

CRAFT VERSUS INDUSTRIAL UNIONS : UNION ORGANIZATION WITHIN THE WORK PLACE

Won-Sun Oh *

< 目 次 >

- I . INTRODUCTION
- II . THE DETERMINANTS OF UNION STRUCTURE
 - 2.1. MODEL
 - 2.2. DATA
 - 2.3. ESTIMATES OF BARGAINING UNIT DETERMINATION
- III . RELATIVE UNION POWER AND BARGAINING OUTCOME
 - 3.1. UNION BARGAINING GOALS AND SOURCES OF RENTS
 - 3.2. ESTIMATES OF THE UNION WAGE DIFFERENTIAL
- IV . CONCLUSION
- ENDNOTES
- REFERENCES

I . INTRODUCTION

Since the turn of the century, union bargaining structure has changed significantly with regard to both the size and scope of unions, through the creation of new unions and through reconsideration of boundaries between unions by their members. This change in union structure is likely to have directly affected union/employer behavior and wage outcomes.

* Research Fellow, Korea Labor Education Institute

Changes in the legal environment, especially passage of the National Labor Relations Act of 1935, had a profound effect on union organization structure. Changes in the nature of industries and production processes have also played a major role in modifying the existing pattern of the bargaining process; changes in industry structure, in the division of labor and in workers' interests account much of the overall decline in union membership since the 1950s¹

Despite the potential significance of bargaining structure in the negotiation process, little is known about the factors that influence the choice of alternative bargaining structures or their consequences for the bargaining strength of the agents. To date, many union studies have focused on compensation differences between union and nonunion workers, analyzing the effects of the nature of industry and labor markets on union bargaining strength and the ex post bargaining pattern.² The early conflicts between craft and industrial union organizations provide strong evidence that the determination of the appropriate bargaining unit is important to workers. Historically, there have been many jurisdictional and representational disputes between craft and industrial unions, both in the initial organization process and in unit clarification cases.³ An inefficient organizational structure may result in weak negotiating power in collective bargaining.

Craft unions are those whose jurisdiction concerns a particular skilled occupation, such as carpenters, plumbers and painters, in which membership is a result of employing particular occupation, regardless of employing industry. On the other hand, industrial unions define their jurisdictions in terms of particular industries, such as autoworkers and steelworkers.

This paper examines in detail the determinants and the economic consequences of alternative types of labor union organization. The empirical results are derived from the 1971 National Longitudinal Survey and the 1970 Census of Population and Census of Manufacturers. The rich National

Longitudinal Survey data provides detailed information on union types, information that can be matched to a wide range of worker and work place characteristics.

I consider two specific hypotheses on the craft union/industrial union/nonunion choice. The first is that craft unions are primarily a method by which more highly skilled workers attempt to avoid within-union wealth redistribution to the less skilled. The second hypothesis is that craft unions exist only where industrial unions are not sustainable and craft unions have had traditionally strong representation right. Under the first hypothesis, craft unions substitute for industrial unions ; in the second, they supplement industrial unions.

II. THE DETERMINANTS OF UNION STRUCTURE

2.1. Model

I develop the theoretical analysis of bargaining unit determination based upon individual decision making. It is assumed that that each worker tries to maximize utility by joining the appropriate bargaining unit. In this context, a union can be defined as a voluntary coalition of workers to achieve mutual benefits through the collective channel. It is voluntary since each worker decides to join based upon his expectation that benefits from collusive behavior will be higher than the utility from remaining nonunion. We classify each individual's choice into three groups : an industrial union (I) ; a craft union (c) ; and nonunion (N) . If a worker chooses either I or C, then he will become a member of the respective union. However, if he prefers N, then he chooses not to join the union and engages in individual bargaining.

The utility function of i th worker in the j th bargaining unit is expressed as

$$U_{ij} = U_{ij} (Y_i, S_j) \quad j = C, I, N \quad (1)$$

where Y_i is i th worker's consumption of private goods, S_j denotes the service provided in j th unit, which includes both pecuniary and nonpecuniary benefits. To the typical worker, the benefits of unionism are derived from the potential relative wage advantage due to union membership, the influence of the union on the nonpecuniary aspects of his job, especially through grievance procedures and seniority systems, and the effectiveness of the union in collective bargaining. We assume that the utility function satisfies the standard properties.

The budget constraint faced by each worker can be expressed as a function of private good consumption and union service. That is,

$$I = Y_i + f_{ij} * S_j \quad j = C, I, N \quad (2)$$

Where I is total income and f_{ij} is the shadow price of the union service which depends upon union service, and various personal and work place characteristics (X).

$$f_{ij} = f_{ij} (S_j, X_i) \quad (3)$$

x includes the demographic and industry nature variables such as race, region of residence, skill levels, firm size and capital labor ratio. For each worker, the optimal combination of private good consumption and union service is determined by solving Equation (1) subject to (2) by the Lagrangian method.

$$L = U_{ij} (Y_i, S_j) + \lambda (I - Y_i - f_{ij} * S_j) \quad (4)$$

Rearranging first order conditions and solving for λ , we have the following results.

$$\begin{aligned} & [dU_{ij} (Y_i, S_j) / dY_i] / [dU_{ij} (Y_i, S_j) / dS_j] \\ & - (df_{ij} / dS_j) * S_j = f_{ij} (S_j, X_i) \end{aligned} \quad (5)$$

$$I - Y_i - f_{ij}(S_j, X_i) * S_j = 0 \quad (6)$$

At the optimum, Equation (5) implies that the marginal rate of substitution between private goods and union representational services must be equal to the individual's share of the marginal cost of organization. This condition determines the amount of union services provided by each bargaining unit. By solving Equations (4) and (5), we can derive demand functions for Y_i and S_j as functions of X :

$$Y_i^* = Y_i^*(X_i), S_j^* = S_j^*(X_i).$$

Then an indirect utility function can be derived by substituting Y_i^* and S_j^* into the utility function. Let V_{ij} be the level of indirect utility for the i th individual joining the j th unit:

$$V_{ij} = V_{ij}(Y_i^*, S_j^*) \quad j = I, C, N \quad (7)$$

$$V_{ij} = V_{ij}[Y_i^*(X_i), S_j^*(X_i)] \quad (8)$$

Assuming that the indirect utility function is a linear function of exogenous variables, we can rewrite it as:

$$V_{ij} = b_j X_i + e_i \quad (9)$$

Where X is the vector of observations on the demographic and industry variables, and e_i are residual terms that are assumed to be independently and identically distributed with the type I extreme value distribution, whose cumulative distribution function is $F(e_j < e) = \exp(-e^{-e})$.

