

Models of Union Wage Determination: What Have We Learned Since Dunlop and Ross?

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This study surveys the development and current status of models of union wage determination since Dunlop and Ross first wrote on the subject in the 1940s. To start, I identify eight empirical dimensions of the union wage effect that models have endeavored to explain and predict. A number of alternative theoretical models are then examined, starting with Dunlop's "economic" and Ross' "political" models and extending to the plethora of models and extensions found in the modern-day literature. Examples include standard monopoly, efficient contract, and bargaining models, as well as offshoots such as median voter, insider-outsider, property rights, and principal-agent models. The article then examines the extent to which these various models generate hypotheses and insights apropos to explaining the eight major empirical dimensions of the union wage effect. The conclusion summarizes what has been learned, the major shortcomings of this literature, and steps for further progress.

ALTHOUGH THE ECONOMICS LITERATURE ON UNIONS GOES BACK MORE THAN A CENTURY, it was only in the 1940s that economists began to construct formal analytical models of unions as wage-fixing institutions. The pioneering first step was made by John Dunlop (1944) in his book *Wage Determination under Trade Unions*. Borrowing from the microeconomic theory of the firm, Dunlop modeled the union as an economic organization that seeks to maximize some objective, such as the wage bill, subject

Editor's note: Several years ago, the editors encouraged submissions of review articles on a competitive basis in the belief that such articles help keep readers abreast of the fast-growing literature in industrial relations. This submission is one of those articles.

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to various constraints—most important, the firm’s labor demand curve. Four years later in *Trade Union Wage Policy*, Arthur Ross (1948) argued that Dunlop’s “economic” model of unions is fundamentally flawed. Ross claims that unions should instead be modeled as political institutions and that union wage determination typically is more affected by concerns of fairness and equity than negative employment effects.

In this article I summarize and evaluate the literature on theories of union wage determination as it has developed in the half century since Dunlop and Ross’ seminal contributions. Three aspects are emphasized. The first is a review of formal models of union wage determination, starting with Dunlop and Ross and extending to recent theoretical contributions. The second is an examination of empirical aspects of union wage determination and an evaluation of the extent to which these theoretical models help understand and explain observed patterns and trends. The third is an evaluation and critique of this literature in which I point out the major insights and contributions, the most serious shortcomings and lacunas, and the most pressing areas for further research. Given the large and diverse literature and the space constraints imposed by a journal-length article, the review that follows is necessarily selective and broad-brush.

The Facts and Questions at Issue

I start this review from the premise that the goal of research on union wage determination is to contribute to improved understanding, explanation, and prediction of unions as institutions and the pattern of wages, employment, and other related phenomena that emerge from the collective-bargaining process. Given this orientation, it follows that to evaluate what has been learned from the half century of research on this topic, one must first identify the most important facts and questions at issue. Here are what I consider the top eight, as culled from an extensive review of the literature. Several other aspects of union wage determination, such as the influence of product market characteristics, bargaining structure, and union characteristics, are omitted due to space constraints.

1. *Union goals in wage bargaining.* Union behavior, like that of other institutions, presumably is shaped by certain organizational goals. What are they? One answer was given by Samuel Gompers (1916:1503), long-time president of the American Federation of Labor, who said that unions seek “to encourage and stimulate the workmen in their effort for a consistently increasing share in production”—a position that over the years has been simplified (perhaps unduly) to a single word—*more* (Rees 1977:47). Alternatively, economist John R. Commons states (1913:121)

that the purpose of unions is wealth redistribution, and he characterized their goal as “protection” and “joint aggrandizement.” A third statement of union goals is by Lynn Williams (1998:180–1), former president of the United Steelworkers Union, who said of his union that it sought to achieve two objectives: first, “achieving the maximum level of wages and benefits for its members” and second, “to maintain all the jobs it could, within as viable an industry as possible.” Is any one of these statements of union goals more accurate than another, or do unions follow some other goal or set of goals? Knowing the answer to this question is important both for evaluating the mission and impact of unions on the economy and also in formulating theoretical models that seek to predict the level and change in union wages.

2. *Size of the union-nonunion wage differential.* Unions have both economic and noneconomic objectives, but one is most certainly to raise the wages and income of their members. Empirical research estimates that this effect for the United States and Canada is, on average, in the range of 15 percent (Lewis 1986; Jarrell and Stanley 1990; Kuhn 1998) but with considerable variation plus and minus for particular work groups and time periods (e.g., Freeman and Medoff 1984; Hirsch and Schumacher 1998a; Waddoups 1999). Measured union-nonunion wage differentials from cross-sectional data in other countries, such as the United Kingdom, and Australia, tend to be lower—typically in the 7 to 15 percent range (Freeman 1994; Blanchflower 1997). A task of theory is to help understand and predict the size of the union-nonunion wage differential and the factors that determine it.

3. *Union wage differentials over time.* A corollary issue is what happens to the size of the union-nonunion wage differential over time, both in the long term and in reaction to short-term macroeconomic fluctuations. With respect to the long term, is there an equilibrium union wage differential, or will unions—according to the statement by Gompers—endeavor to widen the wage differential in successive bargaining rounds? If the latter is the case, collective bargaining will (other things equal) generate some degree of cost-push inflation in the economy as firms respond to union-induced increases in labor and production costs by hiking the prices of their products (Mitchell 1980; Neumark 1993). The evidence on the long-term trend depends on the time period examined—from the end of World War II to the early 1980s in the United States, the union-nonunion wage differential trended upward (Johnson 1984; Lewis 1986) but since then has been roughly constant or modestly declining (Blanchflower 1997; Hirsch and Schumacher 2001). A similar pattern has been found in Great Britain for the latter period (Hildreth 1999). With

respect to the short term, the union-nonunion wage differential typically has shrunk in periods of low unemployment and inflation surprises while expanding in periods of stagflation (Blanchflower 1997). A goal of theory should be to help us understand and predict both features of the time pattern of union-nonunion wages.

4. *Union wage rigidity and wage concessions.* An oft-noted feature of unionized labor markets is that wage rates exhibit a much greater degree of downward rigidity than in unorganized labor markets (Shister 1943). This phenomenon reflects, in part, the long-standing union principle of “no backward step” in previously won wage gains. Many examples in labor history can be found where unions waged bitter and protracted strikes to avoid a give-back, and in recent years examples can be cited where union members chose to let the plant or company go out of business rather than give a concession (Hoerr 1988; Mitchell 1994). However, many other examples can be found where unions have agreed to sizable reductions in wages and other forms of labor compensation. Thus another task for theory is to understand why unions so strongly resist wage cuts, under what conditions unions will agree to a wage concession, and how large a wage cut will be accepted.

5. *Wage structure.* Unions affect not only the level of wages but also their structure, which is to say the size of wage differentials among workers who vary by characteristics such as age, skill, education, race, gender, occupation, and exposure to injury or unpleasant working conditions. Empirical research finds, for example, that unions typically flatten the wage structure among production workers in a plant or company, compress the wage structure between skilled and unskilled workers, reduce the returns to additional years of education, and in some cases reduce differentials between men (whites) and women (blacks) and in other cases widen them (Freeman and Medoff 1984; Hirsch and Addison 1986; Blanchflower 1997). As a rule, unions also widen the wage differential workers receive for doing unsafe or unpleasant work (Dorman and Hagstrom 1998). A theory of union wage determination should be able to explain these patterns.

6. *The form of compensation.* Another dimension of wages that unions affect is the form or type of compensation. Unions, for example, have in many cases bargained for time-based rates of pay in preference to output-based pay (e.g., a wage per hour versus a piece-rate system), although in some cases the reverse is also found (Drago and Heywood 1995). Likewise, unions typically desire that greater emphasis be given to seniority over merit as the basis for pay advancement. Then there are nonwage forms of compensation, such as annual bonuses and profit-sharing, which

unions have heretofore tended to oppose (Cheadle 1989), as well as various forms of employee benefits (e.g., health insurance and paid vacations), which they often favor. Finally, evidence also indicates that unions not only tilt the compensation package toward a greater share of benefits but also influence the structure of benefits (e.g., pensions get greater emphasis) and the distribution of benefits among the employees (Fosu 1993; Freeman 1994).

7. *Employment effects.* A seventh dimension of union wage policy concerns the extent to which unions take into account the employment effect of their wage demands, the actual impact unions have on employment, and practices unions adopt to create or maintain jobs (e.g., restrictive work rules). Ross claimed, for example, that the employment effect stemming from union wage gains is typically neither discernible to unions nor of much influence on their decision making, a position often taken by union leaders (e.g., Williams 1998; Bewley 1999). Dunlop, on the other hand, claimed that employment in general and the demand curve for labor in particular are important constraints on union wage policy, a position subscribed to by most economists (Addison and Chilton 1997). Also of interest is the effect unions actually have on employment levels. The evidence is to date contradictory—some studies find that unions have a significant negative effect on employment levels and/or employment growth, whereas others find small to nonexistent negative effects and yet others find that unions lead to higher employment levels (Leonard 1992; Pencavel 1991; Zax 1989). Related to the union impact on employment are two other issues. One is the union impact on work hours, which appears to be negative (Pencavel 1991; Trejo 1991); the other is various kinds of “make work” restrictive work rules and “featherbedding” requirements, which appear with more frequency among craft unions and in declining industries (Slichter, Healy, and Livernash 1960; Addison 1984; Booth 1995).

8. *Wage imitation and pattern bargaining.* A final feature of union wage policy that has been the focus of much attention over the years is the extent to which there is interdependence between the wage outcomes negotiated in separate union-company bargains. A popular form of such interdependence is *pattern bargaining*, in which a union negotiates an economic package with one firm or industry and uses this package as the basis for settlements with other related firms or industries (Mitchell 1980; De la Croix 1994). A related form of interdependence is *wage imitation*, in which there is strong autocorrelation in union settlements over time as one union seeks to emulate the settlement achieved by another, thereby imparting considerable inertia in union wage growth. Although the extent

of pattern bargaining and wage imitation weakened noticeably during the crisis years of the 1980s, several recent studies find evidence that both forms of wage interdependence have reemerged in stronger form in the 1990s (Erickson 1996, 2001; Budd 1997). A challenge facing theoretical models of union wage determination is to explain why and under what conditions wage interdependence exists and the effect it will have on both the union and nonunion sectors of the labor market.

