Faculty Working Papers

THE EFFECT OF MARKET STRUCTURE ON UNION

WAGE LEVELS IN U.S. MANUFACTURING

Wallace Hendricks

#152

College of Commerce and Business Administration
University of Illinois at Urbana-Champaign

THE EFFECT OF MARKET STRUCTURE ON UNION

WAGE LEVELS IN U.S. MANUFACTURING

Wallace Hendricks

#152

THE EFFECT OF MARKET STRUCTURE ON UNION

WAGE LEVELS IN U.S. MANUFACTURING

Wallace Hendricks[*]

Theoretical work on the factors which affect union power over wage levels has stressed various aspects of both labor and product market structure.[1] The emphasis in labor market literature has been on the degree of unionization, the technical structure of the market (bargaining structure), and local labor market structure. Empirical investigations of resulting hypotheses, however, have tended to focus on only one of the dimensions of this structure: the degree of unionization. The studies have found that the effects of unionism on the relative wages of union labor differ substantially from one union jurisdiction to another. The evidence which these studies provide on the factors which account for this variation is quite inconclusive. Virtually no empirical work has been done on the impact of bargaining structure or local labor market structure on union wage levels. Tests of product market structure hypotheses have usually used the "concentration ratio" as the important explanatory variable.[2] However, most data for these tests have been on both union and nonunion wages. The difficulties encountered due to the "threat" effect in these studies make it almost impossible to determine the role concentration plays in the determination of union power over the wage levels of <u>union members</u>.

To develop any comprehensive public policy towards unions it is necessary to evaluate how union power is related to these various aspects of structure. Our policy towards centralized bargaining, for example, may well rest on its influence on the power relationship between unions and management. Does centralized bargaining increase the monopoly effects of unions? What role does product market structure play?

This paper uses new disaggregated data on union wage levels in 450 firms in U.S. manufacturing to look at the effects of both labor and product market structure. It is divided into five parts. Part I reviews the arguments which have been presented for the connection between both labor and product market structures and the level of union wages and the resulting hypotheses. Part II describes the data; Part III presents the empirical results for the local labor market sub-sample; Part IV summarizes the results for the entire sample. Part V gives some conclusions.

I. Theoretical Arguments

The structure of bargaining should have an important role in the setting of wages because it affects the costs of a strike and the cost of settlement to the firm as well as the cost of the strike to the union.[3] The firm might be a "tough" bargainer if the costs of a potential strike are small or if the costs of settlement at a high wage are large. For example, losses of customer "goodwill" as well as loss of profits will be considerably smaller if the firm can keep producing in other plants while a single plant is on strike. There will be less incentive for the firm to settle for a high wage. On the other hand, if the union can guarantee that a wage level will be matched by competing firms (take wages "out of competition"), the firm will not be at a competitive disadvantage in allowing an increase and will have less incentive to "take a strike". On the union side, the bargaining unit may partially determine the cost of the strike to individual members through its role in establishing strike benefits. If only a portion of the membership go out on strike, the other union members can help alleviate the cost of the strike by paying into a strike fund. Thus, union bargaining power may differ under different bargaining structures.

There are several different types of structure in collective bargaining. In this paper it is assumed that the bargainer on the labor side is a national union.[4] On the management side, the bargaining may be for a single plant, several plants (perhaps a single firm), or several employers (either industry-wide--national--or with a local employer association). Using these categories there are thus four possible bargaining units. Each structure will affect union power in different ways.

If the unit of bargaining is a single plant of a multi-plant firm, it is commonly assumed that the union is at a disadvantage. Plant managers generally do not have the power to make the final decision on wages. The union thus cannot bargain directly with the person in power. Multi-plant firms can also shift production from one plant to another if a strike occurs in only one plant ("whipsaw" the union).

The outcome of multi-plant or company bargaining will depend in part on the sizes of the bargainers. A multi-plant firm bargaining with a national union will generally be in a relatively weaker position than if it were dealing with a plant union. The firm may not have the threat of "whipsawing" the union and the large national union will probably have more "staying power" than a small local. Union power to bargain over wages will be high. Very large firms bargaining with national unions will not be in a weak position as far as the cost of a strike, but there will be less incentive for them to fear a high wage if they are oligopolists in the product market.[5]

The union's power is maximized in the case where the unit of bargaining is multi-employer in a local market. Even though employer associations have grown up in response to union power, it is not unusual for unions to actually encourage their growth.[6] Associations are not

usually organized simply for the purpose of presenting a united front to
the union. They also serve the function of providing information to indi-
vidual members on product and labor market conditions. It is possible
that this increased information will allow departures from competitive
pricing in the product market. Individual firms will also not have to
worry about other firms paying lower wages. Thus, if the union organizes
the entire local market, it is in the same position dealing with an employer
association as with individual companies in highly concentrated industry.