The cost (f_{ij}) of joining an appropriate bargaining unit depends heavily on the nature of labor markets such as race, region and skill levels, and the product market facing the unions and their employers. Furthermore, the cost functions vary according to whether union is organized on a craft or industrial basis. Although workers and their unions bear the primary responsibility for the initial development of collective bargaining unit, the

role of employers and their associations should not be overlooked. For example, a union can easily organize its work force if the employer has a high ability to meet union wage demands. Each workers needs to maximize the potential rents by selecting the most suitable bargaining structure due to cost differentials among bargaining units.

We expect that the level of skill is an important determinant in union status. In an industrial setting, wage policies most frequently focus on payments by job, with each job classified primarily by skill requirements. It is thus natural to imagine that skill groups are the fundamental organizational unit in any potential coalition. The skill group must then decide whether or not it will integrate formally with other skills within the plant, and then must decide (individually or collectively) to integrate or not across plants in other locations.

The industrial union seeks to avoid a competitive bargaining situation by organizing all the firms competing in the same product market, and attempts to negotiate a master agreement covering all production facilities of the individual employers or the entire industry. To accommodate large portion of heterogenous workers, the industrial unions need to standardize wage structure. Benefits from the egalitarian wage policy are higher for the less skilled workers than for the highly skilled. Therefore, in industries in which the dispersion of skill level is large, the desire for separate representation by the high-skilled workers is likely to be great. A motive for joining the craft union is to preserve the privilege of nonreplaceable skills and prevention of rent redistribution ; in that sense we expect skilled workers to prefer craft unions to industrial bargaining. Furthermore, it is possible that the rent sharing concerns of the high skilled might retard union formation all together, whether craft or industrial.

Union type also depends on firm size, market concentration, region of residence, size of nonunion sector, and on the degree of specialization in the division of labor.

The optimal choice mechanism is derived by the negotiation unit indicator function. Since the decision choice is trichotomous, we use a multiple logit model for the prediction of bargaining types of each individual, based upon certain personal and industrial characteristics.⁴ Then an index function becomes

$$\begin{aligned}
 Y_{ij} &= 1 \text{ if } V_j = \text{Max}(V_{ic}, V_{il}, V_{iN}) \\
 &= 0 \text{ otherwise}
 \end{aligned}
 \tag{10}$$

Probabilities of ith worker making jth choice are expressed as

$$\begin{aligned}
 \text{prob}(Y_{ij} = 1) &= \text{prob}(b_j \hat{X}_i + e_j > b_k \hat{X}_i + e_k), \\
 j, K &= C, I, N \quad J = k \\
 &= \text{prob}(e_k < b_j \hat{X}_i - b_k \hat{X}_i + e_j) \\
 &= e^{b_j \hat{x}_i} / \sum_{k=1}^3 e^{b_j \hat{x}_i}
 \end{aligned}
 \tag{11}$$

The determined union structure must represent the community of interests by considering every member's demands, and the derived structure is directly related to the potential negotiating power of the organization. In fact, the NLRB draws upon a community of interest criterion to determine whether employees with special craft skills and training should be separated for the purpose of voting and bargaining or whether they should be included with semi-skilled and unskilled employees in an industrial unit.

If the proposed unit consists of a distinct and homogeneous group of skilled journeymen or craftsmen or if it is comprised of a functionally distinct type of work, then there is a tradition of separate representation by a craft union. Moreover, craft unions organize through a narrow skill groups in order to keep the ratio of labor cost to total costs low in their jurisdiction and to maintain monopoly power in labor supply by controlling entry to the particular craft. Industrial unions usually secure favorable wages and

working condition mainly through the collective bargaining settlement. Since the bargaining power is based on the strike effects, the industrial union must organize a large portion of relevant workers in the same industry to ensure the effectiveness of the strikes.

2.2. Data

the main data set used in the empirical study is the older male cohort of the 1971 National Longitudinal Survey (NLS), which provides individual data on union membership and detailed personal characteristics. The cohort was initially surveyed in 1966 when 5024 male respondents were 45 to 59 years of age. The NLS allows longitudinal analysis of union membership and union impacts on wage and nonwage outcomes. The industry data—firm size, four firm concentration ratio, geographical concentration index, and capital-labor ratio—used in the empirical study is derived mainly from two sources, the Census of Population and the Census of Manufactures.

The geographical concentration index is used as a proxy for the geographical dimension of the product market. For each 3 digit Census of Population industries(1970), the ratio of employment among the five states with the largest industrial employment in that industry to total industry employment is calculated in percentage terms. The firm size is calculated as the percentage of employees in firms with 500 and more employees. The capital-labor ratio is measured as the gross book value divided by the total number of employment. Freeman and Medoff's (1979) estimates of extent of the private unionism is used for our analysis.

Although there are variations in the composition of workers and bargaining mechanism among different industries, our analysis is restricted to workers in the manufacturing industry.⁵ The sample is composed of 612 male production workers in the manufacturing industry, of whom 281 are industrial union members and 63 are craft union workers.

2.3. Estimates of Bargaining Unit Determination

I consider two specific hypotheses on the craft union/industrial union/nonunion choice. The first is that craft unions are primarily a method by which more highly skilled workers attempt to avoid within-union wealth redistribution to the less skilled. The second hypothesis is that craft unions exist only where industrial unions are not sustainable and craft unions have had traditionally strong representation right. Under the first hypothesis, craft unions substitute for industrial unions ; in the second, they supplement industrial unions.

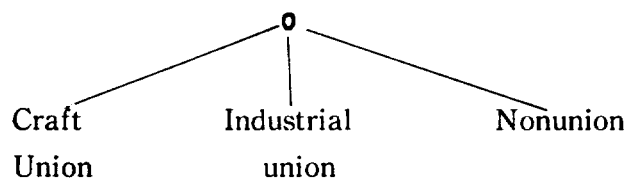
Figure 1 presents a diagrammatic representation of the alternative hypotheses as well as of the general model. The multiple logit estimate technique captures effects of explanatory variables on union status if workers choose among different types of bargaining structures, rather than simply union or nonunion, in the initial organization. The sequential logit model 1 tests the hypothesis that craft unions supplement industrial unions. In this analysis, it is assumed that industrial unions are the dominant bargaining structure and craft unions are formed where industrial unions are not sustainable. In the sequential logit model 2, workers first determine whether they will join a union or not. Then, they select the preferred union structure.

