UNION WAGE PRACTICES AND WAGE DISPERSION WITHIN ESTABLISHMENTS

RICHARD B. FREEMAN*

This study analyzes establishment-level data primarily to examine the effect of unionism on the wage structure within establishments. The major finding is that within-establishment dispersion of wages is significantly narrower in unionized than in nonunionized establishments, a pattern the author attributes in large part to unions' wage practices, such as single rate or automatic-progression modes of wage payment as opposed to merit reviews and individual wage determination. The data also show that dispersion in average wages is narrower among organized plants, but by more modest amounts than the within-establishment differential. Overall, the evidence suggests a major role for explicit union wage policies in explaining the dispersion of wages within firms and in the economy as a whole.

ONE of the principal goals of trade union wage policies has been to reduce dispersion of wages through standard rate policies. These policies seek to obtain "equal pay for equal work" across establishments and to reduce "inequities" and differentials based on perceived personal characteristics rather than on specific job tasks. Recent work on dispersion of wages among union workers and among nonunion workers has suggested that these policies have produced markedly lower dispersion in the union sector.[1] Because of a paucity of data on establishments, as opposed to individuals, and on establishment wage practices, however, this work did not document the effect of unions on wage dispersion *within establishments,* nor did it show the link between wage practices favored by unions and dispersion.[2] As a result, the literature currently lacks any estimates of the impact of union wage policies on the wage structure within establishments.

The present paper seeks to remedy this gap in our knowledge by using data from the Bureau of Labor Statistics' Industry Wage Survey[3] on wages for workers within estab-

*The author is a professor of economics at Harvard University. He has benefited from the research assistance of John Ballen, Joyce Jacobsen, and Mark Hindal. This work was supported by a National Science Foundation grant and is part of the National Bureau of Economic Research's labor studies program.

[1]Richard B. Freeman, "Unionism and the Dispersion of Wages," *Industrial and Labor Relations Review*, Vol. 34, No. 1 (October 1980), pp. 3–23.

[2]While Slichter, Healy, and Livernash, among others, suggest that unions reduce wage dispersion through single-rate policies, no quantitative relationship has yet been established. See Sumner H. Slichter, James J. Healy, and E. Robert Livernash, *The Impact of Collective Bargaining on Management* (Washington, D.C.: The Brookings Institution, 1960), pp. 592–623.

[3]In the *Industry Wage Survey,* the Bureau of Labor

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lishments and on the explicit wage practices of organized and unorganized establishments. The data on within-establishment wages are used to calculate measures of dispersion of wages by establishment. These measures of establishment-level dispersion are then related to the union status of the establishment and to its explicit wage practices.

Union Wage Policies Within Establishments

With rare exception, unions have sought to reduce differentials among workers with nominally similar skills and job tasks within establishments. They normally seek such reduction through two types of wage policies: a single rate of pay for each occupational group and a seniority-based progression of rates up to a maximum. Single-rate policies, with one level of pay for all workers in a specified job category, reduce dispersion more than do other wage policies, but even seniority plans with progression to a maximum level tend to exert substantial control over dispersion by requiring similar treatment of workers who have the same seniority. Because of union desires for reduction of differentials, many progression plans have tended, moreover, effectively to meld into single rate maxima.[4] Union pressures to reduce the range of rates within job categories and to expand the number of job titles included within categories further narrow the dispersion. Overall, Slichter, Healy, and Livernash conclude that because of these two avenues of influence—single rates and automatic progression plans—the role of unions in within-firm wages has "clearly been one of minimizing and eliminating discriminatory judgement-based differences in pay for individuals employed in the same job."[5]

At the other end of the spectrum, unions have generally opposed merit review and individual-determination payment plans, with the result that in the early 1970s, when 43 percent of all major companies used merit review for blue-collar workers, just 12.5 percent of major union contracts contained a merit progression plan.[6] Moreover, since unionized workers under contracts with merit plans who are not given increases can file and win grievances, many union merit plans also resemble automatic progression or single-rate plans. All told, unions have been very successful in removing performance judgments as a factor in determining individual workers' pay.

Three basic factors appear to explain union preference for reduced differentials within firms. First, there is the belief of many workers that existing rate differentials reflect favoritism and discrimination rather than relative job duties and responsibilities.[7] "Inequity problems" have historically plagued numerous industries, leading workers and their organizations to prefer "objective" standards to evaluation of individuals based on the subjective decisions of foremen.[8] As long as supervisors are imperfect and make decisions based on criteria other than "true" contributions to the firm (which are exceedingly difficult to measure), it is reasonable to expect employee preference for narrow job-related rates. In a world characterized by the Rawls

Statistics provides information on most workers in establishments sorted into specific four-digit industries. The only workers who are not in the sample are those lost because the BLS is unable to categorize them into a detailed occupation. The survey also includes data on establishments.

[4]Slichter, Healy, and Livernash found, for example, that at the time of their study, in a major unionized company with a wage plan providing automatic progression within a range of wages, 87 percent of the workers had reached the top of the range and thus were effectively paid a single rate. See Slichter, Healy, and Livernash, *The Impact of Collective Bargaining on Management*, p. 605.

[5]Ibid., p. 602.

[6]Bureau of National Affairs, *Wage and Salary Administration Survey 97* (Washington, D.C.: B.N.A., July 1972), p. 14, Table u; and U.S. Department of Labor, Bureau of Labor Statistics, *Characteristics of Major Collective Bargaining Agreements* (Washington, D.C.: G.P.O., July 7, 1974), p. 33, Table 3.5.

[7]Richard Lester and E. Robie, *Wages Under National and Regional Collective Bargaining* (Princeton, N.J.: Princeton University, 1946).

[8]Prior to the comprehensive wage study in the steel industry, for example, pay within a company was often fixed by department supervisors without relation to rates elsewhere. See Lloyd Reynolds and Cynthia Taft, *The Evolution of the Wage Structure* (New Haven, Conn.: Yale University Press, 1956), pp. 45–46.

"veil of ignorance" where workers do not know whether they will benefit or lose from seemingly arbitrary supervisory decisions, simple "maxi-min" behavior will dictate preference for narrow ranges of rates.[9] Finally, workers with risk-averse preference functions or with preferences for a narrow distribution of relative wages will favor standard rate policies rather than a wide range of wage rates.

Second, there are *organizational* reasons for expecting unions to favor narrow ranges of rates. Viewing the union as a political organization dependent on average (median) worker preference, one can see that when the median wage is less than the mean wage, a majority of workers will favor redistribution to the lower paid, which can lead to wage policies reducing inequality.[10] In other words, the median worker who receives less than the mean wage will favor redistribution; hence, 50+ percent will prefer standard-rate policies. Finally, worker solidarity and organizational strength are also more likely to be greater when workers receive roughly the same pay than when they receive very different levels of pay.