Explaining the Facts: Dunlop and Ross

Dunlop and Ross were not the first economists to write about union wage policy and wage determination. An earlier generation of scholars associated with the institutional school of labor economics, such as Sydney and Beatrice Webb, John R. Commons, William Leiserson, and Sumner Slichter, contributed major works on the subject. Unions, in their view, could be modeled as either an economic or political organization, in the former case as a labor market equivalent of a cartel and in the latter as a form of “industrial government” (Commons 1950:40; Kaufman 2000). Both had relevance the institutionalists thought, but they believed that the political conceptualization of unions was the most insightful model. Crucial to understanding the behavior of unions, therefore, were several factors in their view: the goals of the organization’s leaders (e.g., a business union agenda of improved wages and conditions versus a political agenda of revolutionary unionism), the structure and form of property rights in unions that determine the nature and distribution of political control among the rank and file and the control the members have over the leadership, the role of transactions costs and bounded rationality, and the strong influence on human motivation and the structure of individual preferences exercised by relative comparisons and considerations of equity and justice.

These theoretical considerations advanced by the early institutionalists never went very far for at least three reasons: They were embedded in lengthy historical and case-study treatments of unions; the approach drew more from history, sociology, and law than from conventional economics; and neither the institutionalists nor their students sought to formalize their insights into a formal model or theory. For these reasons, the formal (analytic) treatment of union wage determination was, as of the early 1940s, largely nonexistent. Into this void stepped Dunlop.

To provide a baseline for evaluating the progress that has been made over the last half century in research on union wage determination, I next sketch the respective models put forward by Dunlop and Ross.

Dunlop: The model. Dunlop begins his analysis of union wage determination with these words (1944:4): “The trade union is clearly a decision making unit. Since analytical models have been devised to explain the pricing and output decisions of business enterprises, Chapter III attempts to construct corresponding models of trade unions.” He goes to say that, analogous to the theory of the firm (1944:4–5), “An economic theory of a trade union requires that the organization be assumed to maximize (or minimize) something. Although not the only possible objective, maximization of the wage bill may be regarded as the standard case.”

These sentences are quoted often, and the theoretical approach suggested in them has spawned a large genre of microeconomics-based models of trade unions. It is noteworthy and largely ignored, however, that on the same page Dunlop qualifies his thesis in two fundamental respects. Immediately following the sentence last quoted, he states (1944:5, italics in original): “But the model is not so easily constructed since the crucial question *Whose wage bill?* remains.” And then, further down the page, he states: “A fundamental tenet of the following pages is that modes of behavior that are broader than economic theory contribute materially to the understanding of wage determination. . . . To appraise wage policy of a trade union merely from the framework of analytical economics may be to misunderstand behavior completely.”

Given these caveats, Dunlop proceeds to develop in graphic form (in Chapter III) his wage-bill model of the trade union. The model contains three functional relationships: a downward-sloping labor demand curve (the union’s average receipts curve), a corresponding downward-sloping marginal receipts curve, and an upward-sloping membership function for the union (analogous to a firm’s marginal cost curve). Dunlop defines the latter as (1944:33) “the appraisal by the leadership of the amount of labor that will be allied to the union at each wage rate.” The wage rate that maximizes the wage bill ($W \cdot L$) is where the labor demand curve is unit elastic (implying that marginal receipts are zero). At this wage, call it W_1 , L_1 union members are employed, whereas $M - L_1$ are unemployed (where M is union membership, as determined by the position of the membership function, and L is the number of workers employed). Dunlop also considers other objectives besides wage bill maximization, such as maximizing union employment and the collective rents of the membership, and likewise shows how the wage-employment outcome varies with different positions of the membership function.

Ross: The model. Ross argues that Dunlop’s formal model of trade unions is fundamentally flawed because of Dunlop’s assumption that the

union maximizes a well-defined objective function. In this vein, Ross states (1948:22): “The union is not a business enterprise selling labor. It is a political institution representing sellers of labor, and there is no necessary reason to assume that it will automatically or mechanically behave in the same fashion as a profit-maximizing business enterprise.”

The problems with a standard, microeconomics-based union objective function are several-fold, according to Ross (1948:22–44). First, it is impossible to aggregate the individual preferences of union members to obtain a well-defined union objective function because individual union members, unlike stockholders of a firm, often do not share equally in the benefits and costs of a particular price (wage) policy due to differences in age, job classification, seniority, and other such factors. Second, union wage policy is formulated and negotiated by the leaders of the union, and the leaders typically have different preferences on this matter than the rank and file. This type of principal-agent problem precludes construction of a well-defined union objective function because the weight given to the rank and file’s wage preferences varies over time and across subdivisions of the union (e.g., among locals) in proportion to the amount of political pressure the members are able or willing to exert on the leaders. The third problem, Ross argues, is that decision making in some unions is very centralized and thus wage policy is largely determined by the leaders at the national (or international) level and implemented through uniform contract provisions across numerous locals/companies, whereas in other unions decision-making power is highly decentralized and thus wages are determined largely at the local level on an individual company/geographic basis. Since the constellation of political pressures felt by the union leadership will vary greatly depending on the locus of bargaining, so will the objectives pursued by the leadership in collective negotiations.

A better way to proceed, Ross claims, is to model the trade union as a political institution operating in an economic environment. Thus, rather than treat the trade union as akin to a business enterprise, the union is instead modeled as a body of government, such as the U.S. Congress, and wage policy is treated as the outcome of a political process much as foreign policy of a nation is so considered. Like foreign policy, a union’s wage policy is determined by the leaders of the organization, and it is thus the pressures that constrain and influence their decisions that must be the focal point of any theory of union wage determination. One such force is the preferences or goals of the union leadership itself, which Ross claims are oriented toward advancing organizational goals of union survival and growth and personal goals of greater power, income, and prestige. Also important are the goals and preferences of the union rank and file. The

members, Ross states, always want “more,” but the minimum acceptable amount varies with economic conditions and the wage gains achieved by other related workers and unions. The latter consideration is given considerable emphasis by Ross as he states that relative comparisons and issues of equity and fairness permeate the process of wage determination.

The essence of the union leader’s job is to reconcile these diverse and often conflicting pressures. Unlike Dunlop, Ross does not develop his model in graphic or mathematical form, and thus his theory does not lead to determinate predictions about the union wage.

Models: A Half Century Later

Dunlop and Ross provided two different conceptualizations for modeling trade unions—one drawing inspiration largely from neoclassical microeconomic theory and the other having more in common with political science and the earlier writings of the institutional labor economists. In point of fact, the perspectives of the two authors converged in a number of places—both counseled an interdisciplinary “industrial relations” approach to studying unions, whereas Dunlop clearly acknowledges in other chapters of his book and in later writings the political nature of union decision making and Ross equally clearly recognizes the importance of economic constraints on union wage aspirations (Burton 1984; Borland 1986; Kaufman 1988, 2002). These similarities, however, often were lost sight of in the ensuing debate and with the passage of time.

In the subsequent half century since Dunlop and Ross, economists have devoted considerable effort and ingenuity to further formalizing and developing models of unions as institutions and wage-setting organizations. Much of this work has followed along the path charted by Dunlop, but some subsequent work also has developed along lines broadly Rossian in spirit. Then, starting in earnest in the 1980s and accelerating to the present time, economists began to bring into the analysis of union behavior an entirely new theoretical apparatus—game-theory models of bargaining—sometimes integrated with microeconomic models of unions and other times used as a stand-alone model. In this section I provide an overview of these various models of trade unions as they are found in the modern literature, starting with the most simple and proceeding to the more complex.

The monopoly model. In his insightful survey of union models, Farber (1986) outlines the key actors, processes, constraints, and outcomes that must be considered by the economic theorist. The actors are three: the firm, the members of the union, and the union leaders. The key processes

are two: the process of goal formation in the union and the process of bargaining between the union and firm. The most important constraints are fourfold: the firm's labor demand curve, the costs of disagreement (principally strike costs), the union's membership function, and relevant laws concerning union security, union governance, and so on. Finally, the outcomes are several-fold: foremost the wage rate and level of employment, followed by other outcomes such as wage structure, benefits, manning rules, and strike occurrence.

This is a daunting list of ingredients, and model builders have proceeded selectively and incrementally. I start with the most basic model, called the *monopoly union model* (Fellner 1949; Cartter 1959). The key features of this model are that it is a static, one-period model; the union is assumed to maximize a well-defined objective function; the principle constraint is the firm's labor demand curve; the union is assumed able to impose its desired outcome on the firm; and the outcome negotiated is the wage rate.

More specifically, the basic model assumes that the union has a utility function of the general form $U = U(W, L)$, where W is the wage rate, L is the level of employment, and M is the level of union membership. The presumption behind the union utility function is that both higher wages and employment are "goods" and are the two major choice variables of interest to the union. [Hours of work also may be a choice variable, as in Earle and Pencavel (1990), but they are most often assumed to be exogenously given.] A number of specific functional forms for the union utility function have been proposed in the literature:

$$\text{Wage bill: } U = W \cdot L$$

$$\text{Income of the union membership: } U = W \cdot L + W_a(M - L)$$

where W_a is the market wage (often assumed to be competitive) or alternative income (possibly union-provided lump-sum payments to unemployed members)

$$\text{Economic rents: } U = (W - W_a)L$$

Two other specifications have been used frequently in recent years (Oswald 1982; Booth 1995). The first is the utilitarian union utility function. Here it is assumed that all union members are treated identically by the union. The goal of the union is to maximize the sum of individual utilities [$U(W_i)$] of the M members:

$$Utilitarian: U = L \cdot U(W) + (M - L) \cdot U(W_a)$$

If the utility function is linear in wages (workers are risk-neutral), the utilitarian specification is equivalent to wage bill maximization. An additional property is that the union is indifferent to alternative (and possibly quite unequal) distributions of utility among individual members (Booth 1995:93), an outcome resting in part on the assumption that individual member utility functions are independent.

The other popular objective function is the expected utility model:

$$Expected\ utility: U = (L/M) \cdot U(W) + [(M - L)/M] \cdot U(W_a)$$

where L/M is the probability that a union member is employed at the union wage (union employment is assumed to be randomly allotted among the members).

Finally, I note without writing out the equations that yet other objective functions also have been specified for the monopoly union model, such as a Stone-Geary utility function and an addilog specification (Dertouzos and Pencavel 1981; Pencavel 1984).