We estimate the probabilities of joining each of the three bargaining structures by using the multiple logit model and the results are presented in Table 1-3. The results in Columns 1 and 2 of Table 1 are the relative probabilities of joining either the industrial union or craft union compared to selecting nonunion. The results in Tables 2 and 3 are estimated using the sequential decision making process.

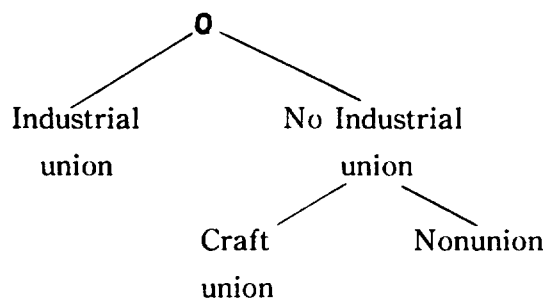
The Column 1 of Table 2 estimates the probability of joining the industrial union compared to the other types of bargaining unit and Column 2 presents the probability of joining the craft union where the sample is restricted to craft union members and nonunion workers.

Column 1 of Table 3 shows the traditional union status determination, by

Procedure 1 : Multiple Logit Model



Procedure 2 : Sequential Logit Model 1



Procedure 3 : Sequential Logit Model 2

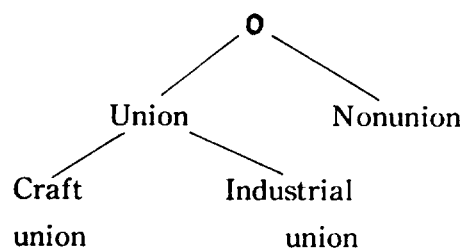


Figure 1 : Decision Procedures on the Alternative Types of Labor Union Organization

dividing samples into two groups, union and nonunion. Column 2 presents the relative probabilities of joining either the craft or the industrial union among union workers.

The significantly negative coefficient on skilled workers in all estimates show that skilled workers prefer individual (nonunion) bargaining to any type of organized bargaining units. This result indicates that the rent sharing concerns of the highly skilled workers retard union formation. Among union workers, highly skilled workers prefer craft unions to industrial unions. Therefore, among union workers, it is high skilled workers interest to organize distinct bargaining units.

The coefficients on the relatively low-skilled group point out an interesting result. The lower skilled workers (laborers) are less likely to join the union than are operators in the overall classification but they are more likely to join craft unions than either industrial unions or to remain nonunion although coefficients are not statistically significant. The explanation of this is unclear ; perhaps the changes in production process have forced craft unions to include lower skilled workers.

The semi-skilled workers are dominant labor force in the industrial union. In this context, the true effect of skill levels on the traditional union status function may be misleading since the two distinct types of unions coexist in the overall classification of unions, especially in the manufacturing industry. In addition, the classical definition of craft and industrial unions needs re-consideration since the traditional importance of the high skilled group and the homogeneity of workers in craft unions have apparently been weakened to accommodate environmental changes. It appears that industrial unions are mainly composed of semiskilled workers and that the two extreme types of workers, either highly skilled or low skilled, are more likely to join craft unions.

The race coefficient indicates that being non-white increases the probability of joining an industrial union. However, the negative coefficient in Column 2 of Table 1 indicates a lower probability of a nonwhite choosing a craft union.

This result points out the poor job opportunities for black males in craft unions along with historical prejudice against black workers in craft jobs. It also suggests that industrial unions are likely to be less discriminatory against blacks; the proportion of black workers who are unionized (45%) differs little from the proportion of white union workers in the industrial union sector (49%), however, the former (6%) is about one half of the latter (12%) in the craft union sector.

Furthermore, the relative portion of black workers in the traditional jurisdiction of the industrial unions has been much higher than in the case of the craft unions. Failure to organize those black workers provides employer an easy access to the substitutive nonunion workers, which reduces the strike threats. Ashenfelter (1981) has found that even in the South the ratio of the number of black craftsmen and operatives in bituminous coal was on the order of .08. On the other hand, the 1960 U.S. Census reports that of 26,615 "air line pilots and navigators" in the U.S., only sixty were black, which gives black/white ratio of less than .003. The traditional argument that residents in the southern area are less likely join either types of union is confirmed in our analysis.

As firm size increases, workers are more likely to join industrial than craft unions. For either type of union, a larger firm size is likely to lower organization costs, but in the craft union where the organization follows the lines of particular skills, the size of firm effect on the cost of organizing is apparently less. In addition, the benefit from standard work rules and grievance procedures are valued highly for industrial union members in large firms where communication between employees and management is difficult. The employer might also want to have the centralized industrial

union since small, fragmented unions result in an unstable relationship. This result is consistent with Hirsch and Berger (1984) who found that individual's incentive to join a union in manufacturing is more likely, the larger average establishment size in the worker's industry of employment.

An increase in the capital-labor ratio favors unionism although the coefficient is significant only for union-nonunion overall classification. The demand for short run labor becomes more inelastic as capital-labor ratio increases, which results in great effects of the unionism. The increase in capital investment especially favors craft units to industrial bargaining structures, which partially supports the capital skill complementarity argument. In sum, the highly skill workers and workers in the southern area have less likely to join the union. Being a nonwhite increase probability of joining the industrial union, whereas laborers prefer craft unions to industrial unions. In addition, increases in the firm size and capital-labor ratio favor industrial unionism.

Table 1
 Estimates of Bargaining Unit Determination,
 A Multiple Logit Model ^a

	Industrial Union	Craft union
Intercept	-1.202 (0.622)	-0.812 (1.028)
Black ^b	0.206 (0.257)	-0.606 (0.431)
South ^c	-1.217 * * (0.263)	-0.691 ^D (0.393)
SMSA ^d	0.450 ^D (0.256)	0.708 ^D (0.394)
Craftsman ^e	-1.030 * * (0.220)	-0.581 ^D (0.330)
Laborer ^f	-0.540 (0.415)	0.505 (0.530)
Firmsize ^g	2.245 * * (0.683)	-0.184 (0.911)
Log(K/L) ^h	0.252 (0.601)	0.280 (0.262)
Geographic ⁱ Concentration	0.084 (1.249)	-2.246 (2.067)

Source : National Longitudinal Survey, Census of Manufacturers

Asymptotic standard errors are in parentheses.

* * significantly different from zero at the 0.01 level

D significantly different from zero at the 0.10 level

^a The dependent variable is the probability of joining either an industrial or craft union, compared to nonunion. The sample is composed of 551 male production workers in manufacturing industries.