Whatever the reasons for union pressures for reducing wage inequality *within* establishments, such policies are a fact of economic life. Do they have a significant effect on the typical organized establishment? Is dispersion lower within organized rather than unorganized plants and, if so, by how much? To what extend can any observed differences in wage dispersion within establishments be attributed to specific wage practices associated with collective bargaining? In short, how important are union policies for reducing dispersion within establishments in the labor market?

Data

To answer these questions, it is necessary to have data on (1) wages of workers *within* establishments, (2) establishment wage practices, and (3) the union status of the establishments. In contrast to widely used data files on individuals,[11] establishment data sets with information on individuals within establishments are exceedingly rare. One of the few such data files is provided by the Industry Wage Surveys of the Bureau of Labor Statistics. These surveys, conducted since the 1940s by the Industry Wage Division of the Bureau of Labor Statistics, are designed to obtain information on wage levels and practices within firms for the purpose of aiding establishments in understanding their labor market environment. The surveys cover a random sample of establishments in major four- (or in some cases, three-) digit SIC industries and provide data on distribution of wage payments unavailable elsewhere.

For purposes of this study, the Industry Wage Surveys have several major advantages. They obtain data on the wages of *individual* workers within establishments, information that allows for the calculation of within-establishment dispersion of wages. They also obtain data on how many production workers in each establishment are paid under the following types of payment plans for time rates: (1) individual determination, (2) range of rates with merit review, (3) range of rates with automatic progression, (4) combination of range of rates with both merit review and automatic progression, (5) single rate, and (6) incentive rates of pay.[12] They categorize each produc-

[9]Rawls's "veil of ignorance" refers to the notion that, given complete lack of knowledge of how he or she will be treated, a worker will tend to be conservative in accordance with the analogue of maxi-min principle. See Jack Rawls, *A Theory of Justice* (Cambridge, Mass.: Harvard University Press, 1971).

[10]Richard B. Freeman, "Individual Mobility and Union Voice in the Labor Market," *American Economic Review*, Vol. 66, No. 2(May 1976), pp. 361 – 68.

[11]Such as the Current Population Survey and the National Longitudinal Survey.

[12]These methods of wage payment are defined by the BLS survey as follows:

Formal rate structures for time-rated workers provide single rates or a range of rates for individual job categories. In the absence of a formal rate structure, pay rates are determined primarily by the qualifications of the individual worker. A single rate structure is one in which the same rate is paid to all experienced workers in the same job classification. (Learners, apprentices, or probationary workers may be paid according to rate schedules which start below the single rate and permit the workers to achieve full job rate over a period of time.) An experienced worker occasionally may be paid above or below the single rate for special reasons, but such payments are exceptions. Range-of-rate plans are those in which the minimum, maximum, or both of these rates paid experienced workers for the same job are specified. Specific rates of individual workers within the range may be determined by merit, length of service,

tion worker by an industry-specific detailed occupational code, such as *card grinder* in the *wool textile industry,* which permits more precise controls on occupation and skill than in most data sets widely used by economists.

At the same time, the Industry Wage Surveys have some disadvantages. Except for sex, they lack information on the human-capital (age, education, and training) and personal characteristics (race and marital status) of all workers and on those production workers whose occupations are not classified in the survey. Because of the narrow occupational categories, however, it is unlikely that the absence of these data is a tremendous drawback.

This study will consider nine four-digit industries in which time rates are the usual structure of payment. It focuses on time rates because the standardization of piece rates has no clear effect upon wage dispersion, the dispersion of the effective *hourly* rate for piece-rate workers depending also on the dispersion of productivity among workers within establishments.

The characteristics of the nine-industry sample under study are listed in Table 1. The sample was chosen so as to include a sufficient number of both union and nonunion establishments to permit comparisons. In total the data include information on nearly 3,000 establishments, 49 percent of which are organized, and on 500,000 individual workers, 45 percent of whom are organized—an exceedingly large number of observations even by modern labor economic standards. Selecting a set of industries in this manner does not provide a random sample. Picking industries with stronger or weaker union organization might have produced somewhat different results.[13]

A surprisingly large number of unions are represented among the organized workers within the industries chosen. In the industrial chemicals industry, for example, organized firms in the survey are covered by the International Chemical Workers Union; the Oil, Chemical, and Atomic Workers Union; the United Steelworkers of America; and single company and local unions not associated with national or international unions.

The Dispersion of Wages

The main dependent variable in the study is the dispersion of wages within establishments. Dispersion is measured by the variance and standard deviation of the natural log (ln) of wages, metrics that are appropriate if wages follow the lognormal distribution or the ln earnings function widely used in empirical work. All of the analyses are also performed using the variance of wages in dollar units. Use of natural rather than ln units strengthens all of the findings reported in this paper.

To obtain the variance of the ln of wages, we took the ln of wages of workers in each establishment and then calculated the mean ln wage and its properly weighted variance. This statistic was calculated for all production workers in an establishment, for male and female workers separately, and for workers in the major industry-specific occupations.

Since the dispersion of wages within an establishment is a variable not widely examined in labor market analysis, it is of some importance to examine its distribution in the sample. On average, the within-establishment variance has a mean of .017, which compares with a variance of .028 for wages *across* establishments.

Table 2 decomposes the total mean sum of squares of wages into the between-establishment and within-establishment components and then further decomposes the within-establishment sum of squares into between-occupation and within-occupation components. While there are notable differences across industries, the table shows substantial dispersion both within and between establishments and within and be-

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or a combination of these. Incentive workers are classified under piecework or bonus plans.

See U.S. Department of Labor, Bureau of Labor Statistics, *Industry Wage Survey: Industrial Chemicals,* Bulletin 1978 (Washington, D.C.: G.P.O., June 1976), p. 48.

[13]The Industry Wage Surveys cover about 40 private sector manufacturing industries. Note that while we selected industries so as to have a reasonable number of both union and nonunion establishments, there is nothing artificial or biased in our selection.

Table 1. Characteristics of the Sample.

