelter and Brown go on to argue that this condition will be approximately true for more general utility functions. However, it is clear that it can only be exactly true if the union utility function is a monotonic transformation of total rents. This is

$$(14) \quad V(W,L) = g([W-W_a]L)$$

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total compensation used by Farber.

53. This is consistent with the vertical contract curve suggested by Hall and Lilien (1979).

where $g(\cdot)$ is an increasing function of its argument.

Ashenfelter and Brown base their test of the efficiency of the wage employment bargains of the ITU on a test of whether employment is a function of the actual wage as opposed to the alternative wage. Of necessity, the validity of this test is conditional on the validity of the assumption that the union is maximizing rents (or some monotonic transformation of rents). Their empirical analysis suggests rather strongly that employment is significantly affected by the actual wage even after controlling for the alternative wage. This would seem to be strong preliminary evidence for a conclusion that contracts in the newspaper industry between the ITU and their employers are not efficient. However, it may be that rent maximization is a sufficiently bad approximation to union objectives in the industry that a vertical contract curve is not appropriate.

MaCurdy and Pencavel set up two models. The first is the labor demand curve equilibrium model (LDEM) where a union sets the wage so as to maximize its objective function subject to the constraint imposed by the labor demand schedule of the firm. This is clearly not efficient. The second model is the contract curve equilibrium model (CEM) where the parties set wages and employment so that the general efficiency condition (equation 7) is satisfied. They derive the standard equilibrium condition in the LDEM model where the factors of production (including labor) are employed such that the ratio of their prices is equal to the ratio of their marginal products. They further show that the equilibrium condition in the CEM model is identical to that in LDEM model with the exception of an additional term in the former representing the marginal rate of substitution (MRS) of the union objective function. This term has the effect of making the ratio of the wage to the price of other factors exceed the ratio of marginal products in an efficient bargain.[54] The

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empirical test of the two models proposed by M-P is essentially a test of the importance of the "additional term" in the equilibrium condition implied by the CEM model.

In implementing their test, M-P assume that the MRS implicit in the union objective function is a nonlinear function of employment and a set of union (local) and time dummy variables. Some special cases of the MRS are integrated to derive the associated utility functions, and it is argued that the form selected is sufficiently general to admit a wide range of objective functions. MaCurdy and Pencavel find that the LDEM model is rejected by the data in the sense that the variables that make up the additional term seem to be important. They further argue that the CEM is supported by their data largely because the estimated MRS implies a quasi-concave objective function for the union. However, they agree that a rigorous test of the CEM model is not possible without making more restrictive assumptions regarding the form of the union objective function and its associated MRS. The conclusion to be drawn is that in the case of the ITU the wage-employment bargain is not characterized properly by a union selecting a wage to maximize its objective function subject to the constraint imposed by the labor demand schedule. One must be agnostic as to whether the contract is, in fact, efficient.

What do the results of the A-B and the M-P studies imply for the structure of the bargain? It seems clear that the simple LDEM model that is the null hypothesis of the M-P study is not appropriate in the ITU case. At the same time the A-B results, though limited due to the restrictive functional form, suggest that labor contracts in the ITU case are not efficient. This is consistent with the M-P results which cannot, in fact,

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the employer would prefer to hire less labor at the given wage. The equilibrium is off the labor demand curve.

distinguish between different departures from the LDEM model. A reasonable interpretation would be that the structure of the ITU's bargains is that the parties negotiate over wages and a set of work rules. However, there is no presumption that these work rules are sufficient to force the bargain to be efficient. The union has, at best, partial control over employment. A final note of caution is that the structure of the bargain, including the particular work rules, is situation specific, and there is little, if anything, in these studies that provides convincing evidence on the efficiency of labor contracts or the validity of the LDEM model outside the ITU's relationship with the newspaper industry.

It is useful to ask if there is anything general that has been learned from existing empirical studies of union objectives. Optimists would answer in the affirmative that they have learned it is generally true that unions are sensitive to the employment consequences of their wage policies and that they put substantial weight on employment relative to wages. They would concede that the precise relative weighting is context specific. However, the pessimist would argue that such strong conclusions are unwarranted for at least two reasons. The first is that the assumption underlying all of the studies, that the union can impose whatever settlement it wishes on the parties, may well not be appropriate. The researcher ignores the bargaining problem through use of this assumption at the peril of misattributing moderation in wages to union preferences as opposed to employer resistance in bargaining. This would make it seem as if the union was putting a higher weight on employment relative to wages than is, in fact, the case. All of the results regarding rejection of the rent maximization hypothesis and the high relative weight put on employment would be called into question. However, as mentioned in the previous section on the bargaining problem, it may not be possible to identify the form of the solution to the bargaining problem

without assuming something about the structure of the union objective function. An interesting and important agenda for future research is a careful exploration of exactly how much a priori structure has to be put on objectives and/or the bargaining process in order to learn something useful from bargaining outcomes about both union objectives and the bargaining process.

The second reason for pessimism regarding any general conclusions that can be drawn from these studies is based on the likelihood that while workers may have similar preferences in different contexts, the structural, institutional, and political characteristics that govern collective bargaining are sufficiently variable that the union objective functions will differ considerably across contexts. What this suggests is that in order to model union behavior more generally, the process by which the individual preferences are aggregated into an objective function for the union must be considered carefully. Unfortunately, the studies surveyed here shed relatively little light on the relationships between worker preferences, the structural features of a union, the political process, and the union objective function.

There are at least three important issues that must be addressed in order to derive a union objective function from the preferences of the workers and the political process of the union in a consistent manner: 1) the determination of the size and composition of the union; 2) heterogeneity in preferences among the membership; and 3) reconciliation of conflicting goals of the membership and leadership.[55] These problems are interrelated, and how

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55. Another important issue relates to the conceptual problems introduced by a bargaining structure where the parties bargain over more than one issue (e.g., wages and employment). Farber (1978b, 1978c) attempts to handle multiple objectives of the UMW in the context of a median voter model, but Blair and Crawford (1981) point out some problems with Farber's analysis. Voting equilibria with multiple issues exist where some special conditions regarding the preferences of the workers are met. However, these cases are

one problem is addressed depends on how the others are addressed. All of the empirical research surveyed in this section embodies a set of implicit or explicit assumptions regarding these issues. In the succeeding sections each problem is discussed briefly in turn in order to indicate why they are important and to suggest potential avenues for analysis.