Table 1 (continued)

- ^b A dummy equal to one if the respondent is a black, zero otherwise
- ^c A dummy equal to one if the current residence of the respondent is in the south, zero otherwise.
- ^d A dummy equal to one if the current residence of the respondent is in an SMSA, zero otherwise.
- ^e A dummy equal to one if the current occupation of the respondent is craftsman or foreman, zero otherwise.
- ^f A dummy equal to one if the current occupation of the respondent is laborer (except farm workers), zero otherwise.
- ^g The percentage of the firm that has more than 500 workers in the industry.
- ^h Log of capital labor ration, measured as the log value of the gross book value divided by employment.
- ⁱ Geographical concentration index, measured as the ratio of employment among the five states with the largest industrial employment in that industry to total industry employment.

Table 2
Estimates of Bargaining Unit Determination,
Based on a Sequential Logit Model 1

	Industrial Union ^a	Craft Union ^b
Intercept	-1.580 (0.586)	-0.849 (1.065)
Black	0.336 (0.245)	-0.550 (0.451)
South	-1.092 * * (0.255)	-0.701 ^D (0.420)
SMSA	0.312 (0.246)	0.724 ^D (0.405)
Craftsman	-0.895 * * (0.207)	-0.595 ^D (0.339)
Laborer	-0.650 ^D (0.391)	0.506 (0.537)
Firmsize	2.307 * * (0.570)	-0.218 (0.895)
Log(K/L)	0.190 (0.158)	0.288 (0.259)
Geographic Cpmcentration	0.538 (1.179)	-2.209 (2.108)

Source : National Longitudinal Survey, Census of Manufacturers

Asymptotic standard errors are in parentheses.

* * significantly different from zero at the 0.01 level

D significantly different from zero at the 0.05 level

^a The dependent variable is the probability of joining the industrial union and the sample is composed of 551 male production Workers in Manufacturing industries. For description of variables, see Table 10.

^b The dependent variable is probability of joining a craft union where sample is restricted for 286 craft union and nonunion workers.

Table 3
Estimates of Bargaining Unit Determination,
Based on a Sequential Logit Model 2

	Union/Nounion ^a	Industrial/Craft ^b
Intercept	0.678 (0.592)	-0.460 (1.071)
Black	0.058 (0.243)	0.688 (0.430)
South	-1.106 * *	-0.602
	(0.241)	(0.407)
SMSA	0.494 *	-0.196
	(0.237)	(0.416)
Craftsman	-0.941 * *	-0.385
	(0.207)	(0.333)
Lavorer	-0.236	-1.196 *
	(0.375)	(0.579)
Firmsize	1.685 * *	2.325 *
	(0.561)	(0.949)
Log(K/L)	0.264 ^D	0.013
	(0.160)	(0.270)
Geographic Concentration	-0.117 (1.190)	2.342 (2.124)

Source : National Longitudinal Survey, Census of Manufacturers
Asymptotic standard errors are in parentheses.

* * significantly different from zero at the 0.01 level

* significantly different from zero at the 0.05 level

D significantly different from zero at the 0.05 level

^a The dependent variable is the probability of joining union and the sample is composed of 551 male production workers in manufacturing industries. For description of variables, see Table 10

^b The dependent variable is probability of joining the industrial union compared to that of the craft union. The sample is restricted to 323 union workers

III. RELATIVE UNION POWER AND BARGAINING OUTCOME

3.1. Union bargaining Goals and Sources of Rents

It is natural to assume that, if workers organize a union, they will establish the most efficient form of labor organization in terms of size and characteristics. The most efficient union has the greatest ability to prevent the firm from acting unilaterally in negotiating workers' respective compensation schedules. Moreover, the most suitable union can extract the highest permissible rents since the bargaining power is intrinsically related to the size and scope of each unit. In this section, we analyze the relative bargaining behavior of existing unions, along with the sources of union power.

Craft unions have much greater control of employment. They have some degree of monopoly power in restricting entry into particular profession through apprenticeship programs, etc., to avoid the market effects resulting from an oversupply of qualified workers. In addition, they can limit loss of jobs and income through restrictive work practices such as featherbedding. The power of controlling employment level is particularly important for the skilled workers since potential rents of the highly skilled workers mainly depends on the nature of craft jobs rather than contemporary employment in particular industry.

On the other hand, the bargaining power of industrial unions is derived from the product market mainly by the effect of strikes, and employment decisions are generally in the hands of management. Therefore, the bargaining strength mainly depends on the number of workers covered in the relevant industry rather than on the nature of particular jobs. By extending the organization, members in the industrial union can secure better compensation due to more inelastic demand for their members' service and a lower degree of competition from the nonunion sector.

Next, we specify explicitly how unions extract rents from employers. The

source of union rents is important because it defines the potential externalities that might induce union members in existing work places to subsidize organizing efforts in other unorganized work places. The sources of the union rents depend upon : first, existing monopoly rents from the firms ; secondly, quasi-rents that capture cartelization of an input market and implicit cartelization of an industry, creating product market rents that are unavailable to the individual firms in the industry.

Unions can capture monopoly rents deriving from market power since the employers' ability to pay is positively related to output market concentration. It is widely accepted that greater bargaining power accrues to unions that organize a larger portion of their industry. Industrial unions need to organize a large portion of workers in the same employment to make the demand for their members' service more inelastic, which may result in more credible strike threats. As the industry becomes more concentrated, industrial unions can increase bargaining power through wide-area bargaining that prevents rivalry among locals in the same industry.

The bargaining power of the localized craft unions will be weakened if industry becomes more concentrated. Therefore, multicraft bargaining which curbs rivalry among different unions in the same area may increase the negotiation power of the craft union by reducing the effective elasticity of labor demand in highly concentrated industry. When both types of unions are present in the same work environment, then inter-union rivalry may induce changes in one union's negotiated terms to balance the other union's needs. The skilled workers' rejection of a settlement may force revision of contract terms that tend to fit the needs of the semi-skilled majority in the industrial union. For example, in 1973, the United Auto Workers, mainly semi-skilled workers, had to negotiate special benefit schedules with Ford for the small set of the highly skilled workers like die makers and model makers.⁶

Recently, researchers (Hirsch and Connolly, Hirsch and Addison) have

focused on the quasi-rents on the firm's capital investment as an important source of union wage premia. Once durable and specific capital is in place, the firm will share quasi-rents with the union rather than allow the unions to disrupt operations. The bargaining power of the union increases as the industry becomes more capital-intensive since during a strike a firm must pay a high level of fixed cost (unless of course supervisors or clerks can take over operation). The quasi-rent also depends on the division of labor and on the degree of substitution between union workers and either capital or nonunion workers.