On the other hand, if the unit of bargaining is industry-wide
on the national level, the union is probably at a disadvantage. It is much
more difficult for them to keep the entire market organized on the national
level than on the local. The union must contend therefore with nonunion
entry and low wage firms. "Whipsawing" tactics are also eliminated. While
firms on the national level may find it difficult to bargain together,
the union will also find it difficult to satisfy a working majority of all
its members, who are probably experiencing very different working conditions.
To the extent that this heterogeneous make-up requires the union to allocate
bargaining power to local supplemental agreements there will be less power
available to bargain over national wage levels.

Local labor market structure will be important in union power due
to the probable "spill-over" effect of the degree of unionization in all
industries in the area of negotiations of an individual industry. Unionized
firms in the local market will have a difficult time resisting wage
increases if other unionized firms in the same area have granted these
increases, even if the firms are in different industries. The strong
drive of employers to keep their place in the local wage hierarchy tends
to reinforce increases in union "militancy."[7] This effect should be

especially important for competitive industries which bargain on the local
level.

Product Market Structure

There have been many suggestions in the literature that wages
in noncompetitive industries are higher than those in competitive industries.[8]
These arguments indicate that both union power and the threat of unionization
are correlated with market structure. There are thus two separate questions:

1) What is the effect of market structure on the wage levels
   of union members? (through increasing union power)

2) What is the effect of market structure on the wage levels of
   non-union workers? (through a threat effect)

The main empirical tests of the market structure hypothesis have tended
to focus on the wage levels of both union and nonunion members, and have
been unable to answer the first question directly.

There are basically two types of arguments for union wages being
higher in noncompetitive industry. The first is that certain factors which
are associated with noncompetitive industry (such as large establishments,
close public scrutiny, different working conditions and rare nonunion entry)
make noncompetitive industry easier to unionize. The assumption is that
higher degrees of unionization increase union power. The second argument
is that union power is increased due to the pricing behavior in noncompetitive
industries. In most of the "mature" oligopolies in the United States
prices tend to be stable except in response to change by the price leader.
Thus prices have been effectively taken out of competition. If firms are
able to keep prices above marginal cost, monopoly rents will accrue. Both
these features of a small number of sellers enhance the firms "ability to
pay" higher wages. If price changes are uniform, an increase in factor

costs may be simply offset by price increases as long as the firm believes other firms will be facing similar union demands and will react in the same way. In this case, if product demand is fairly inelastic, a large wage increase may mean only a small drop in profits.

If we hold the degree of unionization constant and look only at the wages of union members, the independent effect of market structure on wage levels should reflect the degree to which this differing price behavior enhances union power.

Of course, this effect may not be entirely independent on the degree of unionization. In the case where the firm is in a perfectly competitive industry, the elasticity of demand is infinite and the firm can make no compensating price changes to help offset any wage change. A higher wage imposed on a single firm would therefore drive it out of business (assuming it was making the competitive rate of return). Thus, the union would seem to be in an impossible position in an industry which is highly competitive and has a low degree of unionization. The union employer cannot afford any wage increases in excess of that paid by non-union companies (the "competitive" wage). However, if the union can impose wage increases on virtually all members of the industry, it is, in effect, bargaining with the industry rather than with the individual firm. As the wage increases, supply will decrease and price will rise. The loss to individual firms therefore will depend on the industry elasticity of demand which enables them to grant wage increases.

A firm in an oligopolistic industry is probably somewhere between the case of the competitive firm and the monopolistic firm. The firm's ability to alter price in response to a wage change will depend on its ability to coordinate its pricing with rivals and its ability to differentiate

its own product from that of others (the firm elasticity of demand). If the union is able to coordinate wage changes between firms, then it is relatively easy for the firms to coordinate price changes. On the other hand, if the union is weak in an oligopolistic industry, the increased "staying power" of large firms might shift the bargaining advantage in favor of the firms and cause lower levels of wages.

These arguments suggest that the interaction between unionism and concentration may be fairly complex. While low unionism plus low concentration should yield low wages, high unionism plus low concentration might yield high wages. On the other hand, high concentration plus low unionism may have a negative effect on wages since the firms are so much stronger than the unions.

Concentration in the product market may simply be a proxy for two other characteristics of the industry which have been associated with union power: the proportion of labor costs in total costs (with which it is negatively correlated) and the size of the firm (with which it is positively correlated). These two characteristics are also included in the analysis.

Hypotheses

The preceding discussion has indicated several elements of market structure which should have an effect on union power over wage levels. While the reduced form of the model may include interactions between unionism and concentration, a linear version of the model will be given as a first approximation.

Specifically:

$$W_j^i = a_{jo}^i + b_{j1}^i EU1 + b_{j2}^i BU2 + b_{j3}^i BU3 + b_{j4}^i LC/TC$$
$$+ b_{j5}^i CR + b_{j6}^i U + b_{j7}^i SIZE + b_{j8}^i UALL + b_{j9}^i COMPWG + e_j^i$$

where W$\frac{i}{j}$=wages in ith occupation and jth firm

BU$_1$=dummy variable for plant bargaining unit of multi-plant firm. Each plant is assigned one of four bargaining units: plant, firm, multi-employer (local) or multi-employer (national). The designation is based on the level at which wage negotiations take place if the firm bargains in a firm-wide unit on some issues, but on a single-plant basis on others.