VI. Size and Composition of the Union

It is commonplace to model the objective of a union as a function of wages and the level of employment. However, it is the membership of the union at the time the collective bargaining agreement is negotiated that participates in the decision making process. While the level of employment implied by the agreement may be indistinguishable from the ex post membership, the ex ante membership (at the time of negotiation) is likely to be very different.[56] Thus, the role that the level of employment plays in the union objective function is not at all clear from the perspective of how that objective function might be derived from the preferences of the workers through whatever political process governs the union. The relationships between membership, employment, and how workers evaluate potential wage-employment bargains requires further examination.

The decision of a worker regarding union representation has been modeled

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not intuitively appealing. See Riker (1980). This general problem will not be discussed further here.

56. It is likely that membership and coverage by a collective bargaining agreement are not the same thing even ex post. In states with Right-to-Work laws workers are not required to join a union or pay dues as a condition of employment. L. Katz (1983) presents evidence regarding the prevalence of covered-nonmembership in states with and without Right-to-Work laws. Lunsden and Peterson (1975), Warren and Strauss (1979), Wessels (1981), Ellwood and Fine (1983), and Farber (1984) present analyses of the effect of Right-to-Work laws on the extent of unionization.

as a utility maximizing decision based on a comparison by the worker of the utility on a union job and on a nonunion job.[57] Union wage-employment policy is directly relevant to the decision of an individual regarding whether to join a union because it affects how a potential member values a union job. The importance of the wage is obvious. The level of employment is relevant to the extent that union employment is related to the worker's evaluation of the likelihood of getting a scarce union job and sharing in the advantages of unionization. Thus, an important factor in determining the size and composition of the union is how scarce union jobs are allocated among the membership. In discussing allocation schemes it is assumed that the parties negotiate over the wage and that the employer is free to set the level of employment.

Note that whether a union job is scarce depends in part on the mechanism used to allocate union jobs. Lewis (1959) made a distinction between the allocation rules used by what he called boss-dominated and employee-dominated unions. He argued that boss-dominated unions allocate jobs using the price mechanism. For example, the level of dues might be adjusted so as to eliminate the excess demand for union jobs. On the other hand employee-dominated unions allocate jobs with nonprice mechanisms such as random assignment, jobsharing, seniority, nepotism and the like. In the boss dominated union most of the advantages of unionization are realized by the leadership, while in an employee-dominated union most of the advantages of unionization are left for at least part of the membership. Evidence consistent with the employee-dominated model is presented by Abowd and Farber (1982) and Farber (1983a) who find that there is excess demand by workers for

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57. See, for example, Lee (1976), Farber and Saks (1980), Abowd and Farber (1982), and Farber (1983a).

union jobs. Thus, the discussion of allocation rules here revolves around nonprice mechanisms. Any analysis of boss-dominated unions is more properly deferred until the discussion of the reconciliation of the preferences of the membership and leadership in section VIII.

A simple job allocation rule is one which allows the jobs to be allocated randomly so that each member has the same probability of having a job after the wage is determined.[58] This rule implies that each member has a probability of employment equal to the ratio of labor demand to existing union membership (L/M). Assuming that if a worker is not employed on a union job then the worker will work on an alternative job at W_a, the representative worker's expected utility is

$$(15) \quad E(U) = \frac{L}{M}U(W_u - C) + \left[1 - \frac{L}{M}\right]U(W_a)$$

where union employment (L) is an inverse function of the union wage and C represents the cost of continued union membership. The expected utility of individual members is inversely related to the size of the membership because as the union grows each worker has a smaller probability of being selected in the lottery for union employment. However, it is straightforward to demonstrate that the most preferred wage of each worker is <u>not</u> affected by the size of the union (M).

Workers will make their choice regarding union membership on the basis of a comparison of E(U) and $U(W_a)$. The condition for preferring union membership is that

$$(16) \quad \frac{L}{M}U(W_u - C) + \left[1 - \frac{L}{M}\right]U(W_a) > U(W_a),$$

and it is clear that all workers will prefer union membership as long as W_u-C is greater than W_a. Thus, the union will expand which implies a dilution of

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58. This is the rule that is explicit in the work of Farber (1978b, 1978c) and Ashenfelter and Brown (1983).

the benefits of unionization. Where workers differ in their alternative wage only those workers with alternative wages below W_u-C will desire union membership and the marginal member of the union will be indifferent between union membership and employment at the alternative wage.[59]

One possible alternative to a random assignment for the allocation of jobs would be an equal sharing of available work so that all members are guaranteed at least some work. A somewhat more complicated objective function for each worker is required because implicit in work sharing is the notion that hours are variable. Assume that all workers have identical preferences defined over income (Y) and the fraction of the standard workday (or week, month, year) worked (H). Represent these preferences by the function

$$(17) \quad U = U(Y,H)$$

where income has positive marginal utility and hours of work (the complement of leisure) has negative marginal utility.[60] The representative worker's utility on a union job is

$$(18) \quad U_u = U(W_u H - C, H)$$

where H represents the fraction of time worked with pure work sharing which is simply the ratio of labor demand to union membership (H=L/M). Net income on the union job is the product of the fraction of time worked and the wage rate less the cost of union membership (C).

The size of the membership has important effects on the level of utility in the work sharing model, though in an ambiguous fashion. An increase in the membership means less income which reduces utility. On the other hand it

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59. The implications of heterogeneity in the alternative wage for union policy is discussed further in section VII.