Industry	*Union Status*	*Number of Workers*	*Number of Establishments*	*Number of Workers per Establishment*
Paints &	Total	10,941	291	37.6
Varnishes	Union	7,734	179	43.2
	Nonunion	3,207	112	28.6
Textile Dyeing	Total	19,739	148	133.4
& Finishing	Union	8,875	73	121.6
	Nonunion	10,864	75	144.9
Cotton, Man-made	Total	151,150	306	494.0
Fiber Textiles	Union	28,524	42	679.1
	Nonunion	122,626	264	464.5
	Total	10,651	56	190.2
Wool Textiles	Union	2,678	19	140.9
	Nonunion	7,973	37	215.5
Industrial	Total	71,659	269	266.4
Chemicals	Union	57,330	199	288.1
	Nonunion	14,329	70	204.7
Wood Household	Total	37,079	330	112.4
Furniture	Union	13,306	137	97.1
	Nonunion	23,773	193	123.2
Miscellaneous	Total	70,354	875	80.4
Plastic Products	Union	36,749	397	92.6
	Nonunion	33,605	478	70.3
Fabricated	Total	23,077	331	69.7
Structural Steel	Union	17,700	235	75.3
	Nonunion	5,377	96	56.0
Nonferrous	Total	18,199	363	50.1
Foundries	Union	11,629	178	65.3
	Nonunion	6,570	185	35.5

Source: Computed from the Bureau of Labor Statistics Industry Wage Survey.

tween occupations within establishments. On average, 40 percent of the variance in ln wages of production workers in a detailed industry is due to the within-establishment differentials of concern here. Of the within-establishment variance in ln wages, on average, 66 percent is due to within-establishment differences in occupational means.[14]

Now that we have some notion of the magnitude and nature of within-establishment dispersion of wages, we turn to the question of concern in this paper: differences in dispersion between organized and unorganized establishments.

Unionism and ln variance of wages within establishments. The results of the first stage of our analysis are presented in Table 3. It contrasts the variance in ln wages in union and nonunion establishments in several ways, each of which strongly supports the conclusion that within-establishment dispersion of wages is much smaller in union than in nonunion settings. Columns 1 through 3 contrast the mean variance of ln wages for organized and unorganized establishments; the differences in means show unionized plants with a lower variance and the t-tests show these differences to be significant in six of the nine cases. To make sure that these results are not due to different

[14]Both of these figures are based on unweighted averages of the fractions of variance for each industry from Table 2.

Table 2. Analysis of Variance of the Wage

Industry	Mean Sum of Squares				Proportion of Mean Sum of Squares Due To:		
	Total (Col. 2 + 3)	*Between Establishments*	*Within Establishments*	*Within Establishments, Between Occupations*	*Between Establishments (Col. 2÷1)*	*Within Establishments (Col. 3÷1)*	*Within Establishments, Between Occupations (Col. 4÷3)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Paints & Varnishes	.0453	.0343	.0110	.0079	.76	.24	.72
Textile Dyeing & Finishing	.0462	.0238	.0224	.0186	.51	.49	.83
Cotton, Man-made Fiber Textiles	.0262	.0044	.0218	.0091	.17	.83	.42
Wool Textiles	.0320	.0153	.0167	.0068	.48	.52	.41
Industrial Chemicals	.0283	.0209	.0074	.0063	.74	.26	.85
Wood Household Furniture	.0528	.0387	.0141	.0059	.73	.27	.42
Miscellaneous Plastic Products	.0633	.0352	.0281	.0226	.56	.44	.80
Fabricated Structural Steel	.0512	.0386	.0126	.0088	.75	.25	.70
Nonferrous Foundries	.0651	.0431	.0220	.0171	.66	.34	.78
Unweighted Averages	—	—	—	—	.60	.40	.66

Source: Computed from the Bureau of Labor Statistics Industry Wage Survey.

characteristics of union and nonunion establishments, we ran regressions for each of the nine industries using the variance of the ln wage in each establishment as the dependent variable and independent variables including a 0–1 dummy variable for unionism and several control variables—size of establishment, region, and the percentage of workers in each detailed occupational category (to eliminate the possibility that differences are due to concentration of workers in occupations with low variances of wages in the union sector). The resultant union coefficients and standard errors, recorded in column 4, show that the differences in means are not attributable to differences in characteristics. In seven of the nine industries, the union coefficient is significantly negative at a 95 percent confidence level, and in six of nine the coefficient is significant at a 99.5 percent confidence level.

For each industry, we also ran regressions using the within-establishment variance of ln wages for a particular occupation as the dependent variable. The number of significant union coefficients in these regressions is displayed in columns 5 through 9. The evidence confirms that unions reduce wage dispersion *within* occupations within establishments. Unions decrease the variance of ln wages in 124 of the 176 detailed occupations, significantly so at 10 percent in 68 occupations and at 5 percent in 51 detailed occupational groups. Correspondingly, the union coefficient increased the variance in only 52 of the 176 occupations, significantly at the 10 percent level in 14 and at the 5 percent level in only 8.

Corresponding estimates for the standard deviation of ln wages, rather than for the variance of ln wages, are presented in Table A in the appendix. Because many analyses of income distributions focus on standard deviations, it is useful to examine those results as well, in large measure to evaluate the magnitude of the estimated union effects. What stands out in the calculations is the fact that the union effect is not only highly significant in all but one case, but also large in absolute magnitude. These calculations show standard deviations of wages in the union sector averaging .0268 units—or 22 percent—below the standard deviation in the nonunion sector. We conclude that in the sample under study, unionism is associated with markedly lower dispersion of wages within establishments.

Unionism and dispersion-reducing wage practices. We consider next the routes by which unionism reduces within-establishment wage dispersion. The greater our ability to relate the union effect to specific wage practices favored by unions, the greater are our understanding of the nature of the results and our willingness to attribute them to unions as economic institutions. According to the standard-rate hypothesis set out earlier, we expect unionism to increase the proportion of workers covered by the most egalitarian wage systems—single rate and automatic progression—and to reduce the proportion of workers covered by those systems allowing greater dispersion and managerial discretion, merit review, and individual determination.

Table 4 presents the results of analyzing the effect of unionism on the different methods of wage payment used within establishments. It records the mean percentage of workers in union and nonunion establishments enrolled in five time-rate payment plans presented more or less in order of their likely impact on dispersion, from the plan with potentially the least dispersion to the plan with potentially the most dispersion. It also records the union coefficient and its standard error from a regression of the percentage of workers in each firm in the payment plan on unionism and the average worker's wage, the ratio of male to female production workers, the ratio of office to production workers, region size, and occupational independent variables.