BU$_2$=dummy variable for industry wide bargaining unit

BU$_3$=dummy variable for local multi-employer bargaining unit

LC/TC=proportion of labor costs in total costs

CR=industry concentration ratio. CCR= corrected concentration ratio

U=unionism in industry. UREG= corrected unionism in industry

SIZE= size of the firm measured by the log of the total number of employees for the parent firm of the plant

UALL=unionism in all industry in the area

COMPWG=index of the competitive wage level in the area measured by the average wage of "office boys" in the SMSA.

The specific hypotheses to test are:

(1) <u>The bargaining unit has an independent effect on the level of wages</u> (The comparison unit is the FIRM wide bargaining unit) If management has been able to use its "whipsawing" power in plant negotiations, b$_1$ should be less than zero The coefficient on the local employer bargaining unit (b$_3$) should be greater than zero, while the coefficient on industry-wide bargaining (b$_2$) should be less than zero.

(2) <u>The level of concentration in the product market and unionization in the labor market have a possitive effect on the level of wages</u> (b$_5$>0, b$_6$>0).

(3) <u>The size of the firm is positively correlated with the wage level</u> (b$_7$>0).

(4) <u>Local labor market structure in the form of the degree of unionization in the area (UALL) and the height of the local competitive wage (COMPWG) has an effect on the level of wages</u> (b$_8$>0, b$_9$>0). If the market is dominated by

competitive forces the main explanation of wage differentials for identical occupations should be differences in the local competive wage. If "spillover" effects are an important determinant of wages, the degree of unionization in all industries in the area may tend to dominate the effect of the competitive wage on wages of union members.

II. The Data

The dependent variable in this study is the wage rate for a specific occupation (e.g. janitor) reported for a specific plant of an individual firm. Most of the data were collected from two primary sources: union contracts on file with the U.S. Bureau of Labor Statistics and questionnaires to individual firms. The U.S.B.L.S. has contracts on file for most bargaining units covering one thousand or more workers ("key" contracts) and a larger number of contracts for units covering less than one thousand workers. All "key contracts" in the selected industries were checked for wage data. "Non-key" contracts were checked in industries with smaller bargaining units. Questionnaires to individual firms were a major source when union contracts did not include data on wage levels, (for example in rubber tires).[9] Whenever possible the data were collected from two points in time: November, 1970 and November, 1971. The wage rate used is wages per hour including any cost-of-living allowance.[10] The final sample represents data from 450 firms in 47 different industries.[11]

Each plant is assigned the structural characteristics of the industry to which it is assigned. In almost all cases plants were assigned to four-digit industries using the Bureau of Labor Statistics listings of union contracts. Thus, while only one plant for a given firm in a given product line is used, the firm might have several observations if it produces products in several different industries. For example,

United States Steel has three observations: one in basic steel, one in cement, and one in steel fabrication.

Three industry characteristics are used: proportion of labor costs in total costs, concentration in the product market and degree of unionization. Following the technique used by Leonard Weiss,[12] the concentration ratios for industries operating in a national market have been corrected when necessary for the inclusion of noncompeting sub-products. Plants operating in industries which were considered to have regional or local markets are assigned the appropriate regional or local concentration figure. For example, there are four recognized markets in the petroleum industry: The West, the Gulf States, the East Coast, and the Midwest. Observations on wages from Standard Oil of California are assigned a concentration ratio for the West Coast, while observations on wages from Standard Oil of New Jersey are assigned a concentration ratio for the East Coast. This technique is also used for estimates of unionization. Whenever possible, plants in regional industries are assigned regional unionization figures.[13]

Data are available for those plants in certain Standard Metropolitan Statistical Areas (SMSAs) on the degree of unionization in all industry and wage rates for specific occupations. These plants are used in the test of the local labor market hypothesis. Since these data were not available for other areas, a "South" and a "rural" dummy are added to try to hold local labor market conditions constant in the larger sample.

Regressions are computed for all nine occupations (janitor, laborer, truck driver, fork lift driver, painter, carpenter, machinists, mechanic and electrician) in the full sample, but only for janitor and laborer in the smaller local labor market sub-sample (due to data limitations).

III. Local Labor Market Sub-sample

Table 1 gives results of 6 regressions run on the sub-sample of
observations of firms in the 39 SMSAs with local data. Regression 1 and
regression 2 show the results with the competitive wage variable (COMPWG) but
without the union structure variable (UALL) for adjusted janitors' wages
and adjusted laborers' wages, [14] respectively. In both cases COMPWG is
significant at the 5% level of confidence. Regressions 3 and 4 include both
the COMPWG variable and the UALL variable. The inclusion of UALL causes the
significance of COMPWG to fall so that it is not significant in either
equation. UALL is highly significant in both regressions.