A high degree of labor division requires less skilled workers and reduces the natural strength of the crafts. On the other hand, if the capital skill complementarity argument (in which the elasticity of substitution between high-skilled and capital is assumed to be lower than between less-skilled and capital) is supported, then the relative bargaining power of the craft union will be greater in capital-intensive firms due to increase in demand for the highly-skilled. As a consequence, the union firm is less likely to invest in research and development and is likely to keep less efficient capital in place to reduce union bargaining power.⁷

Central to input market cartelization is the union's legal right to strike, especially on the firm-by-firm basis, which results in lower industry output, so that employer profits can be threatened. In this context, more centralized national unions have relatively stronger bargaining power than do localized bargaining units. When union coverage is industry-wide, then spillover externalities created by the striking firm is internalized by other union members through higher prices, profits, and employment at competing firms. On the other hand, in the localized union structure, this externality is captured by different union members or even nonunion workers. Since the profitability of the firm is the interests of both workers and managers, the benefit from an increase in monopoly power can be shared by the employer and union workers.

3.2. Estimates of the Union Wage Differential

In this section, the effects of environmental variables, particularly bargaining structure and the importance of skill levels, on rent determination is analyzed. The rent (wage gap) is defined as the excess of a worker's wage if unionized over his wage if nonunion, at a given specification of working conditions for an individual. Parsons (1988) partitioned the individual's observed wage payment into a competitive wage component, an organizational rent component, and a random component. Following his analysis, the wage equations can be rewritten as follows :

$$W_{Ci} = (1 + K_{Ci})W_T \quad (12)$$

$$W_{Ii} = (1 + K_{Ii})W_T \quad (13)$$

re K_{Ci} and K_{Ii} show the effectiveness (organizational rent) of craft and industrial unions in raising the wage above the competitive wage. W_T is the expected wage if workers had chosen nonunion at the given specifications. In this analysis, we assume that the union relative wage differential is due to the effectiveness of the union in raising wages above the competitive wage level.

To derive an estimable relationship, we assume that the log of the respective wage is a linear function of the appropriate exogenous variables. Wage equations are expressed as

$$\ln W_{Ci} = b_{Co} + \hat{b}_{C1} X_i + e_{Ci} \quad (14)$$

$$\ln W_{Ii} = b_{Io} + \hat{b}_{I1} X_i + e_{Ii} \quad (15)$$

$$\ln W_{Ni} = b_{No} + \hat{b}_{N1} X_i + e_{Ni} \quad (16)$$

where W_{Ci} , W_{Ii} and W_{Ni} are the wage rates for craft union, industrial union and nonunion workers, respectively. X includes worker and work place characteristics. The expected values of the error terms in Equations (14), (15), and (16) may be nonzero due to the potential correlation

between the error terms in the union status equation and the wage equations. That is, $E(e_{Ci} / P(c=1)) = 0$, $E(e_{Ii} / P(I=1)) = 0$, and $E(e_{Ni} / P(N=1)) = 0$. Therefore, the correct estimation procedure requires correction of the multiple selection bias problem, which is quite difficult.

Instead, we use a single wage equation using dummy variables for union types. Since our focus lies in the wage effect comparison between two unions, this dummy variable approach is more appropriate. The quantitative result of this approach may result in smaller wage gaps than does the estimation corrected for the union endogeneity problem.⁸ Although the exact magnitude of the wage gaps may be different between the two methods, we expect similar qualitative results. The wage equation can be expressed as :

$$\begin{aligned} \ln W_i &= b_{N0} + b'_{Ni} X_i \\ &+ C_i [(b_{C0} - b_{N0}) + (b_{C1} - b_{N1})' X_i] \\ &+ I_i [(b_{I0} - b_{N0}) + (b_{I1} - b_{N1})' X_i] + e_i \end{aligned} \quad (17)$$

To test the effect of each union type on the wage outcomes, we first assume that there are no cross product effects between union status (I, C) and the variables included in X. then the Equation (17) becomes :

$$\ln W_i = b_{N0} + b'_1 X_i + C_i (b_{C0} - b_{N0}) + I_i (b_{I0} - b_{N0}) + e_i \quad (18)$$

where $(b_{C0} - b_{N0})$ and $(b_{I0} - b_{N0})$ indicate the wage gap for craft union and industrial union workers, respectively.

Estimation results are reported in Table 4. Column 1 includes all samples, and Column 2 shows the wage equations for union workers. Both types of unions have a positive effect on wage. The craft union (9.5%) is more successful at raising wages than the industrial union (4.9%). Among union workers, craft union workers have a greater wage gap (3.1%) than the

industrial union members. The other exogenous variables have the expected signs. The relatively disadvantaged groups, blacks and laborers, have negative wage effects while skilled workers and workers in SMSAs have positive wage effects. In addition, the wage effect increases as worker's tenure becomes longer and as the extent of unionism increases.

The positive coefficients on union coverage show that an increase in unionism will increase wages for both union and nonunion workers. It seems likely that unionism has increased the wage rates of nonunion workers in industries where unions are prevalent or most likely to organize. This is partially explained by the threat effect, through which the employers try to discourage unionization by offering a higher wage and trying to buy out the group that favors unionism the least. Given the positive effect of union coverage on the nonunion wage, it can be conjectured that the threat effect is greater than the spillover effect.⁹ The positive relationship between union wages and union organization can be explained by the demand effect. Increases in union coverage in the given industry will lower the elasticity of demand for the good produced by the unionized firm, since substitution to the reduced number of nonunion firms is more difficult. Furthermore, the elasticity of demand for union workers will be lower, and the union can then increase wages without significantly reducing employment.