Working with the general specification $U = U(W, L)$, union indifference curves can be generated, such as pictured in Figure 1 by the lines U_1 and U_2 . The indifference curves are negative and convex, per standard assumptions, and asymptotically approach W_a . Additionally, the smaller the weight given to employment, the flatter will be the indifference curves. The goal of the union is to maximize the utility of the membership (where $M = L_a$ at the beginning of bargaining), so it selects the wage W_3 in

FIGURE 1
MONOPOLY, EFFICIENT CONTRACT, AND MEDIAN VOTER
WAGE/EMPLOYMENT OUTCOMES

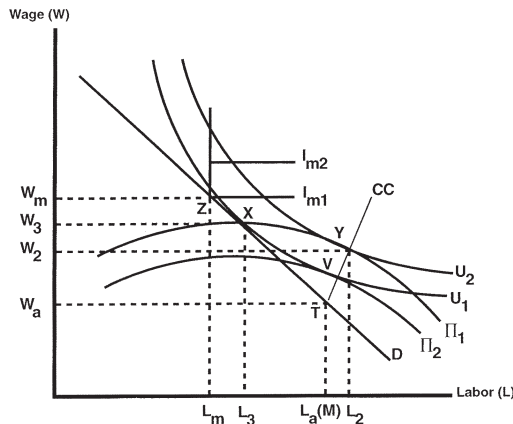


Figure 1, where the indifference curve U_1 is tangent to the firm's labor demand curve D (point X). Assuming that the firm's wage would have been W_a in the absence of the union (the market wage), the union wage gap is $W_3 - W_a$, and employment is L_3 . The other $L_3 - M$ members earn the alternative wage W_a , say, by working at another firm or in the form of a lump-sum redundancy payment. This latter result points out a potentially troublesome internal political issue for the union—in these models identical workers typically receive different outcomes. As Pencavel (1991:60) observes, this conclusion is at odds with union rhetoric stressing solidarity and equal treatment and calls attention to various practices (essentially forms of property rights), such as seniority layoff rules and work-sharing arrangements, that redistribute the gains and losses of collective bargaining among the members.

The chief prediction of the monopoly model is that when workers organize into a trade union, the union will use its market power to raise the wage above the nonunion level (Manning 1994). However, there are also other implications (Oswald 1982; Reynolds 1981; Booth 1995:100). Clearly, the more inelastic the labor demand curve, the higher will be the union wage (other things equal). Assuming that all workers in the industry or sector belong to the union (what Booth calls a “closed shop” union), it can be shown that the union's preferred wage is unaffected by changes in union membership or the size of the union. In a similar vein, the monopoly union wage also remains unchanged in the face of shifts in the firm's labor demand curve, but only if labor demand is isoelastic; otherwise, the union wage may either rise or fall in reaction to a demand shift. Finally, Booth (1995) shows that an improvement in the alternative wage W_a , such as might happen during a business cycle upswing, leads to an increase in the union's preferred wage rate (and a reduction in employment).

Extensions of the monopoly model: Heterogeneous preferences. As noted earlier, the stripped-down version of the monopoly union model involves a number of assumptions, many of which are questionable when compared with real-world behavior. Thus researchers have extended the model in a number of directions. Three are reviewed briefly: heterogeneous preferences in the objective function, endogenous union membership and dynamic multiperiod models, and principal-agent considerations. Other extensions (e.g., efficient contracts, bargaining models) are reserved for later.

As is well known from the social choice literature, it is not sufficient to simply posit a utility function for a collective entity such as a nation-state

or a labor union—the researcher must demonstrate how the aggregate utility function is consistently derived from the underlying preferences of the individual members (Mueller 1989). The typical assumption made by economists who use objective functions such as the expected utility or utilitarian is that union members are homogeneous or that employment in union jobs is determined by random draw. In some cases these assumptions may not deviate too far from reality, such as in various “hiring hall” industries such as construction and long shoring, but for many other unions there are good reasons to think that members have quite different and sometimes conflicting preferences. As one example, a union may represent workers at numerous different plants or work sites of a large company that differ with respect to future employment prospects (say, because some locations have higher production costs or make slower-selling products), thus causing members to have different preferences over the size of the union’s optimal wage demand (Kaufman and Martinez-Vazquez 1988). Another source of heterogeneity in member preferences is union policies affecting voting rights and job-allocation procedures. An example of the former is whether retired union members are allowed to vote on new contracts; an example of the latter is a layoff by seniority rule (Farber 1986). Alternatively, differences in personal characteristics of members, such as level of education or years to retirement, may create heterogeneous preferences.

Several approaches have been taken to modeling heterogeneous preferences in the union objective function. One is modeled on the insider-outsider theory developed by Lindbeck and Snower (1988) and Solow (1985). The idea is that employed workers (“insiders”) in a firm are protected to some degree from competition by the unemployed (“outsiders”) by various forms of turnover cost, thus giving them greater leverage to influence firm employment practices. By analogy, it is argued that insiders also are likely to have greater influence over union bargaining policy than are outsiders (Sanfey 1995). Based on this reasoning, Nickell and Andrews (1983) and Jones and McKenna (1989) posit the following modified utilitarian union objective function, assuming that union membership is less than total employment:

$$\textit{Insider-outsider: } U = M[U(W) - U(W_a)] + z(L - M)[U(W) - U(W_a)]$$

where z is the weight given to outsiders and takes a value between 0 and 1. Diagrammatically, this type of objective function implies that the union’s indifference curves between wages and employment become flatter or

even horizontal with respect to any employment greater than current employment levels (Pencavel 1991:67). In other specifications, the indifference curves have a kink where employment transitions from insiders to outsiders (Oswald 1985). In either case, union wage policy is tilted to favor the interests of employed union members.

A second approach to modeling heterogeneous preferences is the median voter model. The median voter model was developed originally in the public finance literature of economics to predict the amount of a public expenditure an elected government leader would choose given that elections are determined by majority vote and citizens have different preferences regarding the desired amount of the good (Mueller 1989). The answer, given certain assumptions, is that the leader will choose the expenditure level preferred by the person occupying the median position in the voting distribution. The reasoning is that any other proposed expenditure will be defeated by a majority coalition of opponents (including the median voter), whereas the preferred outcome of the median voter will be able to attract 50 percent plus 1 of the votes (see Grossman 1983; Hirsch and Addison 1986:25–6; Flanagan 1993).

The median voter model has been applied to unions in a number of studies. Divergent preferences among the rank and file can be generated by a host of variables, but the one most often focused on is layoff by seniority (“first in, last out”). Assuming that only employed union members have voting rights on new contracts and that the size of union membership is initially L_a at the competitive wage W_a , workers can be arrayed along the horizontal axis of Figure 1 by seniority, extending from most senior at the origin to the least senior worker (L_a). It is assumed that each union member’s utility is a function of only his or her income and employment—utility increases monotonically with higher wages as long as the person is employed; if the person becomes unemployed, utility falls to $U(W_a)$. This assumption generates a series of L-shaped indifference curves, such as I_{m1} and I_{m2} pictured in Figure 1 for the median union member (Kaufman and Martinez-Vazquez 1990; Oswald 1993). The interpretation is that increases in employment beyond L_m provide zero utility to this worker (the horizontal part of the indifference curve), whereas higher wage rates, given that employment is at least L_m , yield successively higher levels of utility ($I_{m2} > I_{m1}$). Each employed union member has a similar indifference map but with a kink at his or her point of seniority, and the challenge of the union leader is to determine which preference to pursue in bargaining. Given zero policing costs and the other assumptions to be shortly described, the union leader will select the preferred wage of the median member L_m , which is the wage W_m in Figure 1, because any other

wage will result in defeat of the contract in a pairwise vote. (The same result holds even if members do not vote on contracts but leaders must periodically seek reelection to office.) In a one-period static model, as assumed here, given that the union's optimal wage is W_m , the employment level is predicted to fall from L_a to L_m .

A median voter type objective function has been represented mathematically in several ways. For example, Black and Parker (1985) specify the union's utility function this way:

$$\text{Median voter (I): } U = PU_m(W) + (1 - P)U_m(W_a)$$

where P is the probability of layoff of the median voter with the utility function $U_m(W)$. An alternative specification of the median voter model was proposed by Farber (1978):

$$\text{Median voter (II): } U = L/M[U_m(W)] + (1 - L/M)[U_m(W_a)]$$

Multiplying by M yields the utilitarian union objective function, only now it is assumed that all members have, in effect, the same preferences as the median.

The median voter model is more Rossian in spirit in that it explicitly models the formation of the union's objective function as the outcome of a political process. Unfortunately, the assumptions necessary to derive a well-defined, consistent union objective function are fairly restrictive: Preferences are defined over only a single issue and are single-peaked, elections are perfectly democratic, voting is on pairwise alternatives, and there are zero policing costs of leaders (Blair and Crawford 1984; Farber 1986; Flanagan 1993). Other complications with the simple model also have been noted; for example, it assumes that all workers receive the same bargained wage (W_m) when in most unions wages rise with seniority (Booth and Frank 1996), and that all workers face the same alternative wage W_a when empirical evidence indicates that the alternative wage may itself be related (negatively) to seniority (Kuhn and Sweetman 1999). (The latter problem affects other models as well.)

In terms of predicted wage/employment outcomes, the simplest version of the median voter model predicts that the bargained solution will lie on the labor demand curve and, absent bargaining costs and other such constraints, will see a considerable rise in the wage, from W_a to W_m , and a decline by one-half in the size of the union membership, from L_a to L_m . The former result (that the negotiated outcome lies on the labor demand

curve) has led most economists to conclude that the median voter type model is a variant of the monopoly model (Oswald, 1993), but as noted later, this conclusion is not necessarily correct.

In terms of comparative statics, if the median voter objective function follows along the lines suggested by Farber, as described earlier, then the predictions derived from the utilitarian union model carry over. The more interesting case is developed by Oswald (1993), however. He modifies the median voter model pictured in Figure 1 in one important respect by assuming the existence of a minimum profit constraint (say, established by the threat of competitive entry of new firms), such as that given by the isoprofit curve Π_1 in Figure 1. (An isoprofit curve shows all the combinations of W and L that yield the same level of profit, and the labor demand curve passes through its maximum point.) In this case, the highest level of utility the median member can reach is the wage W_3 (point X), where a horizontal indifference curve (not drawn) is tangent to the isoprofit curve. Employment in this case is L_3 . Given this outcome, Oswald then derives a number of comparative static results. The most interesting is that union wage behavior demonstrates a “ratchet effect”—the union’s preferred wage rises when labor demand shifts rightward but remains constant (rigid) when labor demand shifts left. However, if the leftward demand shift is large enough that it threatens the median member with layoff, then the union will agree to a lower wage (also see Kaufman and Martinez-Vasquez 1987, 1988).