It is quite possible that the local competitive wage has little
effect on local union wages. In a highly unionized area like San Francisco
it is not likely that the small nonunion sector has much effect on the
opportunity wage of union members. However, the wage series used as a proxy
for the competitive wage is not very good. Area wage surveys are done at
different points in time so that linear extrapolations have to be made.
Also, the data do not seem very accurate due to small sample sizes and
collection technique. In some areas wages actually fell from one year to
the next. Since it is not likely that wages fell in any given firm, it must
be assumed that the reason for this finding is the chosen sample. The
unionization figures are probably much more reliable.

Since local labor market characteristics are significant in
explaining different levels of wages, some method of describing these
characteristics with variables available for the whole sample is necessary.
Regression 5 shows the results for the sub-sample with a SOUTH dummy
variable in place of the COMPWG and UALL variables for purposes of

comparison. The SOUTH dummy does better than the COMPWG variable in regression 1. However, the UALL variable is still highly significant when all three variables are included in the same regression (regression 6). Although it is clear that the UALL variable is the best proxy for local conditions among the three chosen variables, there is no data for unionism in non-metropolitan areas. Since the SOUTH dummy does almost as well, it will be used along with a dummy variable for non-metropolitan areas (RURAL) to test the other hypotheses on the entire sample. Together these two variables will be used to hold local conditions constant in the larger sample which includes metropolitan areas outside the 39 SMSAs in the sub-sample as well as observations in rural areas.

IV. Results for the Entire Sample

Tables 2 through 4 give the results of regressions run for the entire sample. Three regressions were run for each of the nine occupations using each wage variable (1970 wages, 1971 wages and adjusted wages). For most occupations the choice of wage variables does not alter the results. The significance of the explanatory variables varies little among wage variables. Therefore, the regression results for 1970 are tabulated for convenience in reporting the results of all nine occupations.

Tables 3 and 4 are a summary of a significance of coefficients on each of the variables tested. Table 3 gives a summary for 1970 wages for the entire sample. The figures show that the concentration variable is significant with the hypothesized sign (+) in three of the nine occupations, is insignificant with the hypothesized sign in five of the nine occupations, and is insignificant with the wrong sign in one occupation. Table 4 gives

Table 1

Tests of Local Labor Market Hypotheses

	Janitors 1	Laborers 2	Janitors 3	Laborers 4	Janitors 5	Janitors 6
UREG	6.96**	5.63**	5.40**	4.20**	5.77**	5.08**
	(1.47)	(1.43)	(1.44)	(1.47)	(1.46)	(1.44)
LC/TC	-15.4**	-13.1**	-14.9**	-12.1**	-15.0**	-13.9**
	(2.5)	(2.4)	(2.4)	(2.4)	(2.4)	(2.3)
CCR	1.94	4.64**	2.45*	4.65**	2.87**	2.84**
	(1.24)	(1.26)	(1.18)	(1.23)	(1.23)	(1.20)
BU1	-194.4*	-202.3**	-221.8**	-244.6**	-214.1**	-222.4**
	(78.9)	(73.7)	(75.2)	(73.2)	(75.1)	*74.7)
BU2	-380.2**	-441.9**	-353.0**	-434.9**	-474.9**	-396.3**
	(119.0)	(108.6)	(113.1)	(105.9)	(111.1)	(115.2)
BU3	140.0	240.9*	128.0	161.5	82.3	23.1
	(103.4)	(98.4)	(101.1)	(99.5)	(99.4)	(100.6)
SIZE	72.9**	77.1**	70.0**	81.7**	72.5**	69.8**
	(15.1)	(15.2)	(14.4)	(14.9)	(14.6)	(14.3)
COMPWG	4.94*	4.48*	2.45	3.60	-----	.105
	(2.00)	(1.94)	(1.29)	(1.92)		(.213)
UALL	-----	-----	9.40**	7.17**	-----	7.72**
			(2.06)	(2.37)		(2.27)
SOUTH	-----	-----	-----	-----	-385.6**	-193.0
					(42.3)	(111.1)
C	1396.9	1394.7	1367.4	1147.9	2678.9	1882.9
R^2	.441	.5292	.4995	.555	.474	.508
N	187	166	187	166	187	187
$\overline{R}^2$	.416	.505	.474	.529	.453	.480

**significantly different than zero at 1% level.
 * significantly different than zero at 5% level.
In each case, the wage variable is the adjusted janitor or
laborer wage (multiplied by 1000 for convenience).

a comparison of the significance of coefficients for two groups of occupations: the unskilled and the skilled. The figures show that the concentration variable is significant in both unskilled occupations, but is significant in only one of five skilled occupations. (Truck driver and fork lift driver are not included in either category.)

