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Chapter Title: The Effects of Unions on Industrial Wage Differentials

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The Effects of Unions on Industrial Wage Differentials

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1. Scope of the Paper

THE purpose of this paper is to estimate the impact of unionism on relative (percentage) wage differentials among industries in the United States. The estimates are based chiefly on evidence obtained from earlier studies of unionism and wage differentials.

The effect of unionism on the interindustrial relative wage structure at any date consists of a set of numbers, one number for each detailed industry in the United States.[1] Estimation of these numbers for each industry at each of several dates in the last three or four decades is an enormous undertaking, only a small part of which has been completed in research done to date. Nevertheless this research does provide evidence for estimating some of the global characteristics of the complete set of numbers for all industries in this period. This paper considers mainly these global numbers rather than estimates of the effects of unionism on relative wages of particular industries.

Let w_t be the weighted geometric mean wage observed in a particular industry at date t in the presence of unionism; w_{0t} is the weighted geometric mean, with the same weights as in w_t,[2] that would

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[1] If there are n industries, there are only $(n-1)$ *independent* numbers in the set, since the all-industry average effect of unionism on relative wages is always zero.

[2] Both w_t and w_{0t} are weighted geometric means of the wages of the various grades of labor employed in the industry, with the same set of weights in w_t as in w_{0t}. The relative weight for each grade is the ratio of the aggregate compensation per unit period of time of employees in the grade to the total compensation per unit period of time of all employees in the industry, the compensation ratios being calculated in the presence of unionism. (The compensation data that are directly available in historical records are those in the presence of unionism.)

If the aggregate production function in the industry were a Cobb-Douglas function of the rates of employment of the various grades of labor and other productive services and were independent of unionism, then the set of relative compensation weights would be the same in the presence of unionism as in its absence and the ratio of w_t to w_{0t} would be the "true" index of the effect of unionism on the absolute level of wages in the industry. In the more general case in which the elasticities of substitution among the productive services are not unity, the relative compensation weights in the presence of unionism will differ from those in the absence of unionism and w_t/w_{0t} may be a biased index of the effect of unionism on the wages of the industry.

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have been observed in the absence of unionism. (The total effect of unionism on the average wage of an industry consists of the direct effect of any unionism that is present in the industry and the indirect effect of unionism present elsewhere in the economy. Thus the "unionism" that I refer to in the expression "in the presence of unionism" is *all* of the unionism present in the economy. Similarly "in the absence of unionism" means "in the absence of any unionism in the economy.") The all-industry counterparts of w_t and w_{0t} are $\overline{w}_t$ and $\overline{w}_{0t}$ respectively.

The industry's *relative wage* in the presence of unionism is $v_t = w_t/\overline{w}_t$ and in the absence of unionism is $v_{0t} = w_{0t}/\overline{w}_{0t}$. The weighted all-industry geometric mean relative wage is unity both in the presence of unionism and in its absence.

The index of the effect of unionism on the relative wage of the industry is $I_t = v_t/v_{0t}$.[3] The weighted all-industry geometric mean of the I's is always unity.

What I seek to estimate are two different aspects of the differences among industries in the relative wage effects of unionism:

1. The dispersion (standard deviation) among industries at various dates of the I's: σ_{I_t}. (Here and elsewhere in this paper the symbol σ denotes the standard deviation of the variable indicated in the subscript.) Because the I's are ratios, it is sometimes simpler analytically to deal with the logarithms of the I's, than with their absolute values. For values of I close to unity there is little difference between $(I-1)$ and the natural logarithm of I. (For example, log 1.25 = 0.223.) Thus for values of σ_I of the size of those estimated in this paper, $\sigma_I \cong \sigma_{\log I}$.

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[3] In defining relative wages I have not distinguished between relative *money* wages and relative *real* wages. The effects of unionism on relative money wages are the same as the effects of unionism on relative real wages only if the effects of unionism on the cost of living of employees in different industries are the same for all industries. I assume that any differences among industries in the effects of unionism on the cost of living of their employees are negligible and, therefore, interpret the relative wage findings of this paper as applying equally to relative money wages and relative real wages.

Let $A_t = w_t/w_{0t}$ be the index of the effect of unionism on the *absolute* (money or real as the case may be) wage level of a particular industry. The weighted all-industry geometric mean of the A's is the index of the effect of unionism on the general wage level. It follows from these definitions and that of I_t that $I_t = A_t/\overline{A}_t$. Thus the indexes I of the effects of unionism on relative wages can be deduced from the set of indexes A of the effects of unionism on absolute wages. The converse proposition, however, does not hold—the effects of unionism on absolute wages cannot be deduced from the effects of unionism on relative wages. Of course, if unionism has no effect on the general wage level, then $I_t = A_t$. However, not even the algebraic sign of $(\overline{A}_t - 1)$ can be deduced from knowledge only of the relative wage effects of unionism.

2. The effect of unionism on the relative dispersion of wages among industries at various dates as measured by $D_t = (\sigma_{\log v_t} - \sigma_{\log v_{0t}})$. The standard deviation σ_I directly measures the extent to which the relative wage effects of unionism differ among industries. Furthermore, it is likely that the larger is this standard deviation, the larger is the impact of unionism on the distribution of employment and output among industries—the resource allocation effect of unionism.

If σ_I is not zero, the effect D of unionism on relative wage dispersion among industries must be positive unless the relative wage effects of unionism are sufficiently negatively correlated among industries with their relative wages. There is rather strong evidence that this correlation is positive (though less than unity) rather than negative and, therefore, that

(1)
$$0 < D < \sigma_{\log I}.$$

If estimates of I and of v were available for one or more dates for a random sample of detailed industries, then both σ_I and D could be estimated for these dates from such sample data. Unfortunately, the numbers that emerge from presently available studies of unionism and wage differentials rarely are estimates of I by detailed industry and date. The sample of such estimates provided by the studies is both small and nonrandom. Therefore, I have used a less direct approach.