Column 3 of the Table 4 represents the wage equations adjusted for selectivity bias. Heckman's two stage estimation technique is used to adjust for selectivity bias problems.¹⁰ First, the wage equations for the union and nonunion workers are expressed as :

$$\ln W_{Ui} = b_{U0} + b'_{Ui} X_i + e_{Ui} , \quad (19)$$

$$\ln W_{Ni} = b_{N0} + b'_{Ni} X_i + e_{Ni} \quad (20)$$

where W_{Ui} and W_{Ni} are hourly wages for union workers and for nonunion workers, respectively. Then the expected wage equations for union and nonunion workers are estimated by using the union status equation devel-

oped in Table 3. The wage equations with the inclusion of the selectivity variables can be rewritten as

$$\text{Ln } W_{Ui} = b_{U0} + b'_{U1} X_i + b_{U2}[-f(\hat{U}N)/F(\hat{U}N)] + U_{ui} \quad (21)$$

$$\text{Ln } W_{No} = b_{N0} + b'_{N1} X_i + b_{N2}[f(\hat{U}N)/(1-F(\hat{U}N))] + U_{ni} \quad (22)$$

where b_{U2} and b_{N2} are covariances between the error term of the reduced form union membership equation and the error terms in the wage equations. An Ordinary Least Squares procedure is used to obtain estimates of the coefficients in Equations (21) and (22). Then we include dummy variables for modes of unionism in the expected union wage equation to capture the effect of each bargaining unit on raising wage compensation. The estimated result is very similar to the unconditional union wage equation and the percentage wage differential is slightly greater (4%).

Next, we estimate wage differentials among various worker and work place characteristics by allowing interaction between the type of bargaining unit and the exogenous variables. Our main interest lies in the effectiveness of the two union types in raising wages above the potential nonunion wage for the different sets of workers. The wage equation is expressed as :

$$\begin{aligned} \text{Ln } W_i &= b_o + b_x X + b_k K + C_i (a_o + a_k K) \\ &+ I_i (g_o + g_k K) + e_i \end{aligned} \quad (23)$$

where K is a particular exogenous variable (i.e. black), C_i and I_i are types of unionism, craft union or industrial union. The coefficients of the interaction terms, a_k and g_k , capture the wage effects of a particular set of workers in each bargaining unit compared with the nonunion workers. The estimated coefficient can be translated into a percentage wage differential by performing $100 * (e^{a_k} - 1)$.

The cross-classification of the wage gaps according to union status and

by demographic and industry nature is reported in Table 5. The wage gap for the black male workers is larger in industrial unions (17.23%) than for craft union members (7.36%). White craft union members have a positive wage gap (10.96%) whereas white workers in industrial unions have negative wage effects (-0.7%). The difference between the black and white wage gap is larger for industrial union workers than for members of craft unions. This result supports the earlier finding that blacks are more likely to join industrial unions than craft unions. We can conjecture that blacks have relatively better wage opportunities in industrial unions than in craft unions and that the black workers in industrial unions may be relatively more productive than nonunion workers or blacks in craft unions.

The highly skilled workers in craft unions secure better wage compensation (2.3%) than craftsmen in industrial unions (-7.42%). This result supports the hypothesis that skilled workers prefer craft unions to avoid the within-union wealth redistribution. Additionally, operatives and laborers in craft unions have greater wage differentials (20.32%, 19.96%) than those in industrial bargaining units (14.23%, 18.41%). For skilled workers, the wage gap is smaller than that of operatives or laborers. On the other hand, the wage differential estimates for the laborers tend to exceed those for operatives in industrial unions, but they are smaller for craft union workers.

This result supports the contention that unions tend to standardize wage structure and to narrow occupational compensation gaps. Hirsch and Addison (1986) found that among production workers, consistently positive union-nonunion wage differentials are found for all skill groups in all industries, especially in the construction industry. However, our analysis shows that, in the manufacturing industry, a negative wage differential exists for the skilled workers in craft union and almost no difference for low-skilled groups, as compared to the semi-skilled group. This suggests that unions tend to reduce skill differences and that the wage policy is highly

weighted toward the relatively low-skilled groups.

A lower wage differential prevails for residents in SMSAs, and the wage gap is larger for residents in South than in other areas. It was also found that industrial union members in non-southern areas have positive wage differentials, but in SMSAs, workers in industrial unions have negative wage gaps. Unlike many studies, which found a positive effect of unionization on the wage gap, our result shows that the wage differential falls as the percentage of unionization in the industry increases, especially for craft unions. Freeman and Medoff (1981) have found that the average firm size in a given industry of employment has a positive effect on both union and nonunion workers' wages and that the coefficient in the nonunion case is significantly higher than that in the union wage equation. In our study, the wage gap declines as firm size increases and union workers in the industry composed of large firms have negative wage gaps (-5.83%, -4.02%). The explanation for this result is unclear. It is possible that the result reveals that the large nonunion firms can provide the same benefits as the large unionized firms, which results in lower wage differentials. In addition, it may be explained by the egalitarian wage policy adopted by unions.

The significance of union type on wages is also analyzed by testing for the significance of differences between craft and industrial union coefficients in the estimated structure. The null hypothesis is $H_0 : a_k = g_k$; the alternative hypothesis is $H_A : a_k \neq g_k$. An F test is performed and the null hypothesis is rejected for white worker, the high-skilled and for workers in the less organized and in the less concentrated industries at 10% significance level. The differences in the other coefficient estimates are not significant.

In sum, within each union, the wage differential is smaller for non-southerners, with the male workers, and workers in SMSAs. In addition, the wage gap falls with the extent of unionization and firm size. The craftsmen have smaller wage gaps than the operatives. However, among bargaining

units, highly skilled workers in industrial unions have negative wage effects, and laborers secure better compensation in industrial unions than in craft unions. The analysis of wage effects on different sets of workers in the two distinct types of unions shows that the wage gap depends not only on the human characteristics and the nature of the work place but also on types of bargaining units in different environments.

Table 4
Estimates of Equations

	All Workers ^a	Union Workers ^b	Union Workers ^c
Intercept	0.984 (0.041)	1.192 (0.055)	1.311 (0.103)
Black	-0.155** (0.027)	-0.113** (0.031)	-0.114** (0.031)
South	-0.209** (0.028)	-0.146** (0.036)	-0.096** (0.051)
SMSA	0.192** (0.028)	0.095** (0.036)	0.070 ^D (0.040)
Craftsman	0.168** (0.024)	0.099** (0.028)	0.137** (0.039)
Laborer	-0.088 ^D (0.042)	-0.081 (0.052)	-0.074 (0.051)
Tenure	0.005** (0.001)	0.003** (0.001)	0.003** (0.001)
Punion ^d	0.226** (0.072)	0.148 ^D (0.086)	0.062 (0.106)
Industrial Union	0.048 ^D (0.027)		
Craft Union	0.091* (0.038)	0.031 (0.034)	0.039 (0.034)
Selectivity Bias			-0.137 (0.101)

Source : National Longitudinal survey, Census of Manufacturers

Standard errors are in parentheses.