In all nine industries, unions increase the percentage of workers paid by single-rate plans and decrease the percentage paid by individual determination. In all but cotton, man-made fiber textiles, the effects are large and statistically significant. In miscellaneous plastics, for example, an average of 63 percent of workers in union plants are covered by single rates compared to 12 percent of workers in nonunion plants, whereas at the other end of the spectrum, just 4 percent of union compared to 49 percent nonunion

Table 3. Differences Between Union and Nonunion Establishments in Variances of ln Wages Within Establishments.
(standard errors are in parentheses)

Industry	Mean of Within-Establishment Squared Error[a]		Differences in Means[b]	Union Coefficient[c]	Numbers of Detailed Occupations with a Significant Union Coefficient in Establishment-Variance-by-Occupation Regressions[c]										
					Negative Significant			Not Significant		Positive Significant			%	% Signif.	% Signif.
	Union (1)	Nonunion (2)	(3)	(4)	.025	.05 (5)	.10	negative	positive (6)	.10	.05 (7)	.025	Negative (8)	Negative (9)	Positive (10)
Paints & Varnishes	.0110	.0203	−.0093*	−.0070 (.0021)	1	2	2	9	3	0	0	0	.82	.30	.00
Textile Dyeing & Finishing	.0180	.0194	−.0014	−.0069 (.0036)	3	0	2	5	5	2	1	0	.56	.28	.17
Cotton, Man-made Fiber Textiles	.0198	.0204	−.0006	−.0037 (.0012)	2	1	0	4	7	1	1	2	.39	.17	.22
Wool Textiles	.0115	.0180	−.0065*	−.0053 (.0027)	1	1	3	4	2	1	1	1	.64	.36	.21
Industrial Chemicals	.0066	.0148	−.0082*	−.0084 (.0014)	10	1	3	5	0	0	0	0	1.00	.74	.00
Wood Household Furniture	.0160	.0186	−.0026	−.0031 (.0023)	5	0	4	5	6	0	0	0	.70	.45	.00
Miscellaneous Plastic Products	.0091	.0231	−.0140*	−.0013 (.0019)	6	0	1	6	2	0	0	0	.87	.47	.00
Fabricated Structured Steel	.0239	.0372	−.0133*	−.0134 (.0021)	11	0	0	9	4	1	0	0	.80	.44	.04
Nonferrous Foundries	.0191	.0323	−.1032*	−.0148 (.0021)	6	1	2	9	7	1	0	2	.64	.32	.11

[a]The union and nonunion means for the standard deviations of wages are calculated from the means of the standard deviations of the ln wages for each firm.
[b]The *t*-test is the standard test of the difference between two means assuming unequal variances of the union and nonunion distribution.
[c]Regression results use variance of the ln wage in each establishment as the dependent variable and size and region and, for the overall establishment equation (column 4), occupation controls as independent variables. In the detailed occupations, establishments with only one worker listed under an occupation are deleted.
*Significant at greater than the 1 percent level in a one-tailed test.

Table 4. Comparison of Union and Nonunion Means of the Percentage of Production Workers Paid by Different Time Rate Plans and the Regression Estimates of the Union Effect on the Percentage of Production Workers Paid by Each Plan.[a]
(standard errors are in parentheses)

Industry	Single Rate			Automatic Progression			Combination Merit Review & Automatic Progression			Merit Review			Individual Determination		
	Union Mean % (1)	Nonunion Mean % (2)	Regr. Coef. on Union[b] (3)	Union Mean % (4)	Nonunion Mean % (5)	Regr. Coef. on Union[b] (6)	Union Mean % (7)	Nonunion Mean % (8)	Regr. Coef. on Union[b] (9)	Union Mean % (10)	Nonunion Mean % (11)	Regr. Coef. on Union[b] (12)	Union Mean % (13)	Nonunion Mean % (14)	Regr. Coef. on Union[b] (15)
Paints & Varnishes	.52	.13	.36 (.06)	.25	.17	.13 (.06)	.08	.17	−.03 (.04)	.07	.20	−.15 (.04)	.04	.44	−.31 (.04)
Textile Dyeing & Finishing	.74	.51	.13 (.09)	.14	.07	.07 (.06)	.01	.10	−.03 (.03)	.07	.03	.08 (.05)	.00	.18	−.20 (.05)
Cotton, Man-made Fiber Textiles	.65	.62	.11 (.06)	.02	.02	−.00 (.02)	.02	.03	−.03 (.03)	.05	.01	.02 (.02)	.00	.05	−.09 (.04)
Wool Textiles	.61	.57	.13 (.10)	.06	.00	.06 (.04)	.04	.07	−.04 (.07)	.00	.02	−.04 (.02)	.05	.08	−.03 (.07)
Industrial Chemicals	.75	.27	.54 (.07)	.14	.19	−.16 (.06)	.07	.30	−.24 (.05)	.01	.13	−.01 (.03)	.02	.09	−.05 (.02)
Wood Household Furniture	.28	.02	.22 (.04)	.09	.02	.09 (.03)	.16	.18	−.02 (.05)	.12	.15	−.01 (.04)	.10	.46	−.31 (.05)
Miscellaneous Plastic Products	.63	.12	.21 (.02)	.06	.04	.21 (.03)	.10	.15	−.13 (.03)	.12	.18	−.13 (.02)	.04	.49	−.15 (.02)
Fabricated Structural Steel	.28	.06	.49 (.07)	.37	.19	.03 (.04)	.19	.29	−.03 (.05)	.05	.18	−.05 (.05)	.05	.24	−.39 (.05)
Nonferrous Foundries	.40	.13	.27 (.05)	.17	.06	−.17 (.04)	.14	.19	−.07 (.04)	.04	.13	−.23 (.04)	.05	.36	−.23 (.04)

[a]The percentage of production workers paid by each plan is obtained by dividing the number of production workers paid by the plan by the total number of production workers in that establishment.

[b]Also included as independent variables are the average wage, the ratio of male to female production workers, the ratio of office to production workers, region, size, and occupation controls. Percentages may not total 100 because we have not reported the tabulations for incentive workers.

Source: Computed from the Bureau of Labor Statistics Industry Wage Survey.

workers are paid by individual determination of rates. Moreover, only when the efforts of unions are totally directed toward single rates of pay, such as in the industrial chemicals industry, do unions appear to adversely affect automatic progression plans. The conclusion that unionism is associated with establishment wage practices likely to reduce dispersion is inescapable.

Method of payment as an intervening variable. To determine the extent to which method of wage payment, particularly the adoption of single-rate wage practices, accounts for the lower dispersion in organized establishments shown in Table 2, we have added to the regressions of the variance of ln wages on unionism and other controls of Table 3 the fraction of workers under all wage systems, with the single-rate factor deleted to prevent singularity. If the union coefficient is substantially reduced by the addition of the variables measuring wage-practices, then we can conclude that explicit wage practices are a major intervening variable in the relationship between unions and within-establishment dispersion.

The results of the calculations, given in Table 5, confirm that in all but one case the addition of the methods of payment variable reduces the negative effect of unionism on the variance of wages. The union coefficients are reduced in eight of the nine sectors and by significant amounts in three. In four of the industries over 50 percent of the difference in variances between union and nonunion firms is explained by wage practices, and in another two cases, 20–30 percent of the union coefficient is so explained. In two industries, addition of the methods of wage payment actually changes the wage coefficient from negative to positive. Thus, for a majority of the industries studied, a significant portion of the union effect is explained by the method of wage payment.