The relative wage effect estimates that may be drawn from the empirical literature on unionism and wage differentials in numerous instances are for categories that are not industries. Hence in this and the following paragraph interpret the index I as pertaining to any category of the labor force. Let p be the ratio in the category of the total employee compensation of union labor—labor covered by collective bargaining arrangements—to the total compensation of all labor. I term p the "extent of unionism" of the category. I denote the extent of unionism in the labor force as a whole by $\bar{p}$. The quantity $U = p - \bar{p}$ is the excess extent of unionism of the category. The all-category average of the U's is zero.

The numbers that I have derived from the studies of unions and wage differentials are of two similar types:

A. For a pair of categories (denoted by subscripts 1 and 2) the logarithmic or percentage difference in the relative wage effects of unionism per percentage point difference in extent of unionism:

$$\frac{\log I_1 - \log I_2}{p_1 - p_2} \cong \frac{I_1 - I_2}{I_2(p_1 - p_2)} \cong \frac{I_1 - I_2}{p_1 - p_2}$$

B. For more than two categories the regression coefficient among the categories of log I (or I) on p. The dimension of the regression coefficient also is in per cent per percentage point difference in extent of unionism. Indeed, the type A numbers are similar regression coefficients in the two-category case.

Return now to the distribution of the relative wage effects of unionism among industries. Let β denote the regression coefficient of log I (or I) on p among all industries. Then,

$$(2) \qquad \log I = \beta U + \lambda,$$

where λ is the residual from the regression. It follows from equation (2) that

$$(3) \qquad \sigma^2_{\log I} = \beta^2 \sigma_p^2 + \sigma_\lambda^2.$$

I have gauged the order of magnitude of β from the type A and B numbers derived from the earlier studies. I have estimated the standard deviation of extent of unionism among industries for the late 1920's and the 1950's from a wide variety of data, chiefly those on union membership and employment by industry.

It follows from equation (3) that $\beta\sigma_p$ cannot exceed $\sigma_{\log I}$. (The ratio $\beta\sigma_p/\sigma_{\log I}$ is the simple correlation coefficient between log I and p; the correlation between these two variables among industries surely is considerably less than unity.) Thus I regard my estimates of $\beta\sigma_p$ as underestimates of the corresponding values of $\sigma_{\log I}$.

It is much more difficult to estimate the residual variance σ_λ^2. For a few industries, all relatively highly unionized, I have been able to derive estimates of the index I. For these industries I have used equation (2) to calculate approximations of λ from the estimates of I, U, and β. The standard deviation of these residuals is a crude estimate of σ_λ

I turn now to the problem of estimating the effect of unionism on relative wage dispersion among industries as measured by $D = \sigma_{\log v} - \sigma_{\log v_0}$. D may be approximated from the inequality $|D| < \sigma_{\log I}$. More precise estimation of D requires knowledge of the correlation between relative wages and the relative wage effects of unionism among industries. Since $\log I = \log v - \log v_0$,

$$(4) \qquad \sigma^2_{\log v_0} = \sigma^2_{\log v} + \sigma^2_{\log I} - 2r_{Iv}\,\sigma_{\log v}\,\sigma_{\log I}$$

where r_{Iv} is the simple correlation between log I and log v.

Data are available for estimating the correlation between relative wages, v, and extent of unionism, p. In estimating D in section 4, I have assumed that $r_{Iv} = r_{pv}$.

2. Summary of the Relative Wage Effect Estimates Derived from Earlier Studies

Our knowledge of the relative wage impact of unionism in the United States stems almost entirely from research reported in the last decade and a half. Before World War II there were, to be sure, many serious studies of wages and of unionism containing statements regarding the effects of unions on wage differentials. However, in none of these studies, to the best of my knowledge, are there numerical estimates, with supporting data, of the relative wage effects of unions. Since the war, on the other hand, there has been an outpouring of empirical research on unions and wage differentials. Table 1 summarizes the estimates of the relative wage effects of unionism which I have drawn from this research.[4]

The effect of unionism on the relative wage differential between a pair of industries cannot be estimated simply from: the percentage difference between the two industries in their average hourly or weekly earnings or compensation or similar measure of average wages and the difference between the two industries in extent of unionism. The gross (unadjusted) differentials among industries in the common measures of average wages reflect not only effects of unionism but also the effects of differences among industries in:

1. The composition of their working forces by such characteristics as skill, age, sex, race, and so on
2. The distribution of their employment by size of community and in the attractiveness of the work and working conditions they offer employees
3. The rates of change over time of underlying demand and supply

[4] In constructing Table 1, I have endeavored to cover all the reports of empirical research on unionism and wage differentials from which I could take directly or compute numerical estimates of relative wage effects of unionism or of directions of change in these effects. (The table, however, does not cover the three recent studies mentioned below in note 6.) Unfortunately, a considerable part of the postwar research on unions and wage differentials is available only in unpublished papers and doctoral dissertations some of which, no doubt, are not known to me. The table also excludes a good many published studies in which there is evidence that unionism may have caused relative wage changes, but the evidence was of such nature that I could not estimate the size of the wage effects.

conditions and in the responsiveness of wages to these changes in conditions

TABLE 1

ESTIMATES OF RELATIVE WAGE EFFECTS OF UNIONISM DERIVED FROM EARLIER STUDIES

(in per cent per percentage point difference in extent of unionism)

	Author and Study Number				
Year	Levinson (1)	Sobotka (2)	Greenslade (3)	Lurie (4)	Rayack (5)
1914-18	—	—	0.40	—	—
1919	—	< in 1914	0.30	—	0.24
1920	< in 1914	—	0.57	≅ 1925	—
1922	> in 1914	—	1.17	—	0.20
1923	—	> in 1919	—	≅ 1925	—
1924	—	—	0.58—0.60	—	0.17
1925	—	—	—	0.15—0.20	—
1926	—	—	0.55—0.61	—	0.21
1928	—	—	—	—	0.30
1929	> in 1922	≅ 1939	0.33—0.43	0.15—0.19	—
1930	—	—	—	—	0.34
1931	> in 1929	> in 1929	0.45—0.48	—	—
1932	—	—	—	—	0.39
1933	> in 1931	—	0.56—0.58	0.22—0.24	—
1935	—	< in 1929	—	—	—
1937	—	—	⎫	0.12	—
1938	0.16	—	⎬ 0.31	0.03—0.06	—
1939	—	0.25; 0.05	⎭	—	0.20
1941	0.17	—	—	—	—
1944	0.09	< in 1939	< in 1939	—	—
1945	0.07	—	—	—	—
1946	0.05	—	—	—	≅ 0.00
1948	—	—	—	0.07—0.18	—
1950	—	> in 1944	0.50[a]	—	—
1957	—	—	—	≅ 1948	≅ 0.00