It is important that skill level be held constant when comparing wage levels. The occupations which best fit this criterion in the sample are the two unskilled occupations: janitor and laborer. Thus, the explanatory variables used should perform best in the "unskilled" regressions. A casual glance at Table 4 indicates that the significance of many of the variables varies considerably between the skilled and unskilled occupations. All variables in the unskilled regressions except two of the bargaining unit dummies are significant at the 1% level of confidence. Only size, proportion of labor costs in total costs, and unionism are significant in more than two of the five skilled occupations. Any conclusions which might be drawn about the differential impact of the explanatory variables by occupation must be taken with this problem in mind. It is almost impossible to determine if the insignificant results for some occupations are due to difficulties in measuring the wage variable, or to problems with the sample, or if they are supportive of the null hypothesis.

Bargaining Unit Variables

The results of tests of the bargaining unit hypothesis vary by types of unit. The single plant dummy does not perform well. For 1970 wages it is significant in only one of nine occupations and has the wrong

TABLE 2

Regression Results for Janitors and Laborers

	Janitor's Wages: Entire Sample			Laborer's Wages: Entire Sample		
	7	8	9	10	11	12
	ADJW	WJ70	WJ71	ADLW	WL70	WL71
UREG	6.75**	7.08**	7.48*	6.28**	6.14**	6.59**
	(1.19)	(1.01)	(1.23)	(1.24)	(1.11)	(1.31)
LC/TC	- 16.0**	- 14.2**	- 17.0**	- 14.2**	- 12.9**	- 14.4**
	(2.1)	(1.8)	(2.2)	(2.1)	(2.0)	(2.2)
CCR	3.57**	2.97**	3.35**	3.57**	3.23**	3.56**
	(.95)	(.85)	(1.00)	(1.02)	(.94)	(1.07)
BU1	- 63.4	- 40.2	- 65.4	- 85.7	- 67.1	- 87.0
	(60.3)	(53.7)	(63.6)	(65.1)	(59.6)	(68.7)
BU2	-356.9**	-406.5**	-272.6*	-413.2**	-419.7**	-321.3**
	(108.2)	(96.6)	(114.4)	(107.7)	(99.4)	(114.4)
BU3	159.6	121.6	150.7	180.2*	107.5	181.2*
	(81.5)	(71.6)	(85.7)	(87.1)	(73.4)	(92.3)
SIZE	62.4**	53.9**	66.1**	68.1**	61.1**	68.8**
	(12.1)	(10.5)	(12.8)	(13.2)	(11.8)	(13.9)
SOUTH	-359.3**	-329.5**	-376.1**	-389.1**	-374.3**	-409.0**
	(62.3)	(56.1)	(65.5)	(63.7)	(58.8)	(67.5)
RURAL	-222.3**	-170.5**	-227.3**	-215.0**	-154.7**	-210.1**
	(50.0)	(43.5)	(51.8)	(53.5)	(48.9)	(56.2)
C	2543.2	2409.2	2601.5	2543.3	2416.1	2617.3
DIFF+	516.5**	528.1**	423.3**	593.4**	527.2**	402.4**
	(116)	(102)	(122)	(117)	(107)	(123)
R^2	.446	.449	.438	.487	.469	.465
N	326	364	332	281	313	285
$\bar{R}^2$	.431	.435	.433	.470	.463	.447

** significantly different than zero at 1% level
 * significantly different than zero at 5% level
 + DIFF = b_3 - b_2. Test of DIFF greater than zero is
                equivalent to test $b_3 > b_2$.
Standard errors are in parentheses. Wage variables have been multiplied by 1000
for convenience.

TABLE 3

Summary of Significance of Coefficients

for All Nine Occupations

1970 Wages

| | Significant with Correct Sign** | Value of Insignificant Sign | |
		+	−
UREG	8	1*	0
LC/TC	9	0	0*
CCR	3	5*	1
BU1	1	4	4*
BU2	3	2	4*
BU3	2	6*	1
SIZE	9	0*	0
SOUTH	6	0	3*
RURAL	3	1	5*
DIFF	5	4*	0

* hypothesized sign
** significantly different than zero at 5% level or better

TABLE 4

Comparison of Significance of Coefficients for

Two "Unskilled" and Five "Skilled" Occupations

| | Significant with Correct Sign** | | Insignificant Sign | | | |
| | | | Unskilled | | Skilled | |
	Unskilled	Skilled	+	−	+	−
UREG	2	4	0*	0	1*	0
LC/TC	2	5	0	0*	0	0*
CCR	2	1	0*	0	3*	1
BU1	0	1	0	2*	2*	2
BU2	2	1	0	0*	1	3*
BU3	0	1	2*	0	3*	1
SIZE	2	5	0*	0	0*	0
SOUTH	2	2	0	0*	0	3*
RURAL	2	1	0	0*	1	2*
DIFF	2	2	0*	0	3*	0