60. Implicit in the random assignment model is that employers hire workers for a fixed number of hours which is the same both in union employment and in alternative jobs. Thus, there was no need to consider the labor - leisure tradeoff explicitly.

means more leisure which increases utility. Note that it would normally be expected that a larger membership would mean more division of the "spoils" of unionization and less utility. However, that is not necessarily the case here because it is assumed that workers are not free to set their hours at the optimal level for a given wage. Their hours are completely determined by the wage rate through the labor demand schedule and the size of the union. Unlike random assignment, the optimal wage is not independent of the size of the union where there is work sharing. Workers make their choice regarding union membership on the basis of a comparison of U_u and $U(W_a)$. The condition for preferring union membership is that

$$(19) \quad U(W_u H - C, H) > U(W_a, 1)$$

noting that on the alternative job the worker will work standard hours (full time). If workers are identical and union work was full time, all workers would desire union representation as long as $W_u - C$ was greater than W_a. What this suggests is that at a given wage the size of the union will expand so that the degree of work sharing makes workers indifferent between union membership and employment on the alternative job. If workers are heterogeneous in their alternative wage then only those workers with low alternative wages will desire union membership and the size of the union will expand so that the marginal worker (the worker in the union with the highest alternative wage) is indifferent between union employment and working full time at the alternative wage.

Two factors limit the settings in which random assignment and worksharing schemes are feasible. The first factor is highlighted by the previous discussion regarding the dilution of the benefits of unionization if the union is open to anyone who wishes to join. On this basis, it is clear that neither random assignment nor worksharing is likely to be feasible unless the union has an effective mechanism for excluding workers from union

membership and eligiblity for union work. The second factor is based on the fact that it is likely that worksharing is more easily implemented over periods longer than a week or month through rotation of workers through jobs. This sort of worksharing can be accomplished by periodically reallocating jobs, perhaps randomly. Thus, there is an element of worksharing even in random allocation schemes. On this basis, random assignment or work sharing is likely to be found only where workers have long run attachments to the union rather than to the employer. If workers had long run relationships with particular employers then the initial draw from the lottery for union jobs in a random assignment scheme would have long run implications that preclude workers from having additional chances at attaining a union job and sharing in the work.

Examples of industries that are appropriate for random assignment or work sharing are the hiring hall industries best exemplified by the construction trades.[61] These unions historically have had effective mechanisms to limit membership through stiff skill requirements that could be met through apprenticeship programs which allowed only limited enrollment. In addition, construction jobs are necessarily of limited duration, and the workers have long run attachments the union. Job referrals from union run hiring halls can be interpreted as a mechanism for explicit work sharing.[62]

The key to understanding the job allocation system in most union settings is that workers have job rights. Workers who are employed in particular positions are not forced to share those jobs with anyone else. Nor are they required to enter a lottery to keep their job. In this context

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61. See Haber (1945) and Mills (1980) for descriptions of collective bargaining in the Construction Industry.

62. While dated, Haber (1945) presents examples of hiring halls enforcing work sharing through referals.

workers who are not already working on a union job have little incentive to join a union and pay dues because joining gives them no rights to share in the advantages of unionization. The union will be composed of workers who are employed at a given time, and it is these workers who will make decisions regarding future wage-employment policy. The way most union contracts outside the hiring hall industries are structured, the employer has complete discretion in hiring when employment is growing.[63] However, once the worker is hired (and is past some relatively short probationary period) the worker has a right to the job. Since wage increases will generally imply a decline (or smaller increase) in employment, it is crucial to specify how scarce union jobs are allocated when all workers have rights to their jobs.

Perhaps the most widely used rule for the allocation of union jobs is based on accumulated seniority (Abraham and Medoff, 1984a). Those workers who are more senior have priority. If there is a decline in employment then the workers are laid off in inverse order of seniority.[64] Consider the case where workers have identical preferences and alternative wages and differ only in their position in the seniority hierarchy. Index workers by their position in the seniority hierarchy so that worker i is the i^{th} most senior worker.[65] If there are L workers employed at a given wage, the L^{th} most senior worker is just on the margin of being employed. All workers with less seniority than the L^{th} worker have no seniority and are equivalent from the standpoint of not

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63. Depending on whether or not there is a union security clause in the contract and whether or not there is a Right-to-Work law in existence, these new workers may or may not be required to join the union or pay dues.

64. Laid off workers often retain for a limited period of time rights to the jobs that they held. If there is a subsequent increase in hiring after layoff then the employer may be required to offer the new jobs to laid off workers in seniority order (the last laid off are the first recalled).

65. This notation is due to Blair and Crawford (1981) who present a concise analysis of union wage behavior where there is uncertainty about labor demand and seniority is used to allocate jobs.

having union employment. The utility of each of the L union workers is U(W-C) while all other workers have utility $U(W_a)$.

There are two important implications of the seniority job allocation scheme that are relevant for the discussion here. The first is that the issue of excludability versus nonexcludability of potential members is not important. Since all workers with zero seniority do not have a right to a union job, they represent no threat to dilute the benefits of unionization to the existing workers. In fact, this may be one reason why seniority rules are so popular. The second important implication of the seniority job allocation rule is that workers of different seniority levels will have systematically different preferences regarding optimal union wage-employment policy. Workers with more seniority will generally prefer higher wages because their jobs are well protected by a buffer of less senior workers. The less senior workers are likely to prefer lower wages because they are more vulnerable to layoffs in employment declines. In the simplest possible static model where there is no uncertainty about labor demand, each worker will prefer the wage that puts that worker just on the margin of being employed. In other words, the i^{th} most senior worker will prefer a wage such that labor demand is just equal to i. In a more complicated model where there is uncertainty about labor demand (Blair and Crawford, 1981), the optimal wage for each worker is likely to be a monotonic function of seniority but not with such a simple relationship. If the workers are risk averse then it seems likely that they will prefer a wage such that the expected employment level implies a buffer of less senior workers.

The discussion in this section makes clear the important role of employment in determining the value to individual workers of union wage policy. More importantly, it suggests that the job allocation mechanism implies structural restrictions on how employment enters individuals'

evaluations of union policy that ought to be exploited in generating an objective function for the union as a whole. While individual preferences regarding wage-employment policies under various job allocation schemes are relatively clear, nothing further can be said about how the union as a whole will behave with respect to wage-employment policy without specifying the political process that governs the union.