Study Number and Author	Estimated Effect and Date
6. Ross	0.08-0.09 (Jan. 1945)
7. Ross and Goldner	0.04 (1946) (1946 < 1938-42)
8. Tullock	< 0.25 (1948-52)
9. Goldner	0.14-0.20 (1951-52)
10. Garbarino	0.15 (1940)
11. Sobotka and others	0.22-0.29 (1956)
12. Scherer	0.00 (1939); 0.06-0.10 (1948)
13. Craycraft	0.01 (1948); 0.19 (1954)
14. Rees	0.00 (1945-48); (1939 > 1945-48)
15. Rapping	0.08-0.35 (1950's)
16. Friedman and Kuznets	< 0.25 (1929-34)
17. Lewis	0.00 (1948-51)

[a] 1949-51 average.

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COVERAGE OF THE ESTIMATES, BY STUDY

Study No.   *Coverage*

1. 1914-33: wage earners, by industry (and in some industries, by skill level), in selected mining, construction, manufacturing, transportation, and public utility industries.
   1938-46: wage earners, by industry, in selected mining and manufacturing industries.
2. 1939: 0.25 estimate is for composite of five skilled building crafts (carpenters, masons, painters, plasterers, plumbers), by city, in 32 large cities; 0.05 is for common construction labor, by city, in 32 large cities.
   Other years: given group is skilled building craftsmen; bench-mark group is all employees in economy.
3. Given group: production workers in bituminous coal mining.
   Bench-mark group: all employees in economy.
4. Given group: unionized motormen in local transit industry.
   Bench-mark group: nonunion motormen in local transit industry.
5. 1919-32: given group is unionized production workers in manufacturing of men's and boys' suits and coats; bench-mark group is nonunion production workers in same industry.
   Other years: given group is production workers in manufacturing of men's and boys' suits and coats; bench-mark group is all employees in economy.
6. Wage earners, by industry, in selected mining and manufacturing industries.
7. Wage earners, by industry, in selected mining, manufacturing, transportation, and public utility industries.
8. Wage and salary employees, by industry, economy-wide.
9. Wage earners in selected occupations, by standard metropolitan area, in 39 such areas.
10. Wage earners, by industry, in selected manufacturing industries.
11. Given group: commercial airline pilots. Bench-mark group: chemical engineers.
12. Given group: employees of year-round hotels in large cities in which these employees were relatively highly unionized.
    Bench-mark group: similar employees in large cities in which few of these employees were unionized.
13. Barbers, by city, in 20 large cities.
14. Given group: production workers in basic steel manufacturing.
    Bench-mark group: all employees in economy.
15. Given group: seamen in Atlantic coast ocean shipping.
    Bench-mark group: all employees in economy.
16. Given group: nonsalaried physicians.
    Bench-mark group: nonsalaried dentists.
17. Given group: civilian physicians.
    Bench-mark group: civilian dentists.

STUDIES COVERED IN TABLE 1

Study No.

1. Harold M. Levinson, *Unionism, Wage Trends, and Income Distribution, 1914-1947, Michigan Business Studies*, June 1951.
2. Stephen P. Sobotka, "The Influence of Unions on Wages and Earnings of Labor in the Construction Industry," unpublished Ph.D. dissertation, University of Chicago, June 1952; "Union Influence on Wages: The Construction Industry," *Journal of Political Economy*, April 1953, pp. 127-143.

STUDIES COVERED IN TABLE 1 (concluded)

Study No.
3. Rush V. Greenslade, "The Economic Effects of Collective Bargaining in Bituminous Coal Mining," unpublished Ph.D. dissertation, University of Chicago, December 1952.
4. Melvin Lurie, "The Measurement of the Effect of Unionization on Wages in the Transit Industry," unpublished Ph.D. dissertation, University of Chicago, December 1958.
5. Elton Rayack, "The Effect of Unionism on Wages in the Men's Clothing Industry, 1911-1955," unpublished Ph.D. dissertation, University of Chicago, December 1957.
6. Arthur M. Ross, "The Influence of Unionism upon Earnings," *Quarterly Journal of Economics*, February 1948, pp. 263-286. This paper is Chapter VI in his *Trade Union Wage Policy*, University of California Press, 1950.
7. Arthur M. Ross and William Goldner, "Forces Affecting the Inter-industry Wage Structure," *Quarterly Journal of Economics*, May 1950, pp. 254-281.
8. Gordon Tullock, *The Sources of Union Gains*, Research Monograph 2, The Thomas Jefferson Center for Studies in Political Economy, University of Virginia, June 1959.
9. William Goldner, "Labor Market Factors and Skill Differentials in Wage Rates," *Proceedings of Tenth Annual Meeting of Industrial Relations Research Association*, 1958, pp. 207-216.
10. Joseph W. Garbarino, "A Theory of Interindustry Wage Structure Variation," *Quarterly Journal of Economics*, May 1950, pp. 282-305.
11. Stephen Sobotka and others, "Analysis of Airline Pilot Earnings," unpublished mimeographed manuscript, The Transportation Center at Northwestern University, March 1958.
12. Joseph Scherer, "Collective Bargaining in Service Industries: A Study of the Year-Round Hotels," unpublished Ph.D. dissertation, University of Chicago, August 1951; "The Union Impact on Wages: The Case of the Year-Round Hotel Industry," *Industrial and Labor Relations Review*, January 1956, pp. 213-224.
13. Joseph L. Craycraft, "A Cross-Section Analysis of the Effect of Unionism on the Relative Earnings of Barbers," unpublished M.A. paper, University of Chicago, Summer 1957.
14. Albert E. Rees, "The Effect of Collective Bargaining on Wage and Price Levels in the Basic Steel and Bituminous Coal Industries, 1945-1948," unpublished Ph.D. dissertation, University of Chicago, September 1950; "Postwar Wage Determination in the Basic Steel Industry," *American Economic Review*, June 1951, pp. 389-404; "The Economic Impact of Collective Bargaining in the Steel and Coal Industries during the Post-War Period," *Proceedings of the Third Annual Meeting of Industrial Relations Research Association*, 1950, pp. 203-212; Lloyd Ulman, "The Union and Wages in Basic Steel: A Comment," *American Economic Review*, June 1958, pp. 408-426; Rees, "Reply," *American Economic Review*, June 1958, pp. 426-433.
15. Leonard Rapping, "The Impact of Unionism and Government Subsidies on the Relative Wages of Seamen," unpublished Ph.D. dissertation, University of Chicago, 1961.
16. Milton Friedman and Simon Kuznets, *Income from Independent Professional Practice*, New York, National Bureau of Economic Research, 1945, Chapter 4.
17. H. Gregg Lewis, unpublished paper.