As for the effect of the methods of wage payments themselves, the coefficients for virtually all of the time-rate methods are positive, indicating that all of the payment methods raise the variance of the firm wage relative to the omitted single-rate method promoted by unions. (The one exception is the automatic progression payment plan in the wool textile industry, which has a negative coefficient). Moreover, as might be expected, the individual-determination coefficients tend to be sizable (in all but the cotton, man-made fiber textiles and fabricated structural steel industries) coefficients (seven of nine cases) are larger than the combination merit review and automatic progression coefficients and all are larger than just the automatic progression coefficients. Finally, eight of the nine combination merit review and automatic progression coefficients are larger than just their automatic progression plans. In sum, the contribution of payment plans to variance of wages within firms is as expected, and the differences in use of plans is a major component of the observed differences in inequality.

Interpreting the Results

The finding that unionism is associated with markedly lower dispersion of within-establishment wages and with explicit wage practices that have a significant effect on the dispersion of earnings is consistent with the hypothesis that standard-rate policies have a sizable impact on establishment wages and, more generally, with one of the major contentions of institutional labor economics: that explicit policies of market organizations (unions and firms) can affect market outcomes. Surely the most immediate interpretation of our results is that union (and firm) policies greatly affect the pattern of wages.

One may, however, object to reading causality into the statistical analysis because of the possible endogeneity of the union organization or the wage practices. With respect to the union effects, perhaps the inverse relation between unionism and dispersion simply reflects the greater likelihood that unions organize low-dispersion firms. For instance, some may argue that workers in such firms are likely to be more homogeneous and thus more easily organizable.

The objection to the line of causality stressed here finds no support in fact. Extant institutional and statistical evidence suggests, if anything, that workers in plants with greater dispersion of wages, not those

Table 5. Regression Estimates of the Effect of Unionism and Methods of Wage Payment on Variance of ln Wages Within Establishments.[a]
(standard errors are in parentheses)

Industry	*Union Coefficients Without Methods of Payment*	*Union Coefficients With Methods of Payment*	*Difference Between Union Coefficients*	*Time Rates*				*Incentive Rates*				*Significance Level of F Statistic for Addition of Methods of Wage Payment*
				Automatic Progression	*Merit Reviews & Automatic Progression*	*Merit Reviews*	*Individual Determination*	*Individual Piece*	*Group Piece*	*Individual Bonus*	*Group Bonus*	
Paints & Varnishes	−.0070 (.0021)	.0052 (.0023)	.0122	.0027	.0066	.0099	.0100	—	—	—	—	.01
Textile Dyeing & Finishing	−.0007 (.0036)	.0032 (.0039)	.0039	.0017	.0032	.0047	.0150	.0076	.0225	.0354	.0711	.05
Cotton, Man-made Fiber Textiles	−.0037 (.0011)	−.0040 (.0011)	−.0003	.0019	.0030	.0064	.0022	.0119	.0017	−.0051	.0040	.01
Wool Textiles	−.0053 (.0027)	−.0027 (.0031)	.0027	−.0100	.0071	.0259	.0093	.0135	.1240	.0130	.0061	.20
Industrial Chemicals	−.0083 (.0013)	−.0044 (.0014)	.0039	.0031	.0060	.0074	.0220	−.0043	—	—	.0091	.01
Wood Household Furniture	−.0030 (.0022)	−.0001 (.0023)	.0029	.0009	.0041	.0100	.0088	.0339	.0062	.0298	−.0170	.05
Miscellaneous Plastic Products	−.0113 (.0019)	−.0064 (.0021)	.0049	.0095	.0163	.0109	.0242	.0080	−.0080	.0126	−.0447	.01
Fabricated Structural Steel	−.0134 (.0021)	−.0104 (.0024)	.0030	.0011	.0057	.0041	.0058	.0170	.0152	.0074	.0094	.15
Nonferrous Foundries	−.0148 (.0021)	−.0125 (.0024)	.0023	.0086	.0014	.0110	.0110	.0199	.0059	.0181	−.0145	.01

[a]The percentage of production workers paid by each plan is obtained by averaging the quotients of the number of production workers paid by the plan divided by the total number of production workers in each firm. Also included as independent variables are the ratio of production workers in each detailed occupational group to total production workers, region, and size controls.

Source: Computed from the Bureau of Labor Statistics Industry Wage Survey.

with narrower dispersion, are more favorably attuned to unionism. Foulkes reports from his interviews with nonunion employers that several eschewed rewarding workers by merit pay for fear that such practices would lead to unionization.[15] In the analysis of NLRB elections by Farber and Saks, the standard deviation of wages in the firm was estimated to have a positive but insignificant effect on the vote for unionism, but their inclusion of a second term in which the standard deviation appears suggests that this underestimates the positive effect of inequality on the vote for unions.[16] In addition, Farber and Saks found that individuals with earnings below their firm mean were significantly more likely to vote for unions than those with earnings above their firm mean. This suggests, as they note, that "workers at the lower end of the interfirm earnings distribution . . . expect a larger increase in earnings from unionization,"[17] consistent with the causal link in which unionism reduces dispersion.

Further, evidence from the 1977 Quality of Employment Survey shows no discernible difference between the dispersion of earnings of nonunion blue-collar workers who would vote for having a union to represent them and the dispersion of those who would vote against a union. Those for the union had a mean log wage of 1.26 with a standard deviation of .45; those against had a mean log wage of 1.42 with a standard deviation of .46.[18] Finally, while I believe that attempts to use systems equations to discern lines of causality from cross-section data are of little value,[19] the one effort to use such procedures reported thus far shows that the systems calculation yields results confirming our conclusions.[20]

The reader who remains skeptical that one can infer causality from cross-sectional comparisons and institutional evidence may ask for longitudinal data that would indicate whether the reduction in dispersion occurred before or after the advent of unionism. Because of a present lack of longitudinal data sets on establishments, this is not possible at the establishment level. It is, however, possible to compare the dispersion of the log wages of individual workers before and after unionism in widely used data sets of individuals. While such an analysis does not permit differentiation of the effects of unionism on within-establishment and among-establishment dispersion, it does provide a test of the overall impact of unionism on dispersion. If union wage policies are the cause of the observed differences in dispersion, the dispersion of wages would be expected to fall among workers moving from nonunion to union status and to rise among workers moving from union to nonunion status.

Analysis of the dispersions of log wages of workers in two longitudinal data sets confirms this expectation, as can be seen in Table 6. This table shows the standard deviation of the earnings of persons changing

[15]See Fred K. Foulkes, *Personnel Policies in Large Nonunion Companies,* (Englewood Cliffs, N.J.: Prentice-Hall, 1980), p. 340–41.