A third approach to heterogeneous preferences is Martin’s (1980) property rights model of unions. He claims that the crucial determinants of the union maximand are the configuration of members’ property rights over the rents captured by the union and the costs of enforcing this configuration of rights. He considers two polar cases: a “proprietary” union where individual members have private, transferable property rights to union membership and jobs (say, by being able to buy and sell a union membership card) and a “nonproprietary” union where individual workers have no ownership claim to a prorated share of rents. In the former case union members can buy and sell claims to the capitalized value of their share of the union-generated rents, whereas in the latter their claim to rents lasts only as long as they are employed in a union job. Martin shows that specific aspects of the union’s wage policy will differ dramatically between the two cases—e.g., in the former the union’s wage will rise and fall in response to demand shocks, whereas in the latter it will remain rigid in most cases (Martin 1980:70, 88).

Endogenous union membership and dynamic models. Both Dunlop and Ross suggested that unions determine their wage policy with an eye on its effect on organizing and membership and that membership in turn has an impact on union wage policy—an argument that makes wages and membership jointly determined variables. Capturing this aspect of union behavior in an analytical model is a challenge, however, both on its own account and because doing so quickly turns the model into a multiperiod exercise.

As noted earlier, the simplest versions of the monopoly model take union membership as a given. Further, a change in union membership M in both the utilitarian and expected utility objective functions leaves unaltered the predicted union wage, a conclusion that strikes many as questionable (Addison and Chilton 1997:163). A number of studies have sought, therefore, to make union membership endogenous. Several approaches are reviewed briefly.

One of the first studies to endogenize union membership is Booth (1984). She assumes that union leaders set the union wage at the level preferred by the median union member. However, she also includes a union membership function and posits that the number of people wanting to join the union increases with higher union wages. The result is a system of two simultaneous equations, one a “wage curve” that shows how the union’s preferred wage varies with greater membership and the other a “membership curve” showing how membership varies with the union wage. Solution of the two equations yields the equilibrium wage and employment level. The key insight of this approach is that the identity of the median voter is endogenous—when the union raises the wage, the number of people who want to be union members increases, which then changes the identity of the median voter and yields a new optimal wage, which again affects membership, and so on. Another early approach to endogenizing union membership is by Kidd and Oswald (1987). They assume that the union has a utilitarian objective function defined over wages and employment but that utility depends on wages and employment both in the current period and in future periods. They further assume that a “closed shop” condition prevails (all employed workers must join the union), so a change in employment is the same as a change in membership. The interesting implication that emerges from this model is that since the union’s utility now depends not only on current employment but also on future employment, it is motivated to set a lower wage (with higher employment) than would be true in a one-period context.

A median voter objective function, when incorporated into a multiperiod framework, yields different conclusions, however. The simple version of

the median voter model, as depicted in Figure 1, predicts that the union gradually will bargain itself out of existence (assuming that only employed members have voting rights). In the first period, one-half the employed union members are laid off as the union raises the wage to the level preferred by that period's median voter—a process then replayed in each successive period until the union wage is raised sufficiently high that employment goes to zero (assuming a given labor demand curve). Various studies have sought to introduce more realism into this scenario in different ways: having the median voter optimize a multiperiod objective function (Black and Parker 1986), introducing risk aversion on the part of the union members (Blair and Crawford 1984), and introducing strike costs as a constraint on the median member's preferred wage (Kaufman and Martinez-Vasquez 1987). These refinements slow the union's march up the labor demand curve but do not alter the basic conclusion—other things equal, unions gradually will push up the union-nonunion wage differential with a concomitant shrinkage in the size of union membership. A number of economists (e.g., Turnbull 1988) have objected that the “shrinking union” phenomenon implied by this form of the median voter model is unrealistic. One response, taken by Oswald (1993) and Disney and Gospel (1989), is to show that under certain conditions (a minimum profit constraint) a median voter model nonetheless can be consistent with stable membership; another response is to claim that the predicted shrinkage in union membership may in fact get close to the truth (other things equal) in light of the long-term decline in employment and union membership witnessed in many organized firms and industries (Kaufman and Martinez-Vasquez 1987).

A final strand of literature that considers intertemporal union behavior concerns the effects of unions on firm-level capital investment decisions (e.g., Grout 1984; Hirsch 1991, 1992; Cavanaugh 1998; Addison and Chilton 1998). Hirsch, for example, argues that the decision-making horizon of most union members (particularly senior members who may control the union's wage policy through a median voter process) often may be shorter than the economic life of the firm's long-lived, specialized capital equipment. This fact, combined with the inability of union members to sell or bequeath their property rights in union jobs to others, causes unions to act “rationally myopic” and raise wages to the point where firms do not earn a competitive return on capital, thus causing a slow process of “dis-investment” and industrial and union decline.

Members and leaders. One of the central arguments put forward by Ross was that union members and leaders often have different bargaining goals and that union wage policy reflects an amalgam of the two. In a

perfectly democratic union, leaders are constrained to follow membership goals, but in a world of imperfect and asymmetric information and potentially large transactions costs, union leaders gain discretion to pursue their own interests. What are these interests, and how does this bifurcation between leaders and members affect union wage policy?

A modest-sized literature has developed over the half century since Ross first broached this argument. Early contributions include Berkowitz (1954), Lewis (1959), and Atherton (1973). Lewis, for example, distinguishes between “boss dominated” and “employee dominated” unions. More recently, Burton (1984) attempted to state in mathematical and graphic form Ross’s implicit model. Union wage policy in this model is determined by the union leadership. The leaders have a utility function and seek to maximize their power, social status, income, and job security, subject to a variety of constraints—the minimum acceptable wage demand of the rank and file, a Dunlopian-type membership function, and so on. Burton solves the multiequation model and shows that the union wage rate is chosen to balance two conflicting pressures—short-run pressure to boost the wage to keep current members in the union and long-run pressure to moderate the union wage in order to preserve employment and thus the size of the union. Another model along this line is by Pemberton (1988), who assumes that the leadership is interested in maximum membership, whereas the wage goal of the rank and file is set by the median member. The union’s wage is then determined as the solution to a Nash bargain between the two parties.

An alternative approach uses principal-agent theory. Faith and Reid (1983) consider why it might benefit individual workers to have a collective agent. They distinguish two reasons: An agent (such as a union) can promote efficiency first by helping solve public goods and asymmetric information problems in the workplace or by achieving economies of scale in coordination and communication and second by facilitating a monopolization of the labor supply and thereby capturing rents for workers. They conclude that both reasons are plausible but that the monopoly effect typically dominates. Given this, Farber (1986) examines the pressures that constrain the union leadership (the agent) to follow the wage preferences of the membership (the principals) and concludes that the most important factors are the costs of insurgency and the extent to which the leadership’s wage policy deviates from that preferred by the median voter. Another interesting analysis of the principal-agent problem is by Martin (1984), who shows that union members have reduced incentives to monitor and punish their leaders, relative to the case of stockholders and managers of firms, because union members lack alienable property rights in future union rents and thus suffer less loss from leader malfeasance.

The efficient contract model. The monopoly model assumes that the union sets the wage and then the firm sets the level of employment. It has long been recognized, however, that the monopoly model outcome is inefficient (not Pareto optimal) in the sense that there are other wage/employment combinations that could make both parties better off and thus which both the firm and the union presumably have an incentive to adopt (Leontieff 1946). This insight, popularized in work by MacDonald and Solow (1981), has led to a second class of union models called the *efficient contract model*. The key difference in this model is that it is assumed that the union and firm negotiate over both the wage and level of employment. For the sake of parallelism in the exposition, I continue to assume that the union has a monopoly in bargaining power—an assumption that will be relaxed shortly.

The simple (nonbargaining) version of the efficient contract model is illustrated in Figure 1. Passing through point X (the monopoly union outcome) is an employer isoprofit curve Π_1 . This curve shows all the other combinations of W and L beside (W_3, L_3) that yield the same level of profit for the firm. Given the isoprofit curve Π_1 and the union indifference curves U_1 and U_2 , an efficient contract outcome is at (W_2, L_2) (i.e., point Y), where U_2 is tangent to Π_1 . In moving from (W_3, L_3) to (W_2, L_2) , the union's utility increases while the firm earns the same level of profit—a move that is clearly Pareto superior. However, there are other (W, L) combinations that also lead to an increase in the utility of one or both parties, such as point V (for the firm lower isoprofit curves are preferred). The range of possible efficient contracts, in this simple version of the model, is given by the various tangency points between an isoprofit and indifference curve in the lens-shaped area between points V and Y , a series of points that together define a *contract curve* (CC). The contract curve originates on the labor demand curve at the alternative wage W_a (point T); can be positively sloped, vertical, or negatively sloped depending on assumptions about risk preference in union members' utility functions; and extends beyond points V and Y in Figure 1 once other possible monopoly model outcomes besides (W_3, L_3) are considered. The point chosen on the contract curve by the union and firm is indeterminate without a model of bargaining, a subject considered shortly.

Compared with the monopoly model, the efficient contract model predicts a lower union wage rate but a higher level of employment. Also of importance, at (W_2, L_2) the firm is no longer on its labor demand curve D but rather has agreed to hire more workers at the bargained wage than it would if given the freedom to set employment at the profit-maximizing level. If workers are risk-averse, the contract curve is positively sloped,

and the marginal revenue product of employment is actually less than the value of the alternative (or competitive) wage. A vertical contract curve obtains in the case of risk neutrality. It has the special property, often referred to as *strong efficiency*, that the firm's allocation of resources (capital-labor ratio, etc.) remains the same as in the competitive case—implying zero deadweight loss from (labor) monopolization—and the size of the bargained wage merely determines the division of rents between the two parties (Ashenfelter and Brown 1986; Pencavel 1991:102). In terms of comparative statics, a rightward shift of the firm's labor demand curve also shifts the contract curve rightward, implying a higher wage at any level of employment (McDonald and Solow 1981). An improvement in the alternative wage shifts the contract curve to the left.

The monopoly and efficient contract models thus seem to give rise to distinctly different predictions about union wage determination—the former predicting that the wage/employment solution lies on the labor demand curve and the latter predicting that it lies off the demand curve. This divergence has spawned, in turn, a modest-sized empirical literature that seeks to test these predictions (reviewed shortly). Several issues of a theoretical nature bear on this exercise, however, so a brief discussion is merited here.