** significantly different from zero at the 0.01 level

* significantly different from zero at the 0.05 level

D significantly different from zero at the 0.10 level

- ^a The dependent variable is the log of the hourly wage of 551 male production workers in manufacturing industries.
- ^b The dependent variable is the log of the hourly wage and the sample is composed of 323 male union workers in manufacturing industry. The Ordinary Least Squares estimation technique is used in this estimate.
- ^c The dependent variable is the log of the hourly wage and the sample consists of 323 male union workers in manufacturing industry. Selectivity bias is corrected using union status equation in Column 1 of Table 12 and the log of the wage is estimated by Ordinary Least Squares estimation technique.
- ^d percentage of workers unionized in the industry.

Table 5
 Estimated Coefficients in Wage Differentials Equations,
 by Union, Demographic, and Industry Types^a

	Craft union workers(a_k)	Industrial union workers(g_k)
Black	0.071 (0.087)	0.159 (0.049)
White	0.104 (0.042)	-0.007 (0.029)
Craftsmen	0.023 (0.057)	-0.077 (0.035)
Operative	0.185 (0.037)	0.133 (0.057)
Laborer	0.182 (0.111)	0.169 (0.086)
South	0.274 (0.075)	0.149 (0.050)
Non-South	-0.006 (0.030)	0.039 (0.044)
SMSA	0.046 (0.043)	-0.018 (0.029)
Non-SMSA	0.198 (0.051)	0.263 (0.079)
Punion > .4	0.056 (0.057)	0.034 (0.038)
Punion < .4	0.144 (0.051)	0.043 (0.032)
Firm size > .5	-0.060 (0.077)	-0.041 (0.040)
Firm size < .5	0.158 (0.444)	0.092 (0.033)
CR4 > .4	0.190 (0.087)	-0.089 (0.041)
CR4 < .4	0.185 (0.042)	0.106 (0.032)

Standard errors are in parentheses

^a The dependent variable is the log of the hourly wage of 551 male production workers in manufacturing industries. For interpretation of coefficients, refer to Equation (28) .

IV. CONCLUSIONS

The early conflicts between craft and industrial unions provide vital evidence of the far-reaching importance of the determination of an appropriate bargaining unit. Furthermore, the selected union structure has an immediate effect on the outcome of the bargaining process. An inappropriate organization of workers in the relevant industry may result in an inefficient allocation of resources and weak bargaining power in collective bargaining. Factors affecting the appropriate bargaining unit choice were considered and the effects of the alternative bargaining structures on the collective outcome were analyzed. If the appropriate bargaining unit is in fact determined by the worker's optimal decision making process and if individuals are given the choice of different types of unions, rather than simply union or nonunion, then studying institutional factors may contribute to existing theories. The theory of the appropriate unit determination becomes important since classification of the union is not exogenous as is traditionally assumed.

In this thesis, the motives and organizational costs and activities between craft and industrial unionism are compared. The evidence shows some divergence of results from the standard union status studies. The estimation result indicates that rent sharing concerns of skill workers may retard union formation. Even among union workers, high-skilled workers prefer craft unions to industrial bargaining units. Industrial unions are mainly composed of semi-skilled workers and that the two extreme types of workers, either very highly skilled or low-skilled, are more likely to join craft unions.

It is also found that extent of the union in a given industry increase wages for both the union and nonunion workers, which can be explained by less elastic demand and threat effect, respectively. Our analysis shows that the highly skilled workers wage gap is smaller than the wage differential of the

semi-skilled groups. Furthermore, the highly skilled workers in craft unions secure better wage compensation than craftsmen in industrial unions. Although the magnitudes of wage differentials are not significant, the wage differential estimated for the laborers tend to exceed those for operatives in industrial union, but they are smaller for craft union workers.

The analysis of wage gaps on different sets of workers in the two distinct types of union gaps on different sets of workers in the two distinct types of union shows that the union wage differentials depend not only on the nature of the labor market and industry but also on types of bargaining units in different environments.

Since union-management relationships are dynamic, the appropriate bargaining unit needs to be continuously modified. As shown in a brief history of the organized labor movement, both craft and industrial unions experienced membership decline due to changes in the labor market characteristics, industry structure and technology. However, these changes may have differently influenced craft unions and industrial unions. The dynamic interaction among labor market forces, individual desires, organizational factors, and industry structure, such as mergers and acquisitions, challenges the importance of the bargaining unit identity and the collective bargaining process. Therefore, it would be desirable to extend our study to the systematic analysis of other types of industrial reorganization, e.g. vertical integration, on labor union organizational structure.

ENDNOTES

1. Historical change in union membership was included in the original version of the dissertation. (It is available upon request)
2. Lewis (1986) provided an excellent survey of union wage effects.
3. Abodelly (1971) provides a survey of cases that involve jurisdictional controversies between craft and industrial unions.
4. For complete derivation of and an application of multiple logit model, see Maddala (1983) and Schmidt and Strauss (1975).
5. The classification of union types by occupation and industry of all production workers in construction, manufacturing and transportation industries are presented in the Appendix A. (It is available upon request.)
6. Estey (p.69)
7. See Hirsch and Berger (1984)
8. For detailed explanation and explicit comparison, see Robinson (1989)
9. As discussed in the large literatures by labor economists, the separate estimation of the magnitude of the spillover effect and threat effect is generally impossible.
10. Lee (1978) and Heckman (1976) examined the significance of selectivity bias problem and presented a correction method.

REFERENCES

- Abodeely, John E., The NLRB and the Appropriate Bargaining Unit Industrial Research Unit, Department of Industry Wharton School of Finance and Commerce, University of Pennsylvania, 1971
- Addison, John T. and Hirsch, Barry T., "Union Effects on Productivity, Profits, and Growth : Has the Long Run Arrived ?," Journal of Labor Economics, Vol.7, No.1, Jan. 1989
- Ashenfelter, Orley, "Racial Discrimination and Trade Unionism," Journal of Political Economy, Vol 80, No.3, May/June 1972
- Ashenfelter, Orley and George Johnson, "Unionism, Relative wages, and Labor Quality in U.S. Manufacturing Industries," International Economic Review, Vol.13 1972
- Block, Richard N., "Union Organizing and the Allocation of Union Resources," Industrial and Labor Relations Review, Vol.34, No. 1, Oct. 1980
- Chaison, Gary N., "A note on Union Merger Trends, 1900-1978" Industrial and Labor Relation Review, Vol.34, No.1, Oct. 1980
- Chitayat, Gideon, Trade Union Mergers and Labor Conglomerates, Paeger Publishers, 1979
- Craypo, Charles, The economics of Collective Bargaining ; Case Studies in the Private Sector, The Bureau of National Affairs, inc., 1986
- Deaton, R. D. and Beaumont, B. P., "The Determinants of Bargaining Structure : Some Large Scale Survey Evidence For Britain," British Journal of Industrial Relations, Vol. 18, No. 2, July 1980
- Estey, Marten, The Unions : Structures, Development, and Management, Harcourt Brace Jovanovich, Inc., 1981
- Farber Henry S., "The Determinatin of the Union Status of Workers," Econometrica, Vol.51, No.5, Sep.1983
- Freeman, Richard B., "Contraction and Expansion : The Divergence of Private Sector and Public Sector Unionism in the United States," The Journal of Economic Perspectives, Vol.2, No.2, Spring 1988
-, "the Effect of the Union Wage Differential on Management Opposition and Union Organizing Success," American Economic Review, Vol.76, No.2. May 1986
- Freeman, Richard B. and James L. Medoff, What Do Union Do ?, Basic