[16]Specifically, Farber and Saks report calculations with the inverse of the standard deviation of wages in a firm and with the wage of an individual minus the wage of the establishment divided by the same standard deviation. The first term obtains a coefficient −.207 with an asymptotic standard error of .273, the second a coefficient −.161 (.049). The derivative of votes with respect to the inverse of the standard deviation of wages is the sum of the two, −.368—which is much larger, of course, than the coefficient on the inverse itself. Note that we report results with respect to the standard deviation, not its inverse, and thus we have reversed the sign. See Henry S. Farber and Daniel H. Saks, "Why Workers Want Unions: The Role of Relative Wages and Job Characteristics," *Journal of Political Economy,* Vol. 88, No. 2 (April 1980), pp. 349–69.

[17]Ibid., p. 363.

[18]These figures are based on responses to the Quality of Employment Survey question: "If an election were held with secret ballots would you vote for or against having a union or employees' association represent you?" In our tabulation of dispersion, 126 persons answered yes and 182 answered no. See Robert Quinn and Graham Steiner, *Quality of Employment Survey* (Ann Arbor, Mich: Inter-University Consortium for Political and Social Research, 1977).

[19]Richard B. Freeman and James L. Medoff, "The Impact of Collective Bargaining: Illusion or Reality?" in Jack Steiber, Robert B. McKersie, and D. Quinn Mills, eds., *U.S. Industrial Relations, 1950–1980: A Critical Assessment* (Madison, Wis.: Industrial Relations Research Association, 1981), pp. 47–97.

[20]Barry Hirsch, "The Interindustry Structure of Unionism, Earnings, and Earnings Dispersion," *Industrial and Labor Relations Review,* Vol. 35, No. 1 (October 1982), pp. 22–39.

Table 6. Longitudinal Analysis of Dispersion in ln Wages of Workers Who Change Union Status.

Survey [a]	*Sample Size*	*Standard Deviation of ln Wages*		*Longitudinal Effect of Change on Dispersion*
		Before Change	*After Change*	
National Longitudinal Survey of Young Men (NLS)				
Workers Who Changed Status, 1969–1976				
Nonunion to Union	237	.42	.33	−.09
Union to Nonunion	231	.39	.42	.03
Michigan Panel Survey of Income Dynamics (PSID)				
Workers Who Changed Status, 1968–1977				
Nonunion to Union	47	.38	.30	−.08
Union to Nonunion	59	.32	.46	.14

[a] Samples include all workers in the labor force who report wages in both years. For a more detailed discussion see Richard B. Freeman, "Longitudinal Analysis of Trade Union Economic Effects" (in process).

union status in two widely used longitudinal data sets on individuals: the Michigan Panel Survey of Income Dynamics and the National Longitudinal Survey of Young Men. Both data sets show a substantial reduction in dispersion for workers moving from nonunion to union status and an increase in dispersion for workers going in the other direction. A more detailed analysis of these data requires a separate study, but it suffices here to note the consistency of the results in Table 6 with our interpretation of lines of causality.

In sum, whereas there is evidence supporting the argument that unions choose wage policies that reduce dispersion, there is neither institutional nor econometric support for the reverse causality.

Further Empirical Tests

Unionism and among-establishment dispersion. In addition to reducing the dispersion of wages within establishments, unionism can be expected to affect the dispersion of wages among establishments. Under the banner of "equal pay for equal work," unions have long pressed for standardization of rates across establishments in the same sector. This goal conflicts, however, with another primary union goal, the desire to achieve monopoly wage gains. The achievement of such gains can be expected to increase dispersion to the extent that different establishments have different elasticities of labor demand.

We find in our data set, controlling for the regional location of establishments and their distribution of employees by occupation, that dispersion of wages among unionized establishments is smaller than among nonunionized establishments in six of nine industries. The empirical results are shown in Table 7. Columns 1 and 2 display the cross-establishment dispersion of wages in the sample as a whole. Column 1 records the mean square error in the sample, while column 2 records the mean square error calculated from a regression of the establishment wage on occupation and region independent variables (weighted by establishment size). Columns 3 and 4 record the mean square error in union and nonunion sectors obtained from separate regressions for the two groups, while column 5 gives the difference in mean square

Table 7. Comparison of Variance of ln Wages Between Firms.

	Total Sample				
Industry	*Mean Sum of Squares Between Firms*	*Residual Sum of Squares from Regression with Occupation & Region Dummies*[a]	*Union*[a] *Residual Sum of Squares*	*Nonunion*[a] *Residual Sum of Squares*	*Difference in Residual Sum of Squares*
Paints & Varnishes	.0343	.0085	.0053	.0148	−.0095
Textile Dyeing & Finishing	.0238	.0023	.0027	.0017	.0010
Cotton, Man-made Fiber Textiles	.0044	.0002	.0002	.0002	−.0000
Wool Textiles	.0153	.0013	.0017	.0010	.0007
Industrial Chemicals	.0209	.0004	.0004	.0005	−.0001
Wood Household Furniture	.0387	.0037	.0046	.0029	.0017
Miscellaneous Plastic Products	.0352	.0026	.0023	.0028	−.0005
Fabricated Structural Steel	.0386	.0039	.0034	.0044	−.0010
Nonferrous Foundries	.0431	.0069	.0050	.0079	−.0029

[a] These numbers were taken from a weighted regression controlling for region and occupation (weighted by number of workers per firm).

errors. In five of nine industries, we find lower dispersion in the organized sector and in one, essentially no difference.

Unionism and within-industry dispersion. The analysis thus far has studied the effect of unionism on wage dispersion by analyzing differences in the dispersion of wages between organized and unorganized production workers. The impact of unionism on the dispersion of wages as a whole depends not only on the impact on organized labor, however, but also on the union wage effect. By raising the wages of organized production workers compared to those of otherwise comparable unorganized production workers, unionism increases dispersion. By raising the wages of production workers relative to higher-paid nonproduction workers, unionism reduces dispersion of wages within an industry.

How do these conflicting effects balance out? To answer this question, we decompose the variance of the ln of wages of all workers in a sector as follows:[21]

$$(1)\quad \sigma^2 = \alpha_{BU}(\sigma^2_{BU}) + \alpha_{BN}(\sigma^2_{BN}) + \alpha_W(\sigma^2_W) + \alpha_{BU}\alpha_{BN}(\ln u/n)^2 + \alpha_{BU}\alpha_W(\ln u/w)^2 + \alpha_W\alpha_{BN}(\ln w/n)^2,$$

[21] This formula is based on the usual conditional variance formula. It differs from that in Freeman, "Unionism and the Dispersion of Wages," by explicitly relating the variances and wage differences of blue-collar union *and* blue-collar nonunion workers and of white-collar workers to the total variance in one formula, whereas the previous decomposition looked separately at blue-collar and white-collar workers in the union part of the industry and at blue-collar and white-collar workers in the nonunion part of the industry. The formulas can, of course, be derived from one to the other.

where

σ^2 = variance of ln wages in the industry;
α_{BU} = share of all workers classified as union and blue-collar;
α_{BN} = share of all workers classified as nonunion and blue-collar;
α_W = share of all workers classified as white-collar;
σ^2_{BU} = variance of ln wages of blue-collar union workers;
σ^2_{BN} = variance of ln wages of blue-collar nonunion workers;
σ^2_W = variance of ln wages of white-collar workers;
u/n = ratio of union to nonunion blue-collar wages;
u/w = ratio of union blue-collar to white-collar wages; and
w/n = ratio of white-collar to nonunion blue-collar wages.