Because the studies covered in Table 1 are numerous and dissimilar in their details, I cannot provide here[5] a study-by-study description of either the data used in the studies or of the techniques employed to separate the effects of unionism from those of other statistical and economic factors. Speaking broadly, however, two different approaches have been used to estimate the relative wage effects of unions.

1. The *cross-section* approach compares the average wage of a given, usually highly unionized, category of labor at a given date with the corresponding average wage of a less highly unionized bench-mark group of labor. The gross wage differential between the two groups is adjusted to eliminate the effects of some of the factors listed above that would produce a difference in average wages between the two groups in the absence of unionism. It is this adjusted or residual difference in average wages that is attributed to unionism.

Two difficulties arise in the use of this method. First, if the two groups differ substantially in characteristics other than unionism, it is often very costly, given available data, to adjust the gross wage difference more than crudely, if at all, for some of the factors other than unionism. The residual wage difference attributed to unionism then contains not only the effects of unionism and of the errors of measurement in the underlying wage data, but also the errors of omission and commission in adjusting the gross wage difference. Moreover, it is likely, I think, that the errors resulting from incomplete adjustment of the gross wage difference more frequently lead to overestimation than to underestimation of the effect of unionism. In this paper "relative wage effects of unionism" are the effects of unionism on the relative wages *of labor of given relative quality.* If relative quality differences between given and bench-mark groups of labor typically were uncorrelated with the true effects of unionism on the relative wage differentials between the two groups, failure to adjust gross wage differences fully for the quality differences would not lead to overestimation, on the average, of the relative wage effects of unionism. However, unionism itself may cause relative quality differences that are positively correlated with its relative wage effects.

For example, a 25 per cent greater relative wage for commercial airline pilots than would be true in the absence of unionization of

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[5] In a forthcoming monograph, *Unionism and Relative Wages in the United States: An Empirical Inquiry,* I review in detail the relevant portions of the studies covered in Table 1 and in other respects document fully the data and procedures underlying the estimates given in Table 1.

these pilots, with pilot quality only loosely specified in collective bargaining, probably would be accompanied by substantial increases in the hiring standards of new pilots by the airlines. New pilots would have to meet higher standards of physical fitness, flight training and experience, and the like. The average quality of pilots employed thus would rise, reducing the true relative wage effect of unionism below 25 per cent.

Union rules may restrain employers from taking full advantage of collectively bargained higher relative wages to raise the average quality of their working forces. In some cases, the rules may be so restrictive as to cause average quality to fall. Nevertheless, I doubt that on the average the union rules have completely prevented increases in relative quality from taking place.

The difficulties of adjusting gross wage differences, when the given and bench-mark groups differ considerably in their labor force characteristics, provide an incentive to restrict the wage comparisons to groups of labor that resemble each other closely except with respect to unionism: union and nonunion employees in the same detailed industry, occupation, locality, size of establishment, of the same sex, race, work experience, etc. The imposition of such strong comparability criteria, however, tends to confine the estimates of the relative wage effects of unionism to small and highly selected samples of union and nonunion employees, whose services may be highly substitutable in demand. The resulting estimates of the relative wage impact of unionism may have little relevance for gauging the effects of unionism on wage differentials *among* industries, occupations, localities, etc.

Several authors have used a variant of the cross-section method in which more than two groups of labor differing in extent of unionism were considered simultaneously. The variant adjusts the wages of each of the groups for factors other than unionism and correlates the adjusted wages with extent of unionism to estimate the wage differential effect of unionism per percentage point difference in extent of unionism. The adjustment and the correlation, of course, may take place simultaneously in a multivariate analysis of wages, extent of unionism, and variables reflecting factors other than unionism.

2. The *time-series* approach adjusts the *change* from a base date to a given date in the gross wage differential between the given group and the bench-mark group for factors other than unionism, and attributes the adjusted or residual *change* in wage differential to the *change*

in unionism from the base date to the given date. This method involves difficulties similar to those of the cross-section method. Furthermore, the adjusted change in the wage differential is an estimate of the level at the given date (as well as the change in the level from the base date to the given date) of the effect of unionism on the wage differential between the two groups only if the corresponding effect at the base date was negligible.

There is also a variant of the time-series method comparable to that of the cross-section method in which the adjusted changes in wages for more than two groups of labor are correlated with the corresponding changes in the extent of unionism of these groups.

Really thorough review of any of the studies covered in Table 1 would go far beyond tabulating summary numbers derived from the study to inquiry into the accuracy and relevance of the evidence used in the study, assembly of relevant data not brought to bear on the findings, and critical analysis of the specific techniques used to isolate unionism from other factors affecting wage differentials. I have not attempted such thorough review of any of the studies covered in Table 1. However, few of the figures in the table are precise copies of numerical estimates made in the studies. In the first place, the statistical work in some of the studies was not carried to the point of providing *numerical* estimates of the relative wage effects of unionism. Secondly, in some other studies the numerical estimates were not in the same dimensions as those in Table 1. For both groups of studies I have made the additional calculations, data permitting, required to reach numerical estimates of the relative wage effects of unionism in per cent per percentage point difference in extent of unionism. Thirdly, in a number of instances I have made alternative estimates that were prompted by disagreements with procedures used in some of the studies or by the ready availability now of data superior to some of those used in the studies. Although in the main I have performed these calculations on the data and within the analytical framework presented in each study, the responsibility for the numbers emerging from these calculations clearly is mine rather than that of the authors of the studies.