*   hypothesized sign
** significantly different than zero at 5% level or better

The "unskilled" occupations are laborer and janitor. The "skilled" occupations are carpenter, painter, electrician mechanic, and machinist.

sign in four of the nine occupations. This is a somewhat surprising
result since a great deal of emphasis in the literature on union power
is on the difference between firm-wide and single-plant bargaining.
However, there are two factors which may offset this increased management
power. As bargaining units become more fractionalized it is likely
that individuals within unions will have more voice in union policy.
While union leaders realize that high wages will mean decreased employ-
ment, each individual member will only take employment effects into
account if there are definite threats to the viability of the firm or
employing unit. Thus, the net gain of taking a strike to each
individual will appear to be simply the increase in wages minus the
cost of the strike, while the net gain to union leaders will also take
employment effects into consideration. Even if the firm substitutes
capital for union labor in the long run, existing union members will
probably not lose their jobs (particularly under seniority systems). Any
cuts in the labor force will occur through attrition. Union leaders,
on the other hand, will have incentives to keep the membership large in
order to increase their own power or because they have a concern for all
workers. The conflict in union wage policy between maximizing wages and
maximizing the wage bill results from these different incentives. These
different incentives as well as more imperfect knowledge by the rank
and file of management's position may lead to higher wage demands and
more strikes than would be optimal strategy for union leaders. Thus,
increased union militancy on wage demands may tend to offset any loss of
power. It might also be true that in some industries (for example, petroleum

or chemicals) management pays high wages in single plant units in order
to ease union pressure for firm-wide bargaining. This might be the case
if management feels that it has better control over productivity at the
plant level. The important downward pressure on union wages would not
come from "poorly organized locals" but from the nonunion element in
the industry. Once unionism in the industry is held constant, these
countervailing tendencies may offset each other and produce no substantial
difference in the level of wages between single-plant and firm-wide units.

The coefficient on the industry-wide bargaining unit variable
suggests that union ability to "whipsaw" firms is a fairly strong
determinant of wage levels. The coefficient is negative in seven of the
nine occupations. In both unskilled occupations it is significant at the
1% level. A second explanation of the negative coefficient is suggested
by the negative coefficient on the labor cost variable. It is possible
that industry-wide collective bargaining prevents unions from taking
advantage of the opportunities offered by the low labor cost dominant firm.[15]
In either case, this finding tends to dispute the contention that the
monopoly effects of unions on the labor market are increased by the practice
of industry-wide bargaining. Firms in industry-wide bargaining units pay
lower wages ceteris paribus than firms in either firm-wide or plant units,
and the employment effects should be less.

The coefficient on the local multi-employer bargaining unit is
hypothesized to be positive and greater than the coefficient on the
industry-wide bargaining unit dummy. The coefficient is positive in
eight of the nine occupations (positively significant in two) and is

greater than the industry-wide dummy in all nine occupations. (The difference is significant in five of the nine.) Unions apparently do have considerably more power in local associations than in national associations. The results of the comparison of local association with firm-wide unit are not as strong but are still consistent with the maintained hypothesis.

Unionism and Concentration

The unionism coefficient is positive for all nine occupations and significant for eight of the nine. Union members' wages are increased by increasing the degree of unionization in the industry. Increasing the value of unionism from 20% to 80% would increase the wages of a union member between 6% and 20% depending on his occupation (the largest increase would be in the unskilled; the smallest in the skilled).[16]

The concentration coefficient is positive for eight of the nine occupations. It is significant for both unskilled occupations, but insignificant for four of the five skilled occupations for 1970 wages.[17] In all cases the coefficient is significantly smaller than the coefficient on unionism. Bain has suggested a value of 70% as a demarcation of a highly concentrated industry. The effect of moving from a low value of 20% to 70% would be approximately a 3% increase in 1970 janitors' wages. Thus, the independent effect of concentration on wage levels appears to be small.

Size of the Firm

The coefficient on the size of the firm variable is positive and significant for all nine occupations. It may be that large firms have different work environments so they must pay higher wages. They may have

more expertise in hiring and selecting workers who have higher skill
levels. It is also possible that large firms are inefficient profit
maximizers.

The work on plant size and wages indicates that there is a
positive correlation between the two. However, the firm size has not been
taken into account. It is possible that the correlation of plant size and
wages is due to the correlation between plant size and size of the firm.
For those firms in the sample where plant size is available, it appears
that large firms pay high wages for all plant sizes. Also, small firms
do not appear to pay higher wages in their large plants than in their
small plants. This casual empiricism would suggest that size of the firm
and not plant size is the important explanatory variable. If it is
assumed that work environment varies with plant size, then it would appear
that the "environment explanation" is probably not correct. However,
it is still possible that large firms hire more skilled workers or use
slightly different production techniques.