For example, the very concept of efficiency is problematic in the presence of heterogeneous member preferences because no aggregate union utility function or indifference map may exist (Farber 1986). A new wage-employment combination that improves the utility of one member, or group of members, may decrease the utility of others, making it impossible to find a Pareto-superior outcome for “the union.” Looking at Figure 1, for example, it is not obvious why the L_3 union members who receive the monopoly wage of W_3 would favor a cut in their wage so that L_2 to L_3 new workers can be hired (Kaufman and Martinez-Vazquez 1990).

A second issue revolves around the problem of incentive compatibility. The motivation for the union to agree to a lower wage is that it gains additional employment of union members. However, once having signed the contract, what prevents the firm from renegeing on the deal and reducing employment back to the labor demand curve? Of course, the union could stipulate in the contract that the firm agrees to hire a certain number of workers, but firms rightfully would be leery of doing so in the face of fluctuating sales, technological change, and other factors that shift the labor demand curve. Several studies have investigated whether unions can use various types of work rules, such as a minimum-crew-size requirement or workers-to-machine ratio, to indirectly move the firm to the efficient

contract outcome, but this device appears to offer only a partial solution (Johnson 1990; Clark 1990; Jergler and Michaelis 1997). Kuhn (1988) suggests an alternative solution that allows efficient contracts to be obtained without bargaining over employment. In this approach, the union acts like a discriminating monopolist—it sets a differential wage for each worker along the labor demand curve, extracting the firm’s rents but leaving employment at an efficient level. Union seniority wage scales, in this model, serve as a device to extract additional rents, like a multipart tariff in the product market, rather than as an income transfer device (Kuhn and Roberts 1989; see also Frank and Malcomson 1994; Booth and Frank 1996).

Finally, even if efficient contracts exist, it may not be possible econometrically to distinguish between them and monopoly model outcomes (Booth 1995:134–41; Andrews and Harrison 1998). Versions of the monopoly model predict, for example, that in certain situations the bargained outcome will lie off the demand curve. One example (Sanfey 1998) is when the notion of “efficiency wages” is incorporated into the model (here *efficiency wages* means that work effort of the union member increases with the wage rate); a second is in a median voter framework when a majority of the rank and file are threatened with technological displacement and bargain for work rules that force the employer to hire a non-profit-maximizing level of labor (Kaufman and Martinez-Vazquez 1990). Conversely, in certain situations, the contract curve of efficient bargains will coincide with the monopoly outcomes along the labor demand curve (Layard, Nickell, and Jackman 1991; Oswald 1993). A final problem, pointed out by Hirsch and Prasad (1995), is that observed factor prices may not accurately measure the true cost of labor and capital to the firm (i.e., because the union wage may represent, in part, a tax on capital), potentially invalidating econometric tests that seek to distinguish between the two models.

Bargaining. The models of union wage determination reviewed to this point largely omit considerations of bargaining power, the bargaining process, and strikes. It is now time to bring these factors into the picture.

Formal bargaining models of union wage determination go back to Zeuthen (1930) and Hicks (1932). For many years this line of literature developed largely independent of the models spawned by Dunlop and Ross. In the case of the former, the wage-determination process was modeled as the outcome of a bargaining process, the principal constraint on the union-determined wage was the higher costs of disagreement (e.g., strike costs) that go with higher wage demands, whereas the labor

demand curve and employment effect of higher union wages generally were omitted as important variables (for reviews, see Kennan 1986; Kaufman 1992). The latter group of models, on the other hand, for many years ignored the bargaining process and omitted the constraint on union wage determination posed by disagreement costs.

Since the early 1980s, however, a number of studies have worked on achieving a better integration of these two theoretical perspectives. The principal tool used to do this has been game theory. Two types of game-theoretic models are popular (Booth 1995; Manzini 1998). The first is the axiomatic approach to bargaining pioneered by Nash (1950, 1953). It assumes that bargaining is a cooperative game and that the wage outcome satisfies certain fundamental axioms or principles, such as might be stipulated by an objective third party called in to resolve the dispute. Given these axioms, if the bargaining is only over wages, then the wage outcome should satisfy the solution to the following maximization problem:

$$\max Z = (W_{u1} - W_{u0})(W_{f1} - W_{f0})$$

where W_{u1} and W_{f1} are, respectively, the utility payoffs to the union and firm from agreement and W_{u0} and W_{f0} are the utility payoffs to each side should no agreement be reached. In words, the Nash solution is to set the wage such that the product of the utility gains to each side are maximized.

The axiomatic Nash approach to bargaining did not make much impact on theories of union wage determination for more than two decades. Among the reasons were its lack of behavioral foundations, neglect of the bargaining process (as opposed to the outcome), and modest ability to generate testable hypotheses (but see DeMenil 1971). Developments in noncooperative game theory in the 1980s, however, have revived interest in the Nash model, albeit in a reconfigured form. Studies by Rubinstein (1982), Binmore, Rubinstein, and Wolinsky (1986), and Binmore and Dasgupta (1987) have demonstrated that the outcome produced by the Nash solution coincides, under certain assumptions, with the outcome of a strategic game-theoretic noncooperative model of bargaining. The advantage of this approach is that it explicitly models the objective functions of the bargainers, specifies the resources of the bargainers and the rule structuring the negotiations, and permits inclusion of common negotiating tactics, such as bluffing and recourse to strikes. If the bargainers negotiate only over wages, have equal discount factors, and the bargaining takes place over a finite horizon, the game-theoretic solution

corresponds exactly to the Nash solution—an equal division of the surplus. Different assumptions lead to different predictions. If one bargainer is more impatient to reach a settlement (has a higher discount rate), for example, he or she gets a smaller share of the surplus.

One of the fruitful extensions of game-theory models of bargaining with regard to union wage determination is, first, to show that under certain conditions they correspond exactly to the solutions generated by various economic models (monopoly and efficient contract) described earlier and, second, to relate variations in wage outcomes to potentially observable economic variables.

With regard to the former, when the firm and union bargain only over wages, the problem to be solved is

$$\max W\{U[W, L(W)] - U_d\}^B \{P[W, L(W)] - P_d\}^{1-B}$$

where the union's utility U is the difference between the agreement outcome (itself a function of the level of wages and employment) and the disagreement outcome (the term U_d) and the firm's utility P is the difference between its agreement level of profit (also a function of W and L) and its disagreement level of utility (the term P_d). In a game-theoretic model, the parameter B can be interpreted as a measure of each party's bargaining power. When $B = 1$, all bargaining power is possessed by the union, and the wage outcome corresponds to the monopoly outcome of W_3 in Figure 1; when $B = 0$, the union has zero bargaining power, and the wage outcome will be W_a in Figure 1, the market-determined wage. The game-theoretic model just described is referred to in the literature as the *right-to-manage model* in light of the assumption that the bargaining is over only wages and the firm retains authority to unilaterally set the level of employment L . Importantly, the monopoly model pictured in Figure 1 thus turns out to be a special case of the right-to-manage model (with $B = 1$).

The right-to-manage model outcome is inefficient for the same reason that the monopoly model outcome is. An extension of the noncooperative model, therefore, is to allow the bargainers to set both W and L . This model is called the *efficient bargain model*. The interesting outcome of this exercise is that the efficient contract model without bargaining cannot predict which wage-employment combination on the contract curve will be chosen by the parties because all are Pareto optimal. When bargaining is introduced, however, the distribution of bargaining power between the two sides moves the parties to choose one specific (W, L) combination on

the contract curve, thus closing the model. In an extension of this approach, Manning (1987) breaks the collective-bargaining process into two sequential steps—bargaining over the wage followed by bargaining over employment—and hypothesizes that contract inefficiency stems from the fact that union bargaining power is greater in stage 1 than in stage 2 (also see Pencavel 1991:131–62).

A number of studies have endeavored to relate the parameters of the game-theory models to observable variables, thus bridging the gap between theory and data (Svenjar 1987; Doiron 1992; Kahn 1993). Variations in the bargaining power parameter B , for example, have been tied to differences in strike costs, firm size, and the unemployment rate; the variables U_d and P_d (the disagreement payoffs) have been related to observable variables such as the level of unemployment insurance benefits and the nonunion wage; and the discount rates in the utility functions have been related to the probability of firm failure.

The Models: Explaining the Facts

In the first section of this article I listed eight features of union wage determination that have been the object of widespread academic research. In this section I now survey the extent to which empirical research has yielded evidence bearing on two related issues: (1) the usefulness of these models for advancing our understanding and ability to explain and predict features of union wage determination and (2) the validity of specific hypotheses from these models concerning aspects of union wage determination. Before proceeding, two caveats are worth stating. First, for reasons of space, the most I can do is provide a modest summary of empirical research findings; second, for similar reasons, I bypass altogether discussion of the many important econometric and data issues that accompany the empirical literature in this area. Useful references on this subject include Pencavel (1991), Booth (1995), and Andrews and Harrison (1998).

Union goals in wage bargaining. Perhaps none of the eight issues to be surveyed here remain as cloudy and contentious as this one. What we know from field research (e.g., Shultz 1951; Levinson 1966; Juris 1969)—now several decades old—is that some unions in some situations give considerable weight in their wage policy to preserving employment, whereas other unions in other situations appear to focus primarily on getting as high a wage as possible. The verdict of more recent econometric investigations is that union wage policy is influenced by both wages and

employment but that the functional relationship between the two varies from union to union and among locals of an individual union [see Pencavel (1991) and Addison and Chilton (1997) for reviews and citations]. Wage bill and rent maximization appear to be rejected in nearly all cases as union objectives. A recent study also rejected an insider-outsider specification (Dorion 1995), although Sanfey (1995) concludes from a survey of the literature that the bulk of the evidence supports a broad conclusion that insiders carry more weight in union objectives than outsiders. Carruth, Oswald, and Findlay (1986) reject the hypothesis that union indifference curves are horizontal at the median voter's level of employment, but Kaufman and Martinez-Vazquez (1988) conclude that the pattern of voting among UAW at the General Motors Corporation supports a median voter interpretation. The same study and one by Cappelli and Sterling (1988) reveal that union members have widely disparate preferences regarding union wage policy and that these preferences are systematically related to factors such as seniority and the probability of layoff. A different source of evidence on the nature of the union objective function is from a survey of union leaders. Clark and Oswald (1993) collected such data and found that unions appear to give more weight to pay than jobs and that union indifference curves are steeper than implied by rent maximization. All in all, it must be concluded that our range of ignorance on union bargaining goals has been reduced modestly relative to when Dunlop and Ross wrote on the subject a half century ago but that progress on this front has been quite modest. As a generalization, research appears to show that unions place more weight on wages than on employment, that insider (incumbent) members exert more influence on union wage policy than do outsiders, and that member wage preferences systematically differ on account of personal characteristics and job property rights.