In interpreting Table 1, it is important to recognize that there is some statistical dependence among the estimates from the separate studies. The dependence among the figures for the mid-1940's derived from the Levinson, Ross, and Ross and Goldner papers is almost perfect. There is also some dependence between the 1938 and 1941 esti-

mates derived from Levinson and the 1940 estimate derived from Garbarino. Moreover, the six studies with broad coverage (Levinson, Ross, Ross and Goldner, Tullock, Goldner, and Garbarino), of course, overlap in varying degree the other studies in the table.

Though I show the numbers in Table 1 to two decimal places, the individual estimates undoubtedly contain errors that in some cases may be quite large. Thus, though comparison of the figures for bituminous coal mining (Greenslade, study number 3) and for the skilled building trades (Sobotka, study number 2), for example, with other figures in the table appears to confirm the popular view that the unions representing coal miners and skilled building craftsmen have been exceptionally effective in raising the relative wages of these workers, I do not regard the evidence in the table as establishing this view conclusively. Furthermore, the data in the table and in more detail in the works underlying it are too meager, in my judgment, to settle the differences among economists regarding the comparative effectiveness of craft and industrial unionism and the significance of degree of product monopoly (output concentration) as a factor producing differences in relative wage effects of unionism.

On the other hand, Table 1 does support two general empirical findings.

1. The effects of unionism on relative wages have varied substantially from one date to another in what appears to be a systematic fashion. The evidence is strongest for the period beginning in the late 1930's and ending at the end of the war or shortly thereafter. Five of the seven studies (counting the Levinson and Ross-Goldner studies as one study) that provided data for that period show declines in the relative wage effects of unionism from the beginning to the end of the period. There is less information for the comparable World War I period, but what there is points to a similar decline in relative wage effect. Both 1914-20 and 1939-48 were marked by rapid inflation of the general price level. Furthermore, there is some evidence of decline in relative wage effects from 1933 to 1939.

In contrast, three of the four studies that span the 1920-22 deflation and all five of the studies covering the deflation following 1929 show increases in the relative wage effects of unionism. Moreover, though the period since 1948 was not one of deflation, the rate of inflation generally was much lower than during and immediately following

World War II, and Table 1 indicates that the relative wage effects of unionism may have risen considerably since 1948.[6]

Thus the data in Table 1 suggest that unionism has tended to make money wages of union labor somewhat rigid against movements of the general price level in the short run. There are two reasons for suspecting that the information in Table 1 may give an erroneous impression of the amount of money wage rigidity attributable to collective bargaining:

First, the wage rigidity finding rests chiefly on the data from the five studies summarized at the top of Table 1. Part of the data in the Levinson study (for 1933 and earlier years) consists, however, of minimum wage rates specified in union agreements and such contract minima probably are more rigid than wage rates actually paid in the short run. The time series data on skilled building trades wages in Sobotka's study (number 2) also may be defective in this respect.

Second, the adjustments of the wage data for factors that might have produced wage rigidity in the absence of unionism, in the estimates derived from the data in the Levinson, Sobotka building trades (except the estimates for 1939), Greenslade, and Rayack (after 1932) studies were crude. Hence the appearance of union money wage rigidity in Table 1 may reflect in part errors in the estimates of the relative wage effects of unionism.[7]

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[6] Three recent studies, not covered in Table 1, contain information, I judge from my first reading of them, from which it may be possible to estimate the changes since 1948 in the relative wage impact of unionism. They are:
Yossef Attiyeh, "Wage-Price Spiral versus Demand Inflation: United States, 1949-1957," unpublished Ph.D. dissertation, University of Chicago, Dec. 1959. Harold M. Levinson, "Postwar Movement of Prices and Wages in Manufacturing Industries," Study Paper No. 21, *Study of Employment, Growth, and Price Levels,* Joint Economic Committee, 86th Congress, 2d sess., 1960. William G. Bowen, *Wage Behavior in the Postwar Period,* Industrial Relations Section, Princeton University, 1960.
In the larger study from which I have drawn this paper I plan to make use of the data in these three studies.

[7] I have nearly completed research in which I am attempting to estimate the extent to which changes over time in the rate of inflation have led to changes in the opposite direction in the relative wage effects of unionism. Let y be a measure of the rate of inflation of money wages or prices and U the excess of the extent of unionism of an industry over the extent of unionism in the economy as a whole. The distinguishing feature of the statistical economic models that I have used is that they include among the variables determining the relative wage of an industry not only U, but also y and the product of U and y. I have fitted a variety of models incorporating these variables to time-series data (annual, 1920-58) for two large industry groups, one consisting of the most extensively unionized industries and the second of almost completely nonunion industries. The results to date rather

2. Throughout the last twenty-five years and very likely also in earlier years (except those of rapid deflation), the *average* relative wage effect of unionism, as measured by the coefficient β in per cent per percentage point difference in extent of unionism, probably at no time exceeded 0.25 and may have been 0.05 or less at the end of and just following World War II.

Except for bituminous coal mining (study number 3), men's clothing (study number 5) in 1930 and 1932, and, uncertainly, Atlantic Coast seamen (study number 15), none of the numerical estimates in Table 1 is as large as 0.30. Furthermore, I suspect that the biases in Table 1 are toward overestimation rather than underestimation of β, not only because of inadequate control over the labor quality factor discussed in the preceding section, but also because of bias in the coverage of Table 1. I judge from my experience as an onlooker and, sometimes, adviser in several of the studies covered by the table that the industries and occupations selected for study consisted disproportionately of those in which the relative wage effects of unionism were believed to be exceptionally large. These beliefs, of course, may have been wrong, but if they were right, the sample of estimates in the table has an upward bias on this account. For these reasons I put the upper limit estimate of β at 0.20, except possibly during periods of rapid deflation of the general price level.