VII. Heterogeneity in Preferences Among Workers

If all workers have identical preferences regarding the appropriate union wage-employment policy then the preference aggregation problem is trivial. Assuming that there is perfect democracy so that the leadership cannot pursue its own goals independently, the union objective function will accurately reflect the objectives of the representative member. However, the assumption of homogeneous preferences is untenable in general, and the preferences of workers with regard to the optimal wage-employment policy will differ along a number of dimensions. The most important differences are likely to be: 1) workers having different labor market alternatives and 2) workers having different amounts of seniority as it affects their job security through the job allocation system. The risk associated with any wage-employment policy will vary systematically along both of these dimensions. It is likely that workers with better labor market alternatives and with more seniority will prefer higher wages.[66] Clearly, some mechanism must be provided to aggregate the disparate preferences of the members into a coherent

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66. This claim is based on an implicit model where union labor demand is uncertain and workers are employed at their alternative wage if they do not have a union job. Blair and Crawford (1981) present such a model where preferences vary by seniority.

union objective function.

The problem of preference aggregation is not unique to the analysis of union behavior. It arises in the context of public choice at all levels: How does a political process take the disparate preferences of individuals and translate them into public policy?[67] In the context of this study, what is the political process that prevails within labor unions? It is perhaps a measure of how far analysis of this problem has yet to go that the only truly operational model of aggregation of individual preferences into a coherent objective function for a democratic organization is the median voter model.

The median voter model was first formulated by Black (1948) and Arrow (1950). Assume that individual preferences are a function of only a single variable (e.g., wages), the quantity of which is to be determined through some sort of voting mechanism. Assume further that each individual's preferences are single peaked in this dimension so that there is only a single relative maximum in utility defined over the entire range of possible outcomes. A sufficient condition for this is that the utility function be globally concave. Assume further that the individuals' most preferred outcomes are distributed across the voting population in a well defined fashion. Under a set of reasonable conditions, it can be shown that the median most preferred outcome is the only position that will defeat all other positions in any sequence of pairwise elections. Thus, a candidate who adopts this position cannot be defeated in a pairwise election. This is called a voting equilibrium. The median voter is defined as that voter for whom half of the other voters have most preferred outcomes that are lower and half have most

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67. See Buchanan and Tullock (1962) for an early discussion of problems of public choice in a broader context. There is a large body of literature on public choice that is beyond the scope of this chapter to review. Some examples from this literature include Downs (1957), Arrow (1963), Plott (1967), Fishburn (1973), and Riker (1980).

preferred outcomes that are higher. More importantly, it can be shown that if any of the basic assumptions of the model fails then no position will exist that can defeat all other positions. In such a case the outcome will depend on the order in which the various options are presented for voting and control of the agenda becomes crucial. From the standpoint of the discussion here, the most important assumptions are 1) single peaked preferences; 2) a single issue being decided; 3) no imposition of outcomes other than through voting (nondictatorship); and 4) pairwise elections.

As a simple illustration of the median voter approach to the analysis of union wage policy consider the case where workers differ in their productivity and hence in the alternative wage (W_a) available to them. Assume that jobs are allocated randomly and that the size of the union is fixed. Each worker's expected utility is defined in equation (15). It is straightforward to show both that these preferences are single peaked under standard conditions regarding the utility and labor demand functions and that the optimal wage of each worker is a monotonically increasing function of W_a. Thus, the conditions for a voting equilibrium are satisfied, and the objective of the union is to provide the wage that maximizes the expected utility of the worker with the median alternative wage.

What are the implications of this outcome? First, as one would expect, unions with higher median skill levels will have higher optimal wages. More importantly, the optimal wage depends only on the median skill level and not on any other characteristics of the distribution. If the distribution is skewed so that there are some members with very low alternative wages, these workers will have a particularly large advantage from unionization. On the other hand, if the distribution is skewed so that there are some members with very high alternative wages, these workers will have a particularly small advantage from unionization. In fact, the alternative wage for these high

productivity workers may be larger than the equilibrium union wage so that the high productivity workers will leave the union. The result will be a drop in the median alternative wage and a reduction in the union wage. This cycle will be repeated until at some point an equilibrium will be reached in both the size of the union and the union wage.

The implications of this model are consistent with two types of observations. First is the well known standardization of rates within industrial unions resulting in a large union-nonunion wage differential for unskilled workers and a smaller union-nonunion wage differential for skilled workers in this sector.[68] Second is the set of internal political problems that exist in unions, such as the United Automobile Workers (UAW), with a skewed skill mix. For example, the skilled tradesmen within the UAW have historically been unhappy with their relative lack of influence on union wage policy. They have felt that they could do better if they negotiated on their own.

The UAW example also shows the limits of the median voter formulation. The UAW must accommodate the high skilled workers in order to keep them in the union and in support of union policy. While beyond the scope of this analysis, it is likely that the bargaining position of the UAW would be weaker without the support of skilled workers crucial to the production process. In fact, it could be argued that the strategy of bargaining over percentage increase in wages rather than over wage levels themselves is in part an

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68. Many studies have documented the standardization of rates across skill levels within the union sector through the estimation of cross section earnings functions. See, for example, Bloch and Kuskin (1978), Freeman (1980b) and Lewis (1984). Even these studies exaggerate the variation in union rates for particular jobs within establishments because the estimates are made with very crude skill measures across establishments. Farber and Saks (1980) present evidence that can be interpreted as workers perceiving that unions standardize wage rates within establishments. See the Webbs (1920) for an early and insightful discussion of the importance of the

attempt to maintain historic differentials between workers of different skill levels.[69]

If the union uses seniority to allocate jobs then the most preferred wage of any particular worker will depend on that worker's seniority. In a static context where there is no uncertainty about labor demand, each worker will prefer a wage such that the worker is the least senior worker employed. Preferences are single peaked and the median voter equilibrium is to set the wage so that the median seniority worker is the least senior worker employed. This version of the median voter model implies a shrinking union over time. If there are initially M members then the union will have as an objective the optimal wage of the $(M/2)^{th}$ worker. The optimal wage of this worker has the property that the worker is now the least senior worker employed in the in the union firm. The result is that the new membership of the union is M/2. When it is time to renegotiate the contract, the $(M/4)^{th}$ worker is the median worker. The optimal wage of this worker will be higher yet so that this worker is the least senior worker employed. The union will again reduce its size by half, and this process will repeat itself until there are at most a handful of workers in the union.[70]

Of course, unions do not shrink out of existence so that there must be an element missing from this model. One element is that the union may not be able to achieve its objectives in bargaining due to employer resistance. The result will be a lower wage, more employment, and a larger union than desired. Another element is foresight on the part of the current median member. This worker must recognize that pursuing the wage policy described above will

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standard rate.