The size of the union-nonunion wage differential. There is a vast empirical literature that measures the wage effect of unionism (Lewis 1986; Booth 1995). A review of these studies reveals that the great majority are largely empirical in content and make at most only passing reference to the theoretical models discussed here. (Theoretical issues are not absent—witness extensive discussion of selection processes and threat and spillover effects, but these are largely orthogonal to the union models discussed here.) A smaller number (e.g., Belman, Heywood, and Lund 1997) attempt to provide some theoretical base for the empirical investigation of union wage gaps, typically in the form of a brief discussion of the determinants of union bargaining power or the elasticity of labor demand (e.g., the role of the percentage of the workforce organized,

implications of the Marshall-Hicks laws of derived demand, the exposure of employers to strike costs). Rarely do studies go beyond this, such as to use these theoretical models to guide the specification of variables, suggest an estimating strategy, or derive testable hypotheses or identifying restrictions. As one example of unexploited synergies, it was early noted that the theoretical prediction concerning the size of the union wage effect depends, in part, on whether the union-joining decision is treated as exogenous or endogenous. This same issue has been discussed extensively in the empirical literature, but the two bodies of literature coexist largely independent of each other. Thus, generalizing to the subject of union wage gaps *in toto*, it appears that theory and empirical research are only loosely connected and that the former has made relatively modest contributions to advancing the latter.

Union wages over time. Only a modest number of empirical studies in recent years have examined the trend in, respectively, union wages and the union-nonunion wage gap over time, reflecting in part the decline of public concern about inflation and the concomitant decline in research on union wages and the inflationary process [see Mitchell (1980) and Hirsch and Addison (1986) for earlier work]. Recent research finds evidence of a “structural shift” in the determinants of union wage growth in the post-1980 period—evidenced by the fact that regression equations fitted to data before the 1980s consistently overpredict U.S. union wage after 1980 (Mitchell 1994; Budd 1997; Budd and Ho 1997). Neumark (1993), however, concludes that this structural shift is not due to the decline in the extent of unionization or union power.

With respect to the union-nonunion wage differential, it appears that the aggregate union-nonunion wage differential in the United States increased from the early 1950s to the late 1970s and then remained steady or exhibited only modest decline over the next 20 years (Johnson 1984; Blanchflower 1997; Hirsch and Schumacher 2001). At the industry level, Linneman, Wachter, and Carter (1990) show that union premiums continued to increase in a number of heavily organized industries through most of the 1980s despite the many well-publicized cases of union wage concessions, a finding that Haggerty and Leigh (1993) document is partly due to nonrandom attrition in the union sector (i.e., because of seniority provisions, layoffs are concentrated among lower-paid, less-senior union workers). Looking at Great Britain, research finds that the aggregate union wage differential exhibited little change since the mid-1980s (Blanchflower 1997; Hildreth 1999). The experience in both countries is notable because a (more or less) steady

union wage premium after 1980 has happened simultaneously with a substantial decline in union membership.

What do these patterns have to say about the models of union wage determination reviewed here? Unfortunately, it is hard to say. I have found no study that explicitly examines time-series variation in union wages or the union-nonunion wage differential for purposes of distinguishing between competing theoretical models. Indeed, most recent studies do not even reference this literature—exceptions being Neumark (1993), who cites median voter behavior as a possible explanation for why unions may impart an inflationary bias to wage determination, and Hirsch and Schumacher (2001), who use an amalgam of monopoly, efficient contract, and median voter models to explain the time-series trend in the union wage premium. On the one hand, this silence is anomalous because economic theorists long ago staked out two alternative views on the secular behavior of union wages. Writing in 1944, Henry Simons argued that the union wage premium will grow gradually (other things equal) as internal political pressure from long-tenure workers for higher wages results in a gradual movement up firms' labor demand curves and a decline in union employment, whereas Friedman (1966) argued that unions are labor monopolies and that monopolies are a source of high prices (wages) but not rising prices (for a given degree of monopoly power). On the other hand, empirical research on this matter is hampered by the crude or limited nature of the data available and, additionally, by the fact that the theoretical literature on union models has not squarely addressed the issue and in many cases gives conflicting predictions (e.g., whether union wages will increase in reaction to a rightward shift in the labor demand curve). The conclusion I reach is that the trends just reviewed provide some support for median voter and insider-outsider models because both union wages and union wage gaps rose in relative terms before 1980 when employment was expanding and then in the case of the latter remained largely steady after 1980 despite large losses in union membership but that constraints imposed by potential membership loss, strike costs, and other such factors can substantially moderate or reverse the upward union pressure for "more" predicted by these models.

Rigid union wages and wage concessions. A substantial empirical literature exists on the rigidity of union wages and a more modest sized one on the closely associated topic of union wage concessions. The principal finding in both is that union wages, in nominal terms, exhibit strong downward rigidity and fall only in the face of large threatened or actual job loss (Mitchell 1994; Bewley 1999). One implication, explored in the

studies referenced earlier, is that unions impart an upward inflationary bias to wage determination or, at the least, make the process of “disinflation” more protracted and painful. Certainly the evidence is consistent with the view that unions weaken the link between wages and real economic activity (Mitchell 1980; Neumark 1993). With respect to wage concessions, studies find that union members generally agree to a cut in wages only when faced with a substantial threat to employment and even then may refuse due to mistrust of management or better perceived alternatives (e.g., generous early retirement benefits).

As with other dimensions of union wage determination, a large portion of this literature makes little use of the theoretical models reviewed here. In a macroeconomic context, most often any theoretical justification of short-run union wage rigidity is made with reference to some aspect of contract theory—why workers might want long-term contracts, problems introduced by decentralized, overlapping contract negotiations, etc. With regard to wage concessions, theoretical arguments often are relatively modest and heuristic. Studies by Cappelli and Sterling (1988) and Bell (1993), for example, argue that wage concessions are more likely the greater is the decline in union employment—a hypothesis deduced without the aid of any formal model or theory, whereas Nay (1991) argues on similarly informal grounds that the severity of the threat to the employer’s financial solvency is the most important determinant of the union’s willingness to grant concessions. The only article to directly develop and test hypotheses concerning union wage concessions using one of the models reviewed in this article is Kaufman and Martinez-Vazquez (1988). They develop a median voter model for a union with a multiplant master contract and derive predictions about the pattern of voting for concessions among individual plants. The most interesting prediction—that a “yes” vote for concessions depends not only on a large perceived threat to jobs but also on the perception that a concession will save jobs—was confirmed in the regression analysis of the pattern of voting among the 102 UAW bargaining units in the 1982 contract concession vote at the General Motors Corporation. Espinoza and Rhee (1989) derive the same implication, but they use a repeated-play game-theory model.

As noted earlier, other union models also predict wage rigidity under certain conditions, so a definitive conclusion about the merits of one model versus another can be made based on this slim evidence. Two considerations suggest, however, that some form of insider-outsider or median voter specification is probably superior in explaining union wage rigidity and concessions. The first is that the existence of wage rigidity in standard specifications of the monopoly model (e.g., with a utilitarian

objective function) and efficient contract model depend on relatively ad hoc assumptions about key parameter values (e.g., isoelastic shifts of the labor demand curve); the second is that concession voting clearly reveals that a large heterogeneity of preferences exists among union members about the organization's optimal wage policy.

Wage structure. Wage structure, as earlier indicated, refers to wage differentials between workers and jobs classified by characteristics such as age, skill, education, race, and gender. Empirical studies find almost uniformly that unions, on net, reduce wage dispersion among observationally equivalent workers and flatten wage profiles with respect to variables such as skills, education, and tenure—a conclusion weakened but not overturned when various sorting and selection effects are controlled (see, e.g., Card 1996; 1997; Hirsch and Schumacher 1998b). As with the other areas of union wage policy, most of these empirical studies proceed with only modest to negligible reference to the models of union wage determination examined here. Where a formal model of union wage determination is called on, however, in nearly all cases it involves an application of the median voter principle.

The most often cited work in this genre is by Freeman (1980, 1982) and Freeman and Medoff (1984) and, in particular, their “exit-voice model” of unions. They argue that in nonunion firms management structures wage and benefit programs to suit the preferences of the marginal worker (the worker on the margin of accepting or leaving employment), whereas in unionized firms wages and benefits are structured to meet the preferences of the median or average worker who exercises dominant political influence in determining the union's bargaining agenda. Thus, from this perspective, the smaller union wage premium for additional skill and the frequent union practice of bargaining for cents-per-hour wage adjustments, for example, are explained as a consequence of the fact that skilled workers typically represent only a small fraction of the voting membership and thus cannot exert sufficient political pressure on the union leadership to protect their interests (White 1982; Hirsch and Addison 1986:158–9)—a hypothesis supported by the efforts of some skilled trade groups, such as in the UAW, to break away from large industrial unions and form their own craft-based bargaining units.

However, as the median voter model predicts, unions will in some cases favor the interests of the higher-paid or higher-skilled groups at the expense of the lower paid and less skilled where the former comprise the majority of the membership. As an example, Babcock and Engberg (1999) compare the wage structure for teachers across unionized school

districts and find that the returns to additional education in each district vary positively with the mean level of education among the teachers. Also supportive of the median voter model are two other pieces of evidence: union insistence that the lower pay schedule in two-tier wage agreements only applies to new hires or low-seniority workers (Martin and Heetderke 1990) and the greater likelihood of union victory in representation elections when the workforce is more homogeneous (making it easier to assemble a majority coalition) (see Demsetz 1993).

The final aspect of wage structure that deserves mention is the oft-noted secular increase in wage inequality in most industrialized nations. Numerous studies have found that the decline in union coverage within industries and across nations has contributed to a secular increase in wage dispersion and income inequality (e.g., Freeman and Katz 1995; Lemieux 1998). As with other parts of the literature, many of these studies make no reference to formal models of union wage determination to explain this result, but those which do typically explain this outcome as a result of union preferences for “standard rate” wage policies. Most often such policies are justified on grounds of bargaining effectiveness (taking wages out of competition), but some type of median voter explanation is also cited occasionally.