To determine the effect of unionism on the variance of wages in the industry, we difference Equation 1 with respect to unionism. This yields:

$$(2) \quad \Delta\sigma^2 = \alpha_{BU}\,\Delta\left[\hat{\sigma}^2_{BU}\right] + \alpha_{BU}\,\alpha_{BN}\,\Delta\left[\ln u/n\right]^2 + \alpha_{BU}\,\alpha_W\,\Delta\left[\ln u/w\right]^2,$$

where the effect of unions on the dispersion of wages of white-collar workers, $\Delta\sigma^2_W$, and on the differential between nonunion blue-collar and white-collar workers—$\Delta(\ln n/w)$—are assumed zero.

The first term on the right-hand side of Equation 2 is just the sum of the union effect on the dispersion of wages within organized establishments and between organized establishments. The second term depends on the differential between union blue-collar and nonunion blue-collar workers, while the third term depends on the differential between union blue-collar workers and nonunion white-collar workers.

The information needed to calculate Equation 2 is presented in Table 8. Column 1 records the proportions needed for the analysis: the fraction of workers who are unionized blue-collar, nonunionized blue-collar, and white-collar in each industry. Column 2 gives the estimated effect of unionism on the variance of ln wages in an establishment, obtained by regressing the within-establishment variance on unionism and the relevant control variables, as in Table 3, but weighting the regressions by number of workers: the exact calculations are given in Appendix Table A. Column 3 gives estimates of the effect of unions on the variance of wages across establishments by taking differences in mean squared errors, as in Table 7. Because we are adding together variances to get a total for the work force as a whole, both of these figures are based on calculations in which firms are weighted by their number of employees. Hence, the figures differ slightly from those in Tables 3 and 7.

The contribution of the within and between effects to the overall industry variance in wages is given in column 4. It is simply the sum of columns 2 and 3 multiplied by the unionized blue-collar share of labor (α_{BU}) reported in column 1. In six of the nine industries, the contribution is negative, indicating—as noted earlier—that through the within- and among-firm effects, unionism lowers dispersion.

Column 5 presents an estimate of the union wage effect in each sector. This estimate is obtained from regressions of the mean ln wage in each establishment on its union status and the full set of controls used in Table 3. These results are shown in Appendix Table B. The dependent variable is weighted by the number of workers in each firm. Consistent with previous work, union wage effects are positive in the majority of cases. The unweighted average of effects, however, is just .06, which is somewhat smaller than the result obtained in most studies. In one industry, unionism is estimated to have a modest negative effect on wages.

Assuming no differential between union and nonunion establishments in the absence of unionism, the effect of the union wage differential on the variance according to Equation 2 is just $\alpha_{BU}\alpha_{BN}$ multiplied by the differential squared. This is

Table 8. Overall Union Effect on Variance Within Establishments.

Industry	(1) Weights: % Blue-Collar Union α_{BU}	(1) Weights: % Blue-Collar Nonunion α_{BN}	(1) Weights: % White-Collar α_{W}	(2) Union Effect on Variance Within Establishment[a]	(3) Union Effect on Variance Among Establishments	(4) Between & Within Weighted Contribution to Variance Differential[b]	(5) Union Wage Effect[c]	(6) Union Wage Weighted Contribution to Variance Differential	(7) Union Effect on Blue-Collar/White-Collar Wage Ratio[d]	(8) Blue-Collar/White-Collar Weighted Contribution to Variance Differential	(9) Total Weighted Effect to Variance Differential
Paints & Varnishes	.39	.15	.45	−.006950	−.025552	−.012676	.056570	.000259	−.052910	−.014903	−.027320
Textile Dyeing & Finishing	.36	.44	.19	−.000694	.001843	.000414	.021900	.000169	−.017630	−.002856	−.002274
Cotton, Man-made Fiber Textiles	.16	.72	.11	−.003730	−.001633	−.000858	.015600	.000154	−.008196	−.000238	−.000942
Wool Textiles	.20	.62	.17	−.005320	.006718	.000280	.050000	.001271	−.067416	−.003289	−.001738
Industrial Chemicals	.52	.13	.34	−.008350	−.000826	−.004771	−.004490	.000002	.001448	.000602	−.004167
Wood Household Furniture	.30	.53	.16	−.003050	.003889	.000252	.045950	.000929	−.032524	−.003527	−.002346
Miscellaneous Plastic Products	.41	.37	.21	−.011300	.005795	−.002257	.051136	.000755	−.040658	−.008762	−.010265
Fabricated Structural Steel	.52	.15	.32	−.013400	−.003200	−.008632	.166536	.002787	−.072555	−.029282	−.035126
Nonferrous Foundries	.50	.28	.21	−.014800	.003838	−.009319	.110243	.002654	−.163906	−.052534	−.059004

[a]The within effect is the regression coefficient on the union variable when included with region, size, and occupation controls in regressions using the firm's variance of the ln wage as dependent variable.

[b]The between effect is the between variance computed in Table 7.

[c]The union wage effect is computed from the union coefficient when included with region, size, and occupation controls in a regression with dependent variables of the average ln wage weighted by the number of workers per firm.

[d]The blue-collar/white-collar wage differential is computed from the corresponding three-digit industry observations from the EEC Survey, and is the ratio of the total blue-collar wages divided by total blue-collar employment and total white-collar wages divided by total white-collar employment. The union effect is equal to the difference of the ln of the blue-collar wage difference added to the union wage effect, all squared, from the ln of the blue-collar/white-collar differential, all squared.

recorded in column 6. Note that, with the exception of three industries, the effect is negligible to the third decimal place, and thus dwarfed by the effects in column 4.