69. See H. Katz (1984) for a more detailed discussion of the influence of skilled workers within the UAW.

70. Heterogeneity in alternative wages does not affect the thrust of this argument.

result in a loss of the union job in the following period as effective control of the union passes to a more senior (or more skilled) worker. A more conservative wage policy may delay the time until the job is lost, but the only wage policy that will preserve the median member's control is to set the wage so that the entire initial membership is employed.

An important consideration, neglected thus far, that will limit the shrinkage of the median voter controlled union where jobs are allocated on the basis of seniority is uncertainty about the demand for labor. In this situation, the worker with median seniority does not know with certainty the wage that will make the worker the least senior employee. It is worthwhile developing this model more fully following the analysis of Blair and Crawford (1981). Let

$$L(W) = G(W) + \mu \tag{20}$$

where $G(W)$ represents the systematic part of the labor demand function and μ represents a random element affecting labor demand with zero mean. The probability that a worker with seniority rank i will be employed on the union job ($EMP_i=1$) at the wage W is

$$\begin{aligned} Pr[EMP_i=1] &= Pr[L(W)>i]. \\ &= Pr[\mu>i-G(W)] \\ &= 1 - F(i-G(W)) \end{aligned} \tag{21}$$

where $F(\cdot)$ represents the cumulative distribution function of μ. The expected utility of worker i at union wage W is

$$EU_i(W) = U(W_{ai}) \qquad W-C<W_{ai}$$

(22)

$$EU_i(W) = \{1 - F(i-G(W))\}U(W-C) + F(i-G(W))U(W_{ai}) \qquad W-C\geq W_{ai}$$

where C represents the (dues and other) costs of unionization and W_{ai} represents the alternative wage of worker i. Assuming that $W-C\geq W_{ai}$, it is straightforward to derive the the optimal wage for a worker with seniority i. Blair and Crawford (1981) derive sufficient conditions on the utility function and the distribution of μ for the preferences of the workers to be single peaked.[71]

If all workers have the same alternative wage the median voter is the member with the median seniority level. This worker's seniority index is i=M/2. Note that the allocation rule could be defined over almost any dimension without altering the optimal wage at all. If the alternative wage varies across workers the situation is somewhat more complicated because the most preferred wage of each worker depends not only on seniority but also on the alternative wage. A voting equilibrium still exists, but it is not clear who the member with the median most preferred wage is. Workers with more seniority will certainly prefer a higher wage as will workers with a higher alternative wage. However, unless the distributions of seniority and alternative wages have the same rank ordering, the individual optimal wages will be monotonic in neither seniority nor the alternative wage. Preferences are still single peaked and a voting equilibrium exists, but, without information on the joint distribution of seniority and the alternative wage,

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71. In addition to the usual conditions regarding the concavity of $U(\cdot)$, the sufficient conditions include a labor demand function concave in the wage rate and demand uncertainty (μ) with a nondecreasing hazard rate. The hazard rate of μ is defined as $f(x)/(1-F(x))$. Many common distributions, including the normal, have this property.

it is impossible to predict whose preferences will prevail.

The dynamic implications of the median voter model with uncertain labor demand for the size of the union are difficult to derive precisely. Blair and Crawford (1981) show that the optimal wage of a given member declines as the worker's risk aversion increases. This is relevant here because it implies that risk averse workers prefer to set the wage so as to provide a cushion of low seniority workers who will be laid off first in the event of an unfavorable realization of the labor demand uncertainty (μ). Thus, where there is uncertainty about labor demand, the median voter controlled union will not shrink to the same point as it would were there no uncertainty.[72]

The median voter model as derived here is a very powerful tool for aggregating the preferences of union members into a coherent objective function for the union as a whole. However, its applicability is limited due to the restrictive set of assumptions required. The most stringent of these for the purpose at hand are that only a single issue be decided and that there is perfect democracy. While the analysis of union behavior with multiple issues is not considered formally, the next section contains a discussion of the implications of conflicting goals of the union leadership and membership for the determination of union objectives.

VIII. Conflicting Goals of Membership and Leadership

The median voter model discussed in the previous section had as a basic assumption that the union was perfectly democratic in the sense that the leadership would be defeated immediately and costlessly if they strayed at all

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72. The median voter controlled union could even grow where there is uncertainty if there is an unexpectedly large realization of labor demand.

from the voting equilibrium wage. Thus, the issue of leadership goals as distinct from membership goals was not relevant. In fact, the members might as well vote for wage levels rather than for leaders. Of course, the assumption of perfect democracy is no more valid for labor unions than it is for other political institutions. Union leaders are free within certain limits to pursue their own goals. Many analysts, including Ross (1948), Berkowitz (1954), and Atherton (1973), have recognized the importance of imperfections in the democratic process and the concomitant consideration of the distinct goals of the leadership. Ashenfelter and Johnson (1969) develop a model of the outcome of collective bargaining that they argue is consistent with the view that the leadership and the rank-and-file have distinct expectations and objectives. More recently, Faith and Reid (1983) reformulated the problem as a principal-agent problem where the union leadership acts as the agent for the membership. The case where there is a perfectly operating democracy (as it is called here) is the case of no malfeasance in the principal-agent nomenclature. Similarly, the case of imperfectly operating democracy is a situation where malfeasance on the part of the agent is possible.