The form of compensation. Similar conclusions apply to form of compensation. The relatively small number of empirical studies that examine the impact of unionization on the form of compensation most often do not discuss formal models of union wage determination. When theory is introduced, it generally centers on some form of median voter decision-making process within unions. Freeman (1981) and Freeman and Medoff (1984) have again led the way. They argue, for example, that the observed tendency for union compensation to be tilted more heavily in favor of indirect forms of compensation is the result of the union’s collective voice mechanism giving greater weight to the preference of the average (median) worker instead of the least senior (marginal) worker as in non-union firms. Likewise, the median versus marginal argument explains why union contracts favor certain kinds of benefits, such as pensions, that are of greater interest to older workers over other benefits, such as child care, that are of interest to younger workers (Miller and Mulvey 1992). Although I am not aware that it has been done, it would seem that a median voter model could offer a cogent explanation for why most unions, except in crisis situations, prefer higher straight-time wages over payouts from a profit-sharing plan—that is, profit-sharing promotes more employment through a lower marginal cost of labor, but the median voter’s self-interest lies in higher wages, not higher employment.

Employment effects. A relatively large but diverse literature considers the employment effects of unions. The first issue germane to this discussion is whether union settlements are on or off firms' labor demand curves and, if the latter, show evidence of being efficient contract outcomes. Conflicting evidence exists, and the results are so far rather muddled, but it seems fair to say as a generalization the bulk of the evidence does not provide strong support for the efficient contract hypothesis. To start, Oswald (1993) documents that relatively few collective-bargaining contracts contain language in some respect fixing the level of employment, thus casting doubt on the practical significance of the efficient contract model. However, this is not the last word, since unions and employers may use implicit agreements or indirect methods such as work rules (reviewed below). Hence a small number of empirical studies have used econometric methods to test whether bargained outcomes appear consistent with a right-to-manage or efficient contract model. Several find evidence, based on significance tests in employment equations of variables proxying for theoretical constructs such as the alternative wage, that bargained outcomes lie off the labor demand curve (e.g., Eberts and Stone 1986, MaCurdy and Pencavel 1986, Card 1986; Doiron 1992), but nearly all reject the hypothesis of strong efficiency (an exception is Abowd 1989), and several others either find no evidence to reject the demand curve model (e.g., Nickell and Wadhvani 1988) or cannot discriminate between models (Martinello 1989; Andrews and Harrison 1998). A particular problem in this regard is that most of these studies do not control for differences in bargaining power and strike costs (but see Doiron 1992). Additional evidence against the efficient contract model is provided by Wessels (1991), who tests for differences between employment levels at union and nonunion firms, holding constant other determinants of labor demand, and finds no difference.

Studies of public-sector unions, however, find greater evidence of positive employment effects, although this is attributed most often to union political power rather than to efficient contract bargaining. Models of union wage determination in the public sector suggest that unions may have both more power and incentive to move employers off their labor demand curves because of both the absence of a profit constraint for employers and the unions' influence in the electoral process. The evidence is conflicting, but some studies find a higher level of employment where a unit of government bargains with a union (e.g., Freeman and Valletta 1988; Zax 1989), whereas others find little or no difference (Trejo 1991; Valletta 1993).

The union impact on employment at a point in time is one issue; the employment effect of unionism over time is an entirely different one. Pencavel (1991:30) notes that there are a number of examples from labor history (e.g., the United Mine Workers under John L. Lewis) of unions that appear to have priced themselves out of the market, leading to a substantial long-run decline in membership. However, he observes, there are also valid reasons why unions may have no adverse effect on employment or may contribute to greater employment over time. So what is the verdict?

Only in the last decade have economists seriously addressed the impact of unionism on employment growth. Part of the reason is that the relationship is complex. Accepting that unions raise wages, one has to determine the impact on relative factor prices, profits, productivity, capital investment, and innovation (R&D) before an answer can be determined. I cannot hope to cover this broad range of subjects adequately here but at best give a flavor of the evidence and the degree to which it is informed by the theoretical models under consideration. The “bottom line” appears to be that over the long run unions have a discernible negative impact on employment growth, generally of modest proportion, but do not typically drive firms into bankruptcy at any greater rate (Addison and Hirsch 1999; Freeman and Kleiner 1999). Empirical studies in the United States (Montgomery 1989; Leonard 1992), Canada (Long 1993), and Australia (Wooden and Hawke 2000) find that unionism reduces employment growth on the order of 2 to 4 percent per annum. This negative employment effect arises, in turn, from reduced profits, an ambiguous (sometimes negative, other times positive) effect on productivity, reduced incentives to invest in long-lived capital, and reduced innovation and R&D expenditures.

More so than some other areas of union wage determination, this literature has had significant contact with theoretical models and has gained useful guidance from them. This interaction is particularly evident in the work of Hirsch (1991, 1992; Hirsch and Prasad, 1995), who develops a rent-seeking model of unions and, based on an amalgam of median voter, property rights, and noncooperative game-theory arguments, develops hypotheses about the impact of unionization on relative factor prices, capital-labor ratios, and incentives to innovate and invest. His model suggests that unions are likely to discourage investment and firm growth, a prediction supported by the empirical studies reviewed previously, and casts doubt on the “strong efficiency” version of the efficient contract model. Further refinements of this argument, using a repeated game-theory model of bargaining, are provided in Addison and Chilton (1998), who show (among other things) that opportunistic capture of quasi-rents by the union is reduced as the union’s time horizon lengthens. Although

the end-game model of Lawrence and Lawrence (1985) suggests that unions decide to appropriate short-run quasi-rents as a forward-sighted, strategic calculation, it appears from the evidence (Deily 1998) and testimony of union leaders (Williams 1998) that bounded rationality in the form of uncertainty, imperfect information, and myopia play as large if not a larger role (an institutionalist Rossian conclusion).

Wage imitation and pattern bargaining. Wage imitation and pattern bargaining were major research issues in the 1950s to 1970s, but with the apparent breakup of strong union patterns in the 1980s and theoretical problems in extant models of wage interdependence (Burton and Addison 1977), the topic in recent years has not figured as prominently in the American literature. In Europe, by way of contrast, a modest but steady flow of research continues (De la Croix 1994).

Empirical research on wage interdependence has sought to find a linkage between the union-negotiated wage in one situation and the wage negotiated in another. An exemplar of such interdependence is the American automobile industry, where research finds a strong link (except in the 1980s during “crisis” bargaining) in both negotiated outcomes and contract language among different firms in the industry, across different contract settlements over time in the industry, and among firms represented by the union in allied industries (Erickson 1992, 1996, 2001; Budd 1997).

One popular approach follows oligopoly theory and models wage interdependence with the concept of union reaction functions (Pencavel 1991; De la Croix 1994). The source of wage interdependence can be introduced into these models in several ways, such as a relative wage term in the union’s utility function, the firm’s production function, or the worker’s effort function or as a determinant of the union’s fallback utility level. The behavioral explanation for the existence of wage interdependence typically is cast in terms of protecting relative income positions, maintaining fairness or equity norms, a product of envy comparisons, or an economizing response to imperfect information. The model may be further extended by making government fiscal and monetary policy endogenous as well.

These models provide several insights. They provide guidance in empirical research, for example, in disentangling the influence on union wage settlements of wage interdependence versus market shifts in demand and supply (Budd 1997). At a theoretical level, these models show that wage interdependence can create externalities and strategic complementarities across individual negotiations, leading to higher than optimal wages and an inefficient outcome for unions and firms. Also, wage interdependence over time can impart an upward inflationary bias and make wage

deceleration more difficult to achieve by weakening the link between union wages and changes in real variables (e.g., the unemployment rate). These conclusions have led some economists (e.g., Calmfors 1993) to argue that macroeconomic performance is maximized in either a system of completely centralized or decentralized bargaining (where wage interdependence is zero). The empirical evidence for and against this proposition is equivocal, however (De la Croix 1994).

Conclusion

The title of this article posed this question, “Models of Union Wage Determination: What Have We Learned Since Dunlop and Ross?” Based on the preceding discussion, here are my conclusions regarding this question:

Other reviewers of this literature have reached fairly pessimistic conclusions. Addison and Chilton, for example, end their review (1997:187) by expressing “some disappointment in the progress made and the fragility of the models” and then later observe (1997:189) that “less progress has perhaps been achieved in understanding the union than other institutions.” In a similar vein, Pencavel concludes his book-length review with these words (1991:160): “To date, the research on this topic [models of unions] raises the hope that this may be a useful way of understanding the wage, hour, and employment aspects of unionism, but it would be inappropriate to believe that much more has been achieved beyond raising hopes.” Perhaps most discouraging are these words of Alan Manning, who concludes of union models (1994:450): “The only theoretical prediction that seems to be robust is that unions raise wages above the alternative wage, but we probably do not need a sophisticated theoretical framework to guess that this might be the case.”

My assessment is modestly more positive but not greatly so. On the plus side I would list a number of advances, evaluated against the state of the literature circa Dunlop and Ross.

Certainly one has to be impressed with the advances made over the last half century in both the mathematical modeling of trade unions and in the econometric testing of hypotheses. The sophisticated mathematics in use today allow economists to treat issues in union wage determination, such as multiperiod optimization, endogenous membership, and strategic bargaining, that were far beyond the technology frontier of Dunlop and Ross’ day. The revolution in econometric techniques has had a similar impact on empirical research. Illustrative is the study of the union effect on wages and employment in the coal industry during 1900–1930 by Boal

and Pencavel (1994)—a subject accessible to researchers of the 1940s, but one that they could never hope to explore with as much insight and care for lack of today's statistical tools and methods.

Sophisticated mathematics, of course, do not necessarily guarantee that today's union models are better than their forebearers in their ability to aid prediction and explanation of observed behavior. Although I think that the record is mixed, let me first state the positive side. For each of the eight empirical "facts" concerning union wage effects, the theoretical models have something useful to say, albeit more so with respect to some dimensions than others. Issues that I judge the models lend most insight to include union wage structure (e.g., lower wage dispersion and returns to education and skill), form of compensation (e.g., benefits versus wages), determinants of wage concessions, the employment effect of work rules, and the negative effect of unionism on capital investment and profits. For other issues, such as the size of and secular trend in the union-nonunion wage differential, the contribution of the models to date is relatively modest.