Because the Industry Wage Survey tapes lack information on the pay of white-collar workers, we have been forced to rely on another data set to obtain estimates of the effect of unionism on the blue-collar/white-collar pay differential. We have estimated the blue-collar/white-collar differential in the absence of unionism using the relevant three-digit industry nonunion observations from the Expenditures for Employee Compensation Survey (EEC) and then used our estimates of union wage effects to calculate the potential impact of unionism on the differential.[22] If, consistent with the results reported by Freeman and Medoff, there is relatively little spillover of wages from union to nonunion blue-collar workers, and if union wages do not affect white-collar wages in a firm, this is the appropriate impact.[23] If the presence of unionism raises wages of nonunion blue-collar labor, it is an underestimate; if the presence of unionism raises the wages of nonunion white-collar labor in organized firms, it is an overestimate. Following Equation 2, the union effect is calculated as the difference between the squared ln blue-collar/white-collar differential from the EEC tape and that differential adjusted for the union wage effect on blue-collar workers.

$$\left[\ln\left(\frac{\text{blue-collar } W}{\text{white-collar } W}\right)\right]^2 - \left[\ln\left(\frac{\text{blue-collar } W}{\text{white-collar } W} + \text{union wage effect}\right)\right]^2$$

As can be seen in the final column in Table 8, consistent with the somewhat different calculations for the entire economy by Freeman,[24] the dispersion-reducing effects of unionism dominate the dispersion-increasing effects in all of the industries covered.

Conclusion

This study has used establishment-level data to examine the effect of unionism on the wage structure *within* establishments, focusing on the impact of unionism on wages in an establishment rather than merely on wages of an individual. It reports five principal findings:

(1) Organized establishments have much lower dispersion of wages than otherwise comparable unorganized establishments in the same four-digit industry. Using the standard deviation of the ln of wages as a measure of dispersion, unionized establishments have levels of dispersion that range from 5 percent to 50 percent below those of nonunionized establishments in the industries studied, with an unweighted differential of 22 percent.[25] Diverse variables controlling for size of establishment, region, and detailed occupation of workers do not greatly affect the magnitude of these results.

(2) Organized establishments have adopted explicit wage practices that tend to reduce wage inequality. They favor single-rate or automatic progression modes of wage payment as opposed to merit reviews and individual determination. A sizable part of the union-induced reduction in within-establishment dispersion is attributable to the explicit wage practices in such plants. By favoring wage practices that

[22]The regression estimates are available in an earlier version of this paper: see Richard B. Freeman, Working Paper No. 752 (Cambridge, Mass.: National Bureau of Economic Research, September 1981).

[23]Richard B. Freeman and James L. Medoff, "The Impact of the Percent Organized on Union and Nonunion Wages," *Review of Economics and Statistics*, Vol. 63, No. 4 (May 1982), pp. 561–72.

[24]In Freeman, "Unionism and the Dispersion of Wages," I did not have proper data to decompose the union effect on the variance of the wages of blue-collar workers into within-establishment and among-establishment dispersion-reducing effects. In addition, that study was limited to male workers, whereas this one looks at all workers.

[25]The unweighted differential of the standard deviation of ln wages is a simple mean over all nine industries of the percentage reduction from the numerous variances in the union sector. The unweighted differential of the variances of ln wages over all industries, computed as the percentage reduction in variance in the union sector from the nonunion sector, is .33 percent. The weighted differential of the variance of ln wages is the mean differential for each industry weighted by the number of firms in the industry. It is computed to be .27 percent.

narrow ranges of rates among workers and limit managerial discretion, unions reduce inequality within firms. Even taking account of wage practices, however, unionized firms tend to have lower inequality among workers, indicative of an influence on the operation of specific wage-setting mechanisms as well as on the choice of the practices themselves.

(3) Dispersion of wages among organized plants in the same four-digit industry also tends to be lower than dispersion of wages among nonorganized establishments, taking account of differences in the regional and occupational distribution of the two sets of plants. This result is found in five of nine industries.

(4) The total effect of unions on the dispersion of wages among blue-collar workers depends upon three components: the effect of unionism on dispersion within organized firms, the effect of unionism on dispersion across organized firms, and the union wage effect. In six of nine industries studied the net effect of unions on dispersion, taking account of all three effects, is *negative,* indicating that in the majority of cases studied unionism lowers wage inequality for blue-collar workers.

(5) Because the union wage gains bring blue-collar wages closer to white-collar wages in the unionized sector, unionism tends to have a greater negative impact on the dispersion of wages among *all* workers in an industry than on the dispersion of blue-collar workers alone. Assuming that unionism does not influence the wage dispersion among white-collar workers, we find that in all nine industries, unionism reduces dispersion of wages among *all* workers by sizable amounts.

Put broadly, these results indicate that explicit union wage policies have a major impact on the dispersion of wages within firms and in the economy as a whole.

Appendix

Table A. Differences between Union and Nonunion Establishments in Standard Deviations of Within-Establishment ln Wages.

(standard errors are in parentheses)

Industry	*Mean of Within Establishment*		*Differences in Means*	*Union Coefficient*
	Union	*Nonunion*		
Paints & Varnishes	.0887	.1276	−.0389*	−.0251 (.0075)
Textile Dyeing & Finishing	.1122	.1275	−.0153	−.0098 (.0118)
Cotton, Manmade Fiber Textiles	.1374	.1385	−.0011	−.0106 (.0044)
Wool Textiles	.1031	.1301	−.0270*	−.0220 (.0101)
Industrial Chemicals	.0727	.1087	−.0360*	−.0360 (.0057)
Wood Household Furniture	.1098	.1251	−.0153**	−.0178 (.0074)
Miscellaneous Plastic Products	.1402	.1776	−.0374*	−.0340 (.0049)
Fabricated Structural Steel	.0851	.1407	−.0556*	−.0561 (.0062)
Nonferrous Foundries	.1270	.1686	−.0416*	−.0492 (.0064)

*Significant at better than the 1 percent level in a one-tailed test.
**Significant at better than the 5 percent level in a one-tailed test.
Source: The union and nonunion means for the standard deviations of wages are calculated from the means of the standard deviations of the ln wages for each firm. The *t*-test is the standard test of the difference between two means, assuming unequal variances of the union and nonunion distribution. Also included in the regressions are size and region and, for the overall firm equation, occupation controls. In the detailed occupations, firms with only one worker listed under one occupation are deleted.

Table B. Union Wage Coefficients from Regressions Weighted by the Number of Workers per Firm with the Dependent Variable the Firm's Average ln Wage.[a]

Industry	*Union Coefficient (Standard Error)*	*Industry*	*Union Coefficient (Standard Error)*
Paints & Varnishes	.0566 (.0220)	Wood Household Furniture	.0460 (.0216)
Textile Dyeing & Finishing	.0220 (.0314)	Miscellaneous Plastic Products	.0511 (.0095)
Cotton, Manmade Fiber Textiles	.0157 (.0088)	Fabricated Structural Steel	.1665 (.0221)
Wool Textiles	.0510 (.0393)	Nonferrous Foundries	.1102 (.0205)
Industrial Chemicals	−.0045 (.0190)		

[a] Also included as independent variables are occupation, region, and size controls.