Interaction Between Unionism and Concentration

In order to test the hypothesis that unionism and concentration
enter the reduced form in a non-linear form, a second specification is
used in regression 13 which includes several interaction dummies. Some
researchers have postulated models where unionism and concentration
were hypothesized to have effects independent of their interaction.[18]
Thus, the data are fit to regressions with unionism, concentration and
the interaction term as independent variables. In all cases the sign
on the interaction term is negative. As was noted above, the interaction
between unionism and concentration may be more complex than this specification.

There is no a priori reason for believing that moderate concentration plus low unionism will yield the same effect as low concentration plus moderate unionism. More important, the interaction term may predict incorrectly for at least two categories--high unionism plus low concentration and low unionism plus high concentration. In order to allow for these differences in the effect of the interaction of unionism and concentration, dummy variables are used for different categories. The following definitions are used:

Low Concentration (LC):	CCR $<$ 40%;
Moderate Concentration (MC):	40% $\leq$ CCR $\leq$ 70%;
High Concentration (HC):	CCR $>$ 70%;
Low Unionism (LU):	UREG $\leq$ 50%;
Moderate Unionism (MU):	50% $<$ UREG $<$ 80%;
High Unionism (HU):	UREG $\geq$ 80%.

Thus, there are nine interaction dummies: low unionism-low concentration (LULC), low unionism-moderate concentration (LUMC), etc. Regression 13 gives the results for this model. The excluded category is low unionism-low concentration. With the exception of the low unionism-moderate concentration dummy (LUMC) which is essentially zero, all the dummies have a negative sign and five of the eight are significant at the 5% level (or higher). The joint F-test of the eight interaction variables also shows that they are significant at the 1% level.

Of course, it is wrong to assume that the net effect of the interaction of unionism and concentration is negative. The net effects of each of the concentration-unionism classifications are given in the table below:[19]

TABLE 5
UNIONISM

		Low	Moderate	High
C O N C E N T	Low	0	39	235
	Moderate	158	378	364
	High	-181	242	468

The low unionism-high concentration category has a negative (although in-significant) effect on wage level. This suggests that poorly organized unions are at a disadvantage in dealing with firms in highly concentrated industry. In fact, it appears that employers in highly concentrated industry do very well when bargaining with unions which have not been able to organize much of the labor force. The large interdependence of these firms combined with a fairly large nonunion sector holds wage rates down. However, the reverse hypothesis does not seem to be born out by the data. The high unionism-low concentration (HULC) net effect is not significantly larger than the coefficients for moderate unionism or high unionism for other concentration categories.

Although the combination of a few small firms and high unionization might lead to a high level of wages, a large number of firms with high unionization does not.

In all but one case, as unionism increases within a concentration class, wages increase. On the other hand, increasing concentration unambig-uously increases wages only in the high unionism class. In the low and moderate unionism classes, increasing concentration has a positive effect

.

TABLE 6

Interaction Between Unionism and Concentration
1970 Janitor's Wages

	13
UREG	11.1** (2.6)
LC/TC	- 13.9** (1.8)
CCR	4.4* (2.2)
BU1	- 22.4 (53.9)
BU2	-407.6** (95.9)
BU3	181.3* (72.7)
SIZE	52.2** (10.6)
SOUTH	-325.6** (55.7)
RURAL	-170.5** (45.0)
LUMC	5.2 (116.2)
LUHC	-442.3** (167.2)
MULC	-231.8* (115.6)
MUMC	- 89.6 (139.5)
MUHC	-357.7* (169.3)
HULC	-324.0* (156.3)
HUMC	-328.3* (160.3)

TABLE 6 (cont.)

HUHC	-320.0
	(185.5)
U^2	-----
CR^2	-----
C	2278.4
R^2	.479

*significantly different than zero at 5% level
**significantly different than zero at 1% level

moving from low to moderate concentration, but a negative effect moving from moderate to high concentration. It appears that unions have a difficult time increasing wages in highly competitive industries no matter what the level of unionism. However, oligopolistic structure combined with moderate levels of union strength is sufficient to raise wages. On the other hand, the effect of increasing concentration to very high levels depends on union strength. The union gains from very high levels of concentration only when the union itself is very strong. Thus, we are led to the conclusion that it is the relative strengths of the two bargainers, combined with constraints of market forces which are important for the setting of wage levels. Union power in highly competitive industries is constrained by market forces. Union power in oligopolies appears to depend on the relative positions of the union and firms in the industry.