Another positive development I see is a gradual synthesis of the competing positions of Dunlop and Ross. I think that the weight of the evidence supports Dunlop's position that it is both necessary and useful to assume that a union seeks to maximize some type of objective function. However, I also think that the evidence supports Ross' contention that union behavior is not well understood through a mechanical application of the microeconomic theory of the firm (a contention Dunlop would agree with). Rather, as Ross (and the institutionalists before him) argued, unions are usefully viewed as political organizations operating in an economic environment, and accordingly, the union objective function is to be derived in light of the union's internal governance structure and member property rights. Only then can the question of "Whose wage bill?" raised by Dunlop be answered in a satisfactory way. The synthesis between these two points of view, although by no means complete or universally accepted, nonetheless has taken form in the development of various models that in some respect allow heterogeneous member preferences, principals and agents, and social choice processes of decision making. Models using the median voter objective function are best illustrative of this synthesis, but also representative are insider-outsider theories and property rights models.

The second area of synthesis between Dunlop and Ross concerns the importance of the labor demand curve as a constraint on union wage behavior and, in particular, the extent to which union wage policy takes into account the employment effect. As suggested by Mitchell (1972,

1980) and Kaufman and Martinez-Vazquez (1987), unions sometimes will appear to ignore the employment effect, as maintained by Ross, because potential strike costs keep the union from raising wages far enough to threaten a sizable number of jobs, whereas in other cases unions will take cognizance of the employment effect, as maintained by Dunlop, when their ability to raise the wage can have a large impact on the number of jobs—such as where the elasticity of labor demand is quite high or the firm has little ability to withstand the union's strike threat. Uncertainty, asymmetric information, and myopia are additional factors that help reconcile the two positions.

A final positive development deserving mention is the progress made integrating bargaining into microeconomic, Dunlop-type union wage models. Until the 1980s, two largely independent explanations existed for the determination of union wages—union utility function models in which the labor demand curve was the principal constraint and bargaining models in which strike costs were the principal constraint. In recent years, particularly with the development of noncooperative game theory, the two perspectives have been melded together so that both constraints are now included in a number of models.

Now it is time for the minuses:

Having made the case above that the theoretical literature on union wage models has indeed helped facilitate empirical research and illuminate observed behavior, I also have to note that the extent of these contributions is in most areas distressingly modest when viewed against either the five decades of research and the hundreds of published studies or the progress made in other areas of labor theory (e.g., human capital, labor supply). On a number of important issues, the range of ignorance is only modestly reduced relative to a half century ago when Dunlop and Ross wrote on the subject. Also troublesome is the evident fact that much of the empirical literature on union wages proceeds with little or no contact with the theoretical literature. Certainly better, more complete data sets would help bridge this gap, but I think that it can be said fairly that the theoretical literature on union wage models has in a number of areas provided few testable hypotheses or identifying restrictions for estimating equations.

Why has this literature not made more progress or had more impact? There are several reasons, it appears to me.

The most important, in my opinion, is that the majority of researchers have chosen to work within an unduly narrow, microeconomic framework. Stated another way, in the study of unions, economics by itself yields only partial and incomplete answers (albeit often very insightful

ones) and needs to be better integrated with industrial relations. “Exhibit A” is the aggregate union utility function, borrowed from the theory of the firm, which is still used in a large part of the literature. Although the social-choice problem inherent in specifying a union utility function has long been recognized, many researchers either assume it away (e.g., by postulating identical member preferences) or rationalize ignoring it on pragmatic grounds (e.g., analytic tractability)—per the observation of Flanagan (1993:10) that, “nowhere in economics have the objectives of an agent been modeled with less attention to foundations than in the study of unions.” An additional problem is that researchers specify the union objective function without regard for the institutional structure of the union and the structure of bargaining. The result of this cavalier treatment of the union utility function in a large part of the literature is that the very core of these union models rests on an ad hoc conceptual base, and often, predictions from these models turn on unexplained differences in union “tastes” (e.g., Dowrick and Spencer 1994).

Another respect in which most union models are too narrowly micro-economic is with respect to interdependent preferences and issues of equity and justice. The rational actor model that underlies standard micro-economic theory typically (but not always) portrays economic agents as having independent utility functions—an assumption that makes difficult consideration of fairness and equity, resting as these concepts do on relative comparisons between individuals and groups (Kaufman 1999). Few models of unions (almost none outside the topic of wage interdependence) incorporate interdependent utility functions or consider the role of equity concerns on wage determination. This seems like a particularly egregious omission, however, for even the most casual acquaintance with collective bargaining teaches one that equity comparisons are both rife and important [see the statement of Albert Rees (1993:243)]. I do not think that all aspects of union wage determination require consideration of interdependent preferences (and other forms of relative wage effects), but surely greater attention is warranted.

In addition to an overly narrow base in microeconomics, the theoretical literature on union wage models suffers from other conceptual shortcomings. I will briefly mention three. First, as noted by Addison and Chilton (1997), the theoretical models are quite fragile. As several articles demonstrate (Manning 1994; Hirsch and Prasad 1996; Chezum and Garum 1996), a change in one or two assumptions, or making a behavioral relation endogenous rather than exogenous, often overturns conclusions or changes the predicted sign of a relationship. Second, although game theory has helped economists integrate bargaining into union wage determination

models, the analysis of bargaining and the treatment of the strike threat in particular remain highly abstract and superficial. And third, almost all authors assume without question that the market wage W_a in nonunion labor markets is determined competitively (but see Currie 1991). This supposition ignores one of the fundamental justifications for unions advanced by their proponents—that they are necessary to offset various market imperfections (e.g., imperfect information, externalities, constraints on employee mobility) that result in employer domination and low wages, long hours, adverse working conditions, and arbitrary and unjust management methods (Kaufman 1997; Lucore 2000).

In addition to conceptual shortcomings, methodological problems also have hampered progress in this literature (Fleetwood 1999). Two seem particularly important to me. First, theoretical work on union wage determination is highly fragmented and particularistic as researchers work with numerous different models and iteratively add or modify assumptions and concepts, making it difficult to compare results across studies or generalize conclusions. In other areas of economics where there is a closer interaction between theory and empirical research, a gradual process of winnowing and sifting takes place as evidence for and against models accumulates, leading to the emergence of a core theoretical construct around which research is organized. So far, however, in the area of union models, the centrifugal forces seem at least as strong as the centripetal.

A second problem is with the type of empirical research conducted on union wage determination, which in my judgment is too narrowly conceived, due to overreliance on econometric methods and concern with technical estimation/data issues, and is divorced from real-world contact with unions and the process of collective bargaining. With few exceptions, the only type of empirical evidence contained in modern-day empirical research on union wage determination comes from some type of econometric data analysis. Also valuable, however, are alternative research methodologies, such as field investigation, case-study, ethnographic, and participant-observer techniques, as done by an earlier generation of economists and industrial relations scholars (e.g., Shultz 1951; Levinson 1966). Few labor economists do these types of studies any longer, and indeed, I find close to zero evidence in the last two decades of journal articles in which the research has in any way been informed by personal contact or experience with union wage determination. Without this type of research, theoretical work becomes inbred and unduly focused on academic esoterica and takes on an “other worldly” quality—in the process losing considerable relevance with respect to informing practice and policy (Dunlop 1977).

A prime example in this regard is the large literature that has developed over the last two decades on efficient contract models of unions, comparisons of the right-to-manage and efficient contract models, and empirical studies that seek to test the validity of one versus the other. All this effort—often by the best minds and talent in the field—is directed at a topic that is highly questionable on conceptual grounds and of apparent limited relevance on empirical grounds.

If the gains from a half century of research on models of union wage determination seem disappointingly modest, what could be done to improve matters? Here are my suggestions:

The place to start is with the specification of the union objective function because this construct is the fundamental weak spot in the theoretical literature. To date, economists have largely been content to use deductive reasoning, pragmatic but ad hoc assumptions, and loose empirical tests to provide guidance on the nature of the union objective function. We need to move beyond this to a micro study of the micro foundations of union behavior.

At a conceptual level, this means that much more attention needs to be paid to the concept of property rights in unions. It is the body of property rights that determines whose interests count in the organization, the political process by which member interests are aggregated, and the degree of control members have over leaders. Only by first knowing the types and distribution of these property rights in unions can the economic theorist determine whether the organization functions as a firmlike monopoly, a town-hall democracy, or an organizational oligarchy or bureaucracy and whether the union will give a large or small weight to wages versus employment, insiders versus outsiders, or leaders versus rank and file members in the objective function. At an empirical level, economists need to do case studies of unions to determine how the body of union property rights is created and how different property rights structures lead to different bargaining goals and behaviors. Remarkably, not a single empirical study of this nature has been done in recent times. The effect of different property rights regimes on bargaining outcomes also could be tested using experimental methods in a laboratory setting.

Regardless whether empirical studies show that unions function in practice as democracies or dictatorships, at the conceptual level the property rights perspective suggested here implies that unions by their nature are a form of government, albeit in the industrial realm. Unions are governments because they possess sovereign power over members, establish property rights for individual “citizens” of the organization through a political process, and have some form of executive, legislative, and judicial

function—according to the observation of Commons and the other early institutional economists. This observation leads me to my second suggestion for ways in which the research on union models can be strengthened.

There is now a large and burgeoning literature in economics devoted to the study of political organizations, collective choice mechanisms, and the structure of organizations under the rubric, respectively, of public economics, public choice, organizational economics, and new institutional economics (see Inman 1987; Mueller 1989; Furubotn and Richter 1997). These literatures are rich in theories and concepts directly applicable to the function, structure, and internal decision-making processes of unions but—outside certain basic topics, such as the median voter model and the public goods aspect of union membership—have heretofore been used only infrequently (but see Williamson 1985; Barker 1997; Rama 1997; Kaufman and Levine 2000). Examples of possible synergies include modeling unions as “clubs,” bureaucracies, or “governance structures”; analyzing unions as a response to market failure; studying the properties and outcomes of alternative voting rules; examining transaction cost explanations of organizational form; and looking at the optimal degree of organizational decentralization (see Cullis and Jones 1992; Inman 1987; Furubotn and Richter 1997).

In sum, the verdict on the amount of progress made in modeling unions and understanding the process and outcomes of union wage determination since Dunlop and Ross first wrote on the subject a half century ago resembles the proverbial partially filled glass—it depends on whether one views the glass as half empty or half full. Viewed from the latter perspective, considerable progress has been made in formalizing, extending, and testing theoretical models of unions; viewed from the former perspective, the amount of progress has been disappointingly slow and meager. I believe that a case can be built for both views, so, as stated previously, I conclude on a more optimistic note than most other reviewers.

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