On the other hand, it is difficult to put the central tendency of the estimates in the table below 0.10 except in the years near the end of World War II. Thus I estimate that, apart from periods of unusually rapid inflation or of deflation, the average relative wage effect of unionism, β, was 0.10 to 0.20 per cent per percentage point difference in extent of unionism.

3. *Estimates of the Dispersion among Industries in Relative Wage Impact of Unionism*

Return now to equation (3) of section 1:

$$(3) \qquad \sigma^2_{\log I} = \beta^2 \sigma^2_p + \sigma^2_\lambda$$

where $\sigma^2_{\log I}$ is the variance among industries in the logarithms of the relative wage effect indexes I, σ^2_p is the corresponding variance of extent

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consistently show negative partial correlations between relative wages and U_y, indicating that the relative wage effects of unionism (per percentage point difference in extent of unionism) have tended to move in the opposite direction to the rate of inflation.

of unionism, and σ_λ^2 is the residual variance—that is, that part of $\sigma^2{}_{\log I}$ not accounted for by dispersion among industries in extent of unionism. In this section I estimate σ_p and, much more roughly, σ_λ.

Despite the widespread interest in unionism and collective bargaining in the last half-century, there is no source to which one can turn for the distributions by industry, with substantial industry detail, of either the total compensation or the number of workers covered by collective bargaining agreements in recent years. I was forced, therefore, to make my own estimates of extent of unionism by industry from fragmentary information. Table 2 contains these estimates.

TABLE 2

NUMBER OF UNION WORKERS AS A PER CENT OF NUMBER OF
PERSONS ENGAGED IN PRODUCTION, BY INDUSTRY
GROUP, 1929 AND 1953

| Industry Group | Per Cent | |
	1929	1953
Farms	a	a
Agricultural services, forestry, and fishing	a	12
Metal mining	3	68
Anthracite mining	80	75
Bituminous and other soft-coal mining	30	86
Crude petroleum and natural gas	1	13
Nonmetallic mining and quarrying	12	30
Contract construction	31	51
Food and kindred products	4	44
Tobacco manufactures	12	57
Textile-mill products	3	30
Apparel and other finished fabric products	28	52
Lumber and timber basic products	12	20
Furniture and finished lumber products	3	29
Paper and allied products	2	45
Printing, publishing, and allied industries	23	37
Chemicals and allied products	a	39
Products of petroleum and coal	a	67
Rubber products	a	54
Leather and leather products	12	39
Stone, clay, and glass products	9	44
Iron and steel and their products, including ordnance	5	57
Nonferrous metals and their products	4	46
Miscellaneous manufacturing	3	18
Machinery, except electrical	13	45
Electrical machinery	12	56
Transportation equipment, except automobiles	a	52
Automobiles and automobile equipment	a	80
Wholesale trade	a	4

(continued)

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TABLE 2 (concluded)

Industry Group	Per Cent 1929	Per Cent 1953
Retail trade and automobile services	1	11
Banking	a	a
Security and commodity dealers, brokers, and exchanges	a	3
Finance, n. e. c.	a	a
Insurance carriers	a	a
Insurance agents and combination offices	a	8
Real estate	2	11
Railroads	33	95
Local railways and bus lines	36	74
Highway passenger transportation, n. e. c.	a	58
Highway freight transportation and warehousing	25	63
Water transportation	16	74
Air transportation	a	51
Pipeline transportation	a	50
Services allied to transportation	22	59
Telephone, telegraph, and related services	1	68
Radio broadcasting and television	a	50
Utilities: electric and gas	a	41
Local utilities and public services, n. e. c.	a	a
Hotels and other lodging places	2	20
Personal services	6	19
Private households	a	a
Commercial and trade schools, employment agencies	a	a
Business services, n. e. c.	a	a
Miscellaneous repair services and hand trades	a	a
Motion pictures	15	21
Other amusement and recreation	21	23
Medical and other health services	a	a
Legal services	a	a
Engineering and other professional services	a	1
Educational services, n. e. c.	a	a
Nonprofit membership organizations	a	a
Federal general government, civilian	11	15
Federal government enterprises	65	79
Public education	a	2
State and local general government, nonschool	1	11
State and local government enterprises	a	30

SOURCE: See accompanying text.
a Less than 0.5 per cent.
n. e. c. = not elsewhere classified.

The denominators of the percentages in Table 2, except for nine industry groups in 1953, are the Department of Commerce estimates of the number of persons engaged in production.[8] The numerators

[8] *National Income*, 1954 ed., supplement to *Survey of Current Business*, 1954,

of the percentages are estimates of the number of employed persons covered by collective bargaining arrangements. The 1929 numerators are based on Leo Wolman's estimates of union membership by industry[9] and on information obtained from union journals and proceedings and studies of trade unionism in the 1920's. The 1953 numerators were estimated from information from a wide variety of sources: unpublished tabulations of the membership of individual trade unions by Leo Wolman and Leo Troy;[10] the Bureau of Labor Statistics surveys of trade union membership,[11] its *Current Wage Development* series, its *Wage Structure* studies, and articles in its *Monthly Labor Review*; trade union proceedings and periodicals, and correspondence with some of the unions whose membership distributions by industry proved most difficult to estimate; business and popular periodicals; correspondence and interviews with economists who have studied unionism in particular industries; articles and book-length studies of particular unions and of unionism in particular industries; and such standard statistical sources as the *U.S. Census of Population* and the BLS monthly, *Employment and Earnings*.

I constructed Table 2 mainly in order to estimate the standard deviation among the industry groups used in the table of the per cent of workers covered by collective bargaining arrangements, rather than to provide myself and others with data on the extent of collective bargaining coverage in particular industries. Thus, though I believe

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Table 28; *U.S. Income and Output*, supplement to *Survey of Current Business*, 1958, Table VI-16.

Because of changes in industry definitions, Commerce has not published estimates for the following manufacturing industries, for the years 1948 to date, that are strictly comparable to those for 1929-47:

<div>

Lumber and timber basic products	Furniture and finished lumber products
Chemicals and allied products	Products of petroleum and coal
Iron and steel and their products, including ordnance	Machinery, except electrical
	Electrical machinery
Miscellaneous manufacturing	Nonferrous metals and their products

</div>

(The industry classification scheme followed in Table 2 is that of the Department of Commerce in its series for 1929-47.) For the nine industry groups listed above I have extrapolated the Commerce series for 1929-47 using data from the Bureau of Labor Statistics, the Bureau of Employment Security, and the Bureau of the Census.