A major problem with the analysis of union behavior where the leadership has some freedom to pursue its own goals (malfeasance) is that very little is known about what these goals might be or how they might be analyzed in a systematic fashion. Ross (1948, p. 16) argues for ". . . the primary importance of organizational survival as the central aim of the leadership." However, beyond this there there is very little analysis, and saying that the primary goal of the leadership is to survive is really to say nothing at all about the goals of the leadership. It is obvious that the organization must survive if the leadership is to have a vehicle to pursue whatever its true aims are.[73]

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[73] It is possible for factors that affect the union

It is not possible here to provide a theory of the objectives of union leadership. However, it is possible to gain some insight into union behavior by examining the constraints acting on the union leadership. The primary constraint on the union leadership is that they remain in power because otherwise they would not be able to pursue their objectives, whatever they might be. This is more than an empty formalization. Essentially, limits will be set on how far the leadership can deviate from the interests of the membership, perhaps as reflected in a voting equilibrium. These limits will depend crucially on the friction in the democratic process. It may be that in some cases the limits turn out to be sufficiently loose that the leadership can maximize their objective function without regard to the constraints of the political process (dictatorship). In other cases it may be that the leadership is severely constrained by the political process and the need to answer to the rank-and-file.

It is worth developing a simple version of this model more formally in order both to consider the potential of this approach and to highlight some of the difficulties in an analysis of this sort. Assume that the leadership is interested in having as large a union as possible. This objective for the leadership may be rooted in the desire to maximize the dues income of the union where dues are levied on a per capita basis. As before, the members get utility solely from their wage income net of dues payments, and the union bargains with the employer over the setting of a single wage for all workers. Workers may differ in their alternative wage, and job allocation is on the basis of seniority if the net wage is such that the number of members who

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slowly over time so as to fully exploit its "capital", either on their own behalf or on behalf of the current members, before their inevitable departure. Leaders have finite lifetimes while organizations have (at least conceptually) infinite lifetimes.

desire jobs is greater than the number of available jobs. Maximization of membership in this context is identical to maximization of employment where members who are not employed leave the union. The analysis proceeds conditional on a given dues level.[74]

If the democratic process in the union is operating perfectly, so that no malfeasance is possible, then the wage will be set at the voting equilibrium defined by the optimal wage of the median individual. The other extreme is the case where the leadership is completely unconstrained by the political process. In this situation, the leadership is constrained by two relationships. The first is the labor demand function of the employer (L(W)). This is a declining function of the wage rate, and it represents the maximum level of employment/membership at a given wage. The second constraint is a membership function of the sort proposed by Dunlop (1944). This is an increasing function of the wage rate net of dues, and it represents the number of members who want union jobs at a given wage.

The membership function can be derived formally from the distribution of alternative wages among the members. Let i index worker's rank on the basis of their alternative wage where i=1 represents the highest alternative wage. An individual will desire a union job if the wage (W) net of the costs of unionization (C) is greater than the alternative wage (W_{ai}). More formally, a worker will desire a union job if $W-C \geq W_{ai}$. The membership function is

$$(23) \quad M(W-C) = M_0 \Psi(W-C)$$

where M_0 represents the initial size of the union and $\Psi(\cdot)$ represents the cumulative distribution function of W_{ai} among the initial membership. This is

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74. The case where the leadership is interested in maximizing dues income directly and sets both the wage and the dues level to that end is considered below.

clearly an increasing function of the wage rate.

Because the union cannot coerce workers to join and cannot coerce the employer to hire workers, the quantity of employment at a given wage rate is

(24) $H(W,C) = MIN[L(W),M(W-C)]$.

Given the negative slope of $L(W)$ and the positive slope of $M(W-C)$, the wage rate that maximizes employment is defined by the intersection of the labor demand and membership functions. This relationship is

(25) $L(W) = M(W-C)$.

Note that there is no job allocation problem because the number of members is equal to the number of jobs. The union will be composed of the least skilled workers among the initial membership, and all of the original members who have alternative wages greater than W-C will take jobs at their alternative wage.

Now suppose that the union leadership is interested in maximization of dues revenues directly and that they can set the dues level as well as the wage. The objective function for the union leadership is

(26) $V(W,C) = CM(W-C)$

which is maximized subject to the constraint that only those workers who are employed become/remain members of the union. This constraint, embodied in equation (25), is simply that the membership of the union is equal to the labor demand of the employer. Without deriving the explicit relationships defining the optimal wage/dues pair, it is clear that at any wage rate the union leadership will raise dues to the point where the increase in dues revenues from existing members is just offset by the loss of dues revenues as membership declines. Once again, there is no job allocation problem because the number of members is equal to employment, and the union is composed of the least skilled workers.

In both the case of the membership mazimizing union leadership and case of the dues revenue maximizing union leadership, the marginal worker will be

indifferent between union employment and the alternative job (W_{ai}=W-C), and all of the inframarginal workers get a positive wage advantage from unionization equal to W-C-W_{ai}. This result is very similar to that derived by Lewis (1959) for his conception of a "boss-dominated" union. Lewis argued that the union leaders monopsonize the supply of labor and extract from the members all of the rents so that the members are indifferent between union employment and nonunion employment. However, he did not consider the possibility that different workers get different benefit from unionization so that a single wage and dues level cannot extract all rents. If the union leadership could set different wages or dues levels for different workers it would act as a perfectly discriminating monopsonist buying labor from workers at their reservation price. Thus, the model developed here is an extension of Lewis's boss dominated union with heterogeneous workers.