- Books, New York, 1984
-, "New Estimates of Private Sector Unionism in the United States," Industrial and Labor Relations Review, Vol.32, No.2 1979
- Gorman, Robert. A., Basic Text on Labor Law ; Unionization and Collective Bargaining, St Paul, West Publishing Co., 1976
- Hartman, T. P. and Franke, W. H., "The Changing Bargaining Structure in construction : Wide-Area and Multicraft Bargaining" Industrial and Labor Relations Review, Vol.33, No.2, Jan. 1980
- Heckman, James J., "The Common Structure of Statistical Models of Truncation, sample selection and Limited Dependent Variables and a Simple Estimator of Such Models," Annals of Economic and Social Management, Vol.5, No.4, Fall 1976
- Hendricks, H. E. and Kahn, M. L., "The Determinants of Bargaining Structure in U.S. Manufacturing Industry" Industrial and Labor Relations Review, Vol. 35, No.2, Jan. 1982
- Hills, Stephen M., "The Attitudes of Union and Nonunion Male Workers Toward Union Representation," Industrial and Labor Relations Review, Vol.38, No.2, Jan. 1985
- Hirsch, Barry T. and John T. Addison, The Economic Analysis of Unions : New Approaches and Evidence, Allen and Urwin Inc., 1986
- Hirsch, Barry T. and Mark C. Berger, "Union Membership Determination and Industry Characteristics," Southern Economic Journal, Vol. 50, No.3 Jan. 1984
- Hirsch, Barry T. and Connolly Robert A., "Do Unions Capture Monopoly Profits ?," Industrial and Labor Relations Review, Vol.41, No.1 Oct.1987
- Janus, J. Charles "Union Mergers in the 1970's : a Look at the Reasons and Results", Monthly Labor Review, Oct. 1987
- Kochan, Thomas A., Collective Bargaining and Industrial Relations, Richard D. Irwin Inc., 1980
- Kochan, thomas A., "How American Workers View Labor Unions," Monthly Labor Review, Vol.102, No.4, Jan.1979
- Kochan, Thomas A. and Block, N.R., "An Interindustry Analysis of Bargaining Outcomes : Preliminary Evidence from Two-Digit Industries" Quarterly Journal of Economics, Vol. 91, Aug. 1977

- Lee, Lung-Fei, "Unionism and Wage Rates : A Simultaneous Equations Model With Qualitative and Limited Dependent Variables", International Economic Review, Vol. 19, No.2, June 1978
- Lewis, H. Gregg, Union Relative Wage Effects : A survey University of Chicago Press, Chicago, 1986
- Linneman, Peter and Michell L. Wachter, "Rising Union Premiums and the Declining Boundaries Among Noncompeting Groups," American Economic Review, Vol.76, No.2, May 1985
- MaCurdy, Thomas and John H. Pencavel, "Testing Between Competing Models of Wages and Employment Determination in Unionized Markets," Journal of Political Economy , Vol.94, No.3, Part 2, June 1986
- Maddala, G. S., Limited-Dependent and Qualitative Variables in Econometrics, Cambridge Cambridge University Press, 1983
- Maranto, L. C. and Fiorito J., "The Effect of Union Characteristics on the Outcome of NLRB Certification Elections", Industrial and Labor Relations Review, Vol.40, No.2, Oct. 1987
- Mellow, Wesley, "Unionism and Wages : A Longitudinal Analysis," Review of Economics and Studies, Vol. 63, No.1, Seb. 1981
- Mishel, L., "The Structnrnal Determinants of Union Bargaining Power." Industrial and Labor Relations Review, Vol.40, No.1, Oct.1986
- Parsons, Donald O., "Models of Labor Market Turnover : A Theoretical and Empirical Survey," Research in Labor Economics, Vol.1, 1977
- Parsons, Donald O., "The Distribution of Worker Rents in Union and Strategically Unorganized Worker Places", Mimeo, 1988
- Podgursky, Michael, "Unions, Establishment Size, and Inter-Industry Threat Effects," Industrial and Labor Relations Review, Vol.39, No.2, Jan. 1986
- Reder, Melvin W., "The Rise and Fall of Unions : The Public Sector and the Private," The Journal of Economic Perspectives, Vol.2, No.2, Spring. 1988
- Robinson, Chris, "The Joint Determination of Union Status and Union Wage Effects : Some Tests of Alternative Models," Journal of Political Economy, Vol.97, No.3, June 1989
- Schmidt, Peter and Robert P. Strauss, "The Prediction of Occupation Using multiple Logit Models," International Economic Review, Vol.16, No.2, June 1975

- Thompson, Earl A., "On Labor's Right to Strike," Economic Inquiry, Vol. 18, No.4, Oct. 1980
- Troy, Leo and Neil Sheflin, Union Sourcebook : Membership, Structure, Finance, Directory, Published by Industrial Relations Data and Information, R.R. Donnelley and Sons Co. 1985
- U.S. Department of Labor, Bureau of Census, Statistical Abstract of the United States, various years
- U.S. Department of Labor, Bureau of Labor Statistics, Directory of National Unions and Employee Associations, Various editions
- Voos, Paula B., "Trends in Union Organizing Expenditures, 1953-1977," Industrial and Labor Relations Review, Vol.38, No.1, Oct.1984
- Weiss, Leonard, "Concentration and Labor Earnings", American Economic Review, Mar. 1966
- Welch, Stephen W., "Union-Nonunion Construction Wage Differentials," Industrial Relations, Vol.19, No.2, Spring 1980
- Windmuller, P. John "Concentration Trends in Union Structure : An International Comparison", Industrial and Labor Relations Review, Vol.35 No.1, Oct. 1981