Part V. Conclusions

This paper has focused on the structure of the labor market and the structure of the product market as determinants of the differences in wage levels of union members. On the labor market side, the degree of unionization in the industry and in the local area were both significant explanatory variables. The structure of collective bargaining in the form of the type of bargaining unit was also seen to play an important role. There was no significant difference between plant and firm-wide bargaining but industry-wide bargaining decreased union wage levels and local multi-employer bargaining increased them. Previous to this study, most of our knowledge about the effects of the bargaining unit have been based on "conventional wisdom." Without empirical evidence it has been very

difficult to evaluate arguments about the "appropriate bargaining unit"
or the monopoly effects of industry-wide bargaining. These findings
suggest that the employer's ability to "whipsaw" the union is either
not an important determinant of the union's power over wages or that it
is off-set by other factors. They also indicate that the monopoly
effects of unions are not increased by industry-wide bargaining. Rather,
we would contend that inflationary effects in the economy may well be
less in large multi-employer bargaining units than in small fractionalized
units. The results have strong implications for the argument over coalition
bargaining as well.[20]

On the product market side, the independent effect of concentration
on wage levels appears to be small. Moreover, the effect of concentration
on wages is highly dependent on the degree of unionization in the
industry. A high level of concentration was seen to have a negative effect
when the degree of unionization was low. Unions apparently gain from
oligopoly pricing at moderate levels of concentration, but subsequent
increases tend to increase wages only when the union is very strong. Thus,
union power over wage levels may be increased by product market structure
in many industries which are often not considered as "concentrated".

Finally, one should note the important effect of the size of the
firm on union wage levels. While the level of concentration in individual
industries does not appear to be increasing, the share of the top two
hundred firms in the economy has increased substantially. Although this
paper has focused on wage levels, the implications of the high correlation
of size and wages would seem to indicate that the growth of the large
corporation may lead to increasing potential for cost-push inflation.

FOOTNOTES

1. See for example E.R. Livernash, "The Relation of Power to the Structure and Process of Collective Bargaining," Journal of Law and Economics VI (Oct., 1963), pp. 10-40 and Martin Segal, "The Relation Between Union Wage Impact and Market Structure," Quarterly Journal of Economics, LXXVIII (Feb., 1964), pp. 96-114.

2. See Leonard Weiss, "Concentration and Labor Earnings," American Economic Review, LVI (March, 1966) pp. 96-117, and Sherwin Rosen, "Trade Union Power, Threat Effects and the Extent of Organization," Review of Economic Studies, 36 (April, 1969), pp. 185-196.

3. Livernash, loc.cit.

4. It was not possible to test the hypothesis that national unions have more (or less) bargaining power than local independent unions due to a lack of data on local unions. Essentially all unions in the sample were national.

5. See below page 5.

6. See Daniel M. Slate, "Trade Union Behavior and the Local Employers' Association," Industrial and Labor Relations Review, 10 (Oct.,1951) pp. 42-55.

7. Many local labor market studies have noted the high stability of the local wage hierarchy even though firms may be facing highly different product demand conditions. See Lloyd Reynolds, The Structure of Labor Markets (New York: Harper, 1957), pp. 155-169.

8. The best summary is in Segal loc.cit.

9. Of the 248 firms contacted, there were 149 usable replies.

10. If fringe benefits vary inversely with the wage, the data might exaggerate the true size of differentials in compensation. However, there is evidence that the actual relation is positive. In fact, the ratio of fringe benefits to earnings varies positively as well, indicating that the true differentials might be underestimated.

11. However, not all firms have data for all the occupations collected. Thus, while there are 364 firms with data on 1970 janitors' wages there are only 89 with data on 1970 mechanics' wages.

12. "Appendix to Concentration and Labor Earnings." Mimeographed. Available from Professor Weiss.

13. A description of the technique used in assigning concentration and unionism figures to specific industries as well as a detailed description of the sources used is available in an appendix from the author.

14. The "adjusted wage" is a linear combination of wages in 1970 and 1971. The formula is ADJW = (WJ71-WJ70)*(DATE/YEAR)+WJ70

    where DATE = number of days wage increase preceded 1/1/71

    YEAR = number of days from 1970 to 1971 increase (generally 365)

15. This might also be a reason why dominant firms sometimes avoid industry wide bargaining. See Lloyd Ulman, " Scotish Journal of Political Economy. (Forthcoming).

16. These results are consistant with those found by Weiss, and are inconsistant with the hypothesis that unionism has advantaged the skilled more than the unskilled. They suggest rather that industrial unions may have had a narrowing effect on occupational wage differentials.

17. When the same data were run using national concentration ratios for all industries (uncorrected for local and regional industries and aggregation problems) the concentration variable was insignificant for all occupations.

18. This technique was first used by H. Gregg Lewis in Unionism and Relative Wages in the U.S. (Chicago: University of Chicago Press, 1968), pp. 159-161 and 177-178; and Leonard Weiss, "Concentration and Labor Earnings," loc.cit. F.M. Scherer in Industrial Market Structure and Economic Performance. (Chicago: Rand McNally, 1971), pp. 300-301 has recalculated some of Lewis's work using the same specification. S. Rosen, loc.cit., had similar findings with several interaction terms.

19. The net figures were calculated by re-running regression 13 without the unionism (UREG) and concentration (CCR) variables thereby ascribing all the effects to the interaction terms. The given values are just the coefficients of the interaction terms in this regression.

20. Wallace Hendricks, "Some Empirical Results on the Question of Coalition Bargaining." Unpublished paper.