It is impossible to determine whether the wage net of dues (W-C) that an employment or dues maximizing union leadership sets will be higher or lower than a perfectly democratic union with a voting equilibrium would set. Detailed information on the labor demand function, the distribution of alternative wages, and the preference function of the union members would be required. However, the fact that there are likely to be more workers willing to work at the union wage than the union employer is willing to hire at that wage suggests that dues revenue and employment could be increased by some combination of increasing the dues level and reducing the wage in order to induce the employer to hire more workers.[75] This is consistent with the notion that the net wage set by a dues revenue maximizing union leadership

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75. See Abowd and Farber (1982) and Farber (1983a) for discussions and estimation of models of the determination of the union status of workers where there are queues for union jobs. Raisian (1981) presents evidence suggesting the the levels of dues and fees in most unions do not offset the union-nonunion wage differential.

with no political constraints would be below that implied by a voting equilibrium. Certainly, it is clear that it would only be by accident that an unfettered leadership would set wages and dues equal to that which would arise out of a perfectly operating democratic union.[76]

The perfectly opearating democratic union and the completely unfettered leadership run union are two extreme views that are unlikely to be a perfect reflection of any real union. The attractiveness of the two types of models presented thus far is not their congruence with the operation of actual labor unions, but it is the ease with which these models can be operationalized. Indeed, virtually all empirical work on the behavior of labor unions surveyed in section V at least pays lip service to the model of the perfectly democratic union. While no one has attempted to analyze union objectives as the result of an unfettered leadership pursuing it own goals, this would certainly be feasible. It is an open question as to the relative empirical performance of these two extreme models.

While it is impossible to characterize completely a model of union behavior with a "somewhat" imperfect democracy, it is useful to at least lay out the barest outlines of such an approach. Consider the case where the leaders are elected through a process that is both costly and uncertain. By costly it is meant that potential candidates or insurgent groups must spend time and/or money in attempt to defeat the current leadership.[77] In addition, it is not certain ex ante whether the insurgency will succeed. As before,

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76. The role that dues play in a perfectly democratic union has not been considered directly to this point. Essentially, this is a dimension in addition to wages that the members have preferences over, assuming that the level of union services (grievance handling, etc.) is a direct function of dues revenues in a democratic union. This raises all of the complicated problems of a multiple issue voting process.

77. At certain times and in certain unions the costs of mounting an insurgency have been much higher and more immediate.

assume that workers differ in their alternative wages, that jobs are allocated based on seniority when there are more members than union jobs, and that dues are fixed. If there is a perfect democracy then the voting equilibrium is where the wage is set at the level that maximizes the utility of the median member (the member with the median optimal wage) as derived above. Without a perfect democracy the union leadership has some freedom to pursue its own goals constrained by the knowledge that as they stray farther from the goals of the membership they are more likely to be defeated. For the purpose of this discussion characterize the leadership goal as maximization of dues revenues which, with fixed dues, is identical to employment/membership maximization.

At the voting equilibrium wage (W_m) only the median member feels that this is an optimal outcome. All other members feel that there is some other wage that would make them better off. The essence of the voting equilibrium is that W_m is the only wage for which there does not exist some other wage that more than half the members prefer. Suppose that the leadership deviates from W_m in their pursuit of dues revenue maximization (or any other goal) and that they set the wage at W_B. Note that W_B may be greater or less than W_m. In this situation there is a set of wages, including W_m, of which all the elements are preferred by at least half the workers to W_B.

If there are more workers who would like a job at W_m than the employer is willing to hire, then the membership/dues maximizing union leadership will attempt to set the wage below W_m so as to induce the employer to hire more workers. In this situation all of the members of the union with optimal wages above W_m will be worse off and all of the members with optimal wages below W_B will be better off. Some of the group of workers whose optimal wage is between W_B and W_m will be better off and some will be worse off. The

important question is whether those workers who are worse off find it in their interest to form a coalition to defeat the leadership. It seems reasonable that what the coalition can offer a worker is a reduction in the distance (where the metric is expected utility) between the union wage and the worker's optimal wage. The larger the reduction in distance the more the worker will value the coalition. Denote this value function by $H(W,W_i,W_B)$ where W_i, the optimal wage of the i_{th} worker, embodies all of the information about the individual including the level of seniority and the alternative wage.

The <u>total</u> gain to the coalition net of the costs of formation of the coalition is

$$(27) \quad H = \Sigma\, H(W,W_i,W_B) - K$$

where the summation is over all members of the potential coalition and K represents the costs of formation of the coalition.[78] There is likely to be uncertainty on the part of the incumbent leadership about the ultimate net gain of a coalition. Given that a coalition will be formed only where the net gain is positive the incumbent leadership will be uncertain as to whether a particular coalition will, in fact, form. The leadership can compute a distribution for the total gain for each possible coalition, and from this they can compute the probability that at least one coalition will form. The central feature of this model (conjecture at this point) is that coalitions will be more likely to form the larger is the total gain to the members of the coalition. It is certainly true that the incumbent leadership can influence the total gain from any coalition by manipulating W_B which implies that they can influence the probability that at least one coalition will form. Since the benefit from leadership is also a function of W_B, the incumbents can

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78. This will be true whether coalitions are organized by aspiring leaders out for personal gain or by groups of workers who will share the gain.

compute the expected benefit from leadership as a function of W_B as the product of the probability that no coalitions form and the benefit from continued leadership. On this basis they can compute the value of W_B that maximizes the expected benefit from leadership. This is the wage that the union will set where there is "imperfect" democracy.

Although they is not demonstrated formally here, there are a pair of substantive results that emerge from this model. First, the existing leadership will deviate more from the voting equilibrium position where insurgencies are more costly (K is larger). Lower costs make insurgencies more likely, and the leadership will compensate for this with a more popular wage policy. Second, the position promised by the insurgency (and delivered by the union if K is small) will be relatively close to the voting equilibrium position. This is more difficult to make intuitive, but consider a union with three members. The optimal wages of the three workers are W_1, $W_2=2W_1$, and $W_3=3W_1$. The voting equilibrium wage is clearly W_2, but a union leadership may not feel bound to provide this wage. If the leadership provides a wage that deviates only slightly from W_2, say W_B slightly lower, then an insurgency could promise an improvement to the last two workers but not to the first. However, the maximum to improvement to the last two members (at some wage slightly higher than W_B) will be relatively small. The insurgents cannot raise the wage very far above W_B without losing member 2 to the incumbents. This small gain is not likely to cover the cost K of forming the insurgency. On the other hand, if the leaders set the wage at a very high level, say $W_B=W_3$, then there will be substantial gain to the insurgency. Any wage lower than W_3 is preferred by both member 1 and member 2, and the gain is likely to be quite substantial. For example, the voting equilibrium position (W_2) is a dramatically different position from W_3 that members 1 and 2 are both likely

to prefer strongly to W_B=W_3. Of course, these conclusion rest on strong (but reasonable) assumptions about the expected utility functions of the members. Overall, unless the barriers to an insurgency are very high the existing union leadership will set the wage relatively close to the voting equilibrium so as not to encourage insurgencies.