[9] Leo Wolman, *Ebb and Flow in Trade Unionism*, New York, National Bureau of Economic Research, 1936, Appendix Tables V, VII, VIII, and IX.

[10] Leo Wolman and Leo Troy, unpublished mimeographed tables revised as of August 1959, from a forthcoming monograph on trade union membership to be published by NBER.

[11] Bureau of Labor Statistics, Bulletin Nos. 1127, 1185, 1222, and 1267.

that the standard deviation of the 1953 figures in the table differs by less than 5 percentage points from the true standard deviation among the industry groups of the per cent of workers covered by collective bargaining arrangements, I suspect that some of the individual figures in the table may err by as much as 20 percentage points.[12]

The weighted (by number of persons engaged in production) standard deviations of the figures in Table 2 are 12.4 percentage points for 1929 and 24.7 percentage points for 1953. These standard deviations differ conceptually, however, from the standard deviation, σ_p, of extent of unionism among industries in two respects. First, the extent of unionism in an industry, as I have defined this concept, is not the per cent of total employment (number of persons engaged) covered by collective bargaining arrangements, but the per cent of total employee compensation going to persons covered by such arrangements. Fragmentary data indicate that for the economy as a whole the error on this score is quite small. Second, the classifications in Table 2 are for broad industry groups rather than detailed industries. There were many hints in the materials used that there was rather large dispersion in extent of unionism among industries within some of the industry groups of the table, especially in the manufacturing industry division. Since the standard deviations computed from Table 2 exclude this within-group dispersion, I put the estimated value of σ_p at closer to 15 than to 12 percentage points for 1929 and nearer to 30 than 25 percentage points for 1953.

The data from which I estimated Table 2 indicate that the dispersion of extent of unionism among industries varied little during the decade 1923-33 and from about 1945 to date. Hence I estimate that σ_p was approximately 15 percentage points in 1923-33, rose to about 30 percentage points by the end of World War II, and then stabilized at approximately 30 points.

In the preceding section, I estimated that β, the average relative wage effect of unionism per percentage point difference in extent of unionism, was approximately 0.10 to 0.20 in the latter part of the 1920's, the late 1930's and early 1940's, and again in recent years. This range and the estimates of σ_p imply that $\beta\sigma_p$ was approximately 1½ to 3 percentage points in the late 1920's, 3 to 6 percentage points recently, and between these two ranges in and near 1940.

[12] I have least confidence in the figures for 1953 for the lumber, furniture, paper, stone-clay-glass, electrical machinery, and miscellaneous manufacturing industry groups.

The quantity $\beta\sigma_p$ is that part of the dispersion, σ_I (or $\sigma_{\log I}$), of the relative wage effect indexes that is correlated among industries with extent of unionism. There is much less information for calculating the approximate value of the dispersion, σ_λ, of the I's that is not correlated with extent of unionism. For the following six industries or industry groups I have calculated approximate values of I and of U (the excess of extent of unionism in the industry over extent of unionism in the economy) chiefly from data in the studies indicated:

Contract construction (Sobotka, study number 2, estimate of I from 1939 data)

Bituminous coal mining (Greenslade, study number 3, estimate of I from 1949-1951 data)

Local transit (Lurie, study number 4, estimate of I from 1948 data)

Men's clothing (Rayack, study number 5, estimate of I from 1957 data)

Hotels (Scherer, study number 12, estimate of I from 1948 data)

Water transportation (Rapping, study number 15, estimate of I for the 1950's).

I then calculated the residual λ for each industry by means of equation (2) in the first section of this paper, with β set equal to 0.20. The weighted (by number of persons engaged) standard deviation of these residuals was close to 5 percentage points—about the same size as the estimate of $\beta\sigma_p$ for recent years (at a value of β of 0.20).

I do not hold this estimate of σ_λ in high esteem. It is based on imprecise information for a nonrandom sample consisting of six industry groups employing a small fraction of the labor force. On the other hand, the estimate does suggest that the residual dispersion σ_λ is roughly the same in size as the dispersion $\beta\sigma_p$ correlated with extent of unionism, and thus that the total dispersion σ_I, is about half again as large as $\beta\sigma_p$. I conclude that in the late 1920's the standard deviation of the relative wage effects of unionism among industries was approximately 2 to 4 percentage points and recently about 4 to 8 percentage points.

4. Estimates of the Effects of Unionism on Interindustrial Relative Wage Dispersion

In the preceding section, I estimated the amount of dispersion, $\sigma_I \cong \sigma_{\log I}$, among industries of the relative wage effects of unions. In this section, I estimate the amount, $D = \sigma_{\log v} - \sigma_{\log v_0}$ of the effect of

unionism on relative wage dispersion among industries. Although these two measures of the relative wage impact of unionism are related, they are not the same. In particular, the second cannot exceed the first numerically: $|D| \leq \sigma_{\log I}$. My estimates of σ_I imply, therefore, that unionism changed the amount of interindustrial relative wage dispersion by no more than 2 to 4 percentage points in the late 1920's and no more than 4 to 8 percentage points recently.

Table 3 shows the standard deviation of relative average annual full-time compensation among the industry groups (except military and work relief) for which the Department of Commerce reports employment and employee compensation of wage and salary employees.[13] (The industry groups are the same as those in Table 2.)

TABLE 3

STANDARD DEVIATION OF RELATIVE AVERAGE ANNUAL FULL-TIME
COMPENSATION AMONG INDUSTRIES, 1929-58

(per cent)

Year	Standard Deviation	Year	Standard Deviation	Year	Standard Deviation
1929	29.6	1939	31.9	1949	25.4
1930	29.9	1940	32.1	1950	26.5
1931	32.1	1941	32.0	1951	27.7
1932	35.1	1942	33.1	1952	28.0
1933	34.4	1943	31.7	1953	28.7
1934	33.4	1944	29.4	1954	28.9
1935	33.1	1945	26.6	1955	29.7
1936	33.0	1946	24.1	1956	30.5
1937	31.8	1947	24.2	1957	30.9
1938	32.4	1948	24.9	1958	31.5

SOURCE: See note 13.