The conclusion that even with imperfect democracy a union is not likely to stray far from the voting equilibrium has important implications for evaluating the recent popularity of a casual sort of median voter model to describe union behavior. The use of the median voter concept in this area has ranged from formal use as a voting equilibrium (Farber, 1978b; Blair and Crawford, 1981) to more widespread use as a general description of unions as organizations that satisfy "average" members while labor markets cater to "marginal" workers (Freeman and Medoff, 1979, 1983; Freeman, 1980a, 1981; Medoff, 1979). It is clear that a pure median voter equilibrium exists only under very special conditions that are unlikely to be met in the context of labor unions. However, the argument made in this section provides a more general justification for the approximate descriptive validity of the median voter concept.

The discussion in this section demonstrates the power of even relatively simple models of the goals of members and leaders to generate testable implications regarding union behavior. Clearly, a fruitful area for further theoretical and empirical research relates to the problems of aggregation of individual preferences, particularly where workers are heterogeneous and the democratic process is not perfect. More specifically, with further work it may be possible to isolate the institutional features of particular unions that affect the ease with which insurgencies can form and their effect on union wage-employment policies.

Overall, the research surveyed in this chapter illustrates the substantial progress that has been made in the analysis of union behavior. At the same time, there remains an extensive agenda for further research that needs to be addressed before economists can claim a real understanding of union behavior.

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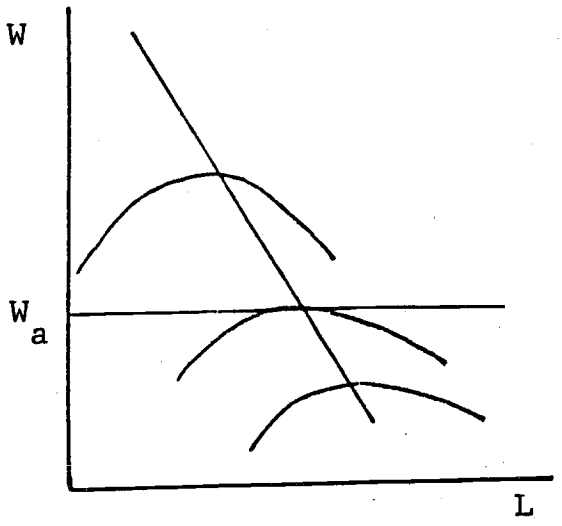

Figure 1

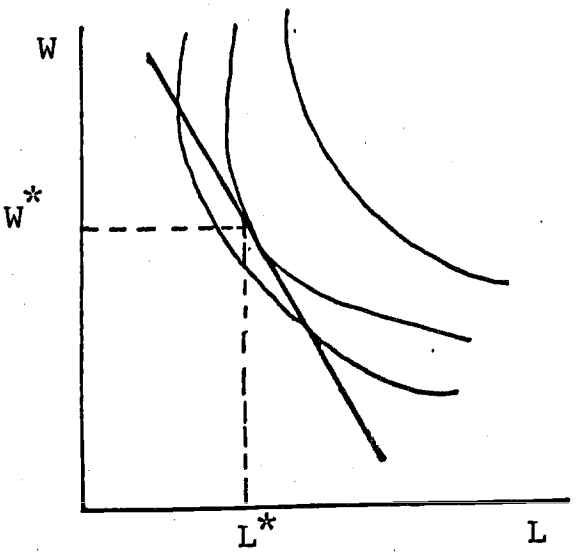

Figure 2

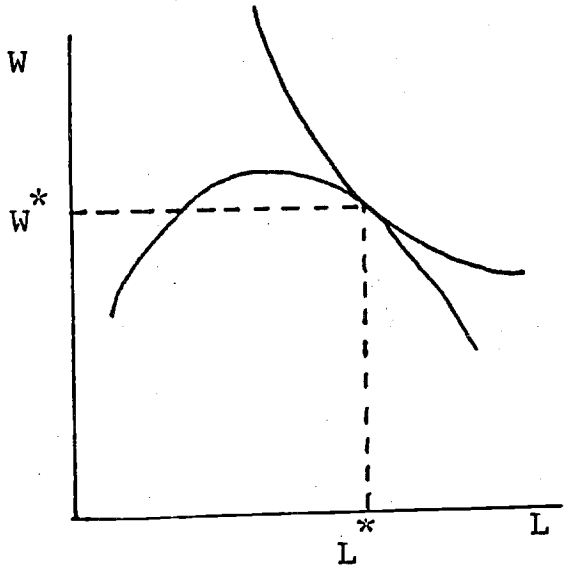

Figure 3

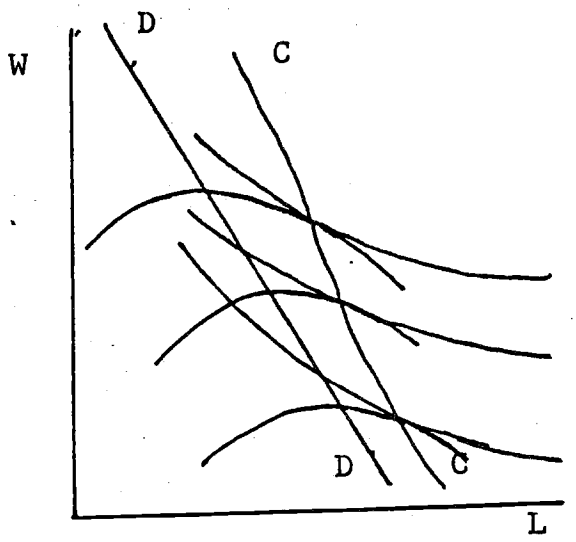

Figure 4