[13] The data underlying Table 3 are largely from the following national income reports of the Office of Business Economics, Dept. of Commerce: *National Income*, 1954, *U.S. Income and Output*, 1958, and *Survey of Current Business*, July 1959, pp. 3-43.

For each industry group and year, I computed average annual full-time compensation by dividing total employee compensation by the number of full-time equivalent employees. The numbers in Table 3 are fixed weighted coefficients of variation of these average annual compensation figures. The fixed weight for each industry group is the group's average number of full-time equivalent employees over the period 1929-57.

For the nine industry groups mentioned in note 8, Commerce employment and employee compensation data for 1948-58 are not "strictly comparable" to those for 1929-47. I have extended the 1929-47 series for these groups through 1958

Throughout the whole period covered by the table the amount of relative wage dispersion among industries was quite large.[14] Furthermore, only a small part of the dispersion was transitory. In general, the industries whose relative wages were high in any one of the thirty years also had high relative wages in the other years: the standard deviation among the industry groups of their thirty-year average relative wages was 28.6 per cent, which is only slightly lower than the thirty-year average (30.1 per cent) of the figures in the table. Thus the interindustrial relative wage structure was a highly stable one in the sense that the correlations among industries between relative wages in one year and relative wages in another year in the period were very high. The structure was also relatively stable in a second sense: there is no trend to speak of in the figures in Table 3. On the other hand, some of the short-run changes in relative wage dispersion were large: the standard deviation rose by 5.5 percentage points from 1929 to 1932 and declined by 9.0 percentage points from 1942 to 1946.

As already noted, σ_I is an overestimate of the magnitude of the effect of unionism on relative wage dispersion among industries, unless the relative wage effects of unionism are perfectly correlated among industries with relative wages. Nevertheless, though my estimates of σ_I are not negligible compared to the figures in Table 3, it is quite clear that, unless I have badly underestimated σ_I, the level of relative wage dispersion among industries must be accounted for largely in terms of factors other than unionism. There is some tendency for the *movements* in the series in Table 3 to correlate positively with the changes in relative wage effects of unionism in Table 2. Thus it is quite possible

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using the national income reports data and data from the Bureaus of Employment Security, Labor Statistics, and Census.

It was also necessary to allocate wage supplement totals for the Commerce "general government" headings among the industry groups within these headings. I allocated the wage supplements as follows: (1) zero wage supplements to "work relief," (2) wage supplements to the remaining groups in proportion to their total wages and salaries.

[14] It is likely that the standard deviations in Table 3 contain some upward bias resulting from errors of measurement in the relative wage figures from which they were computed. On the other hand, the standard deviations surely are biased downward by their exclusion of relative wage dispersion among detailed industries within the broad industry headings used by the Department of Commerce.

The standard deviations may also be affected by differences among industries in relative "full-time" hours worked per man per year. I suspect that in most of the years covered by the table the standard deviation of average hourly compensation would not have differed much from the standard deviation of average annual compensation.

that unionism may account for an important part of the difference between the level of the series in the late 1930's and early 1940's, and again in 1956-58, and the level in 1929-30. The changes in relative wage dispersion from 1929 to 1932, 1942 to 1946, and 1946 to 1958, however, are too large to be explained mainly in terms of unionism.

For the two years, 1929 and 1953, for which I have estimated extent of unionism for the industry groups in Table 2, I have attempted to make more precise estimates of the effect of unionism on interindustrial relative wage dispersion. These estimates take into account, at least roughly, the correlation among industries between relative wages and the relative wage effects of unionism. The procedure followed is that discussed at the end of section 1. For each industry group in Table 2, the estimates of relative wages v, in the presence of unionism for 1929 and 1953, are those underlying the standard deviations for those years in Table 3. The formula used for calculating relative wages, v_0, in the absence of unionism is:

$$v_0 = v/(1 + U\sigma_I/\sigma_p)$$

where U is the excess of the extent of unionism p in the industry group over the average extent of unionism $\bar{p}$ in all industries. My estimates of σ_I and σ_p imply that in both years the ratio σ_I/σ_p was approximately 0.2, and this is the figure that I used in the computations. The extent of unionism figures in Table 2 refer to all persons engaged in production in each industry group. The relative wage estimates underlying Table 3, however, cover only wage and salary employees on a full-time equivalent basis. To make the extent of unionism figures comparable with the relative wage figures, I multiplied each figure in Table 2 by the ratio for the industry group and year of the number of persons engaged in production to the number of full-time equivalent employees.[15]

For 1929, the estimated standard deviation of relative wages in the absence of unionism was 29.5 per cent, negligibly lower than the actual dispersion, 29.6 per cent, shown in Table 3. The estimate for 1953 of the standard deviation of relative wages in the absence of unionism was 26.4 per cent, 2.3 percentage points lower than the actual standard deviation of 28.7 per cent. Thus though unionism apparently explains the slightly higher level of relative wage dispersion in recent years than in 1929-30, it can account for only a small part of the actual

[15] See notes 8 and 13 for sources of these employment data.

dispersion in relative wages during the period 1929 to 1958. Further-more, these more precise estimates make it very likely that the large changes in relative wage dispersion from 1929 to 1932, 1942 to 1946, and 1946 to 1958 stemmed mostly from factors other than unionism.

5. Summary

In this paper I have brought together information from a rather large number of studies of unionism for the purpose of estimating for the economy as a whole (1) the extent to which unionism has affected in different proportions the wages paid by different industries and (2) the amount of the effect of unionism on relative wage dispersion among industries. These estimates are easily summarized:

a. The standard deviation among industries of the percentage effects of unionism on relative wages, I estimate, was of the order of magnitude of 2 to 4 percentage points in the latter half of the 1920's, about 4 to 8 percentage points recently, between these two ranges in the late 1930's and early 1940's, but may have been as low as 2 percentage points or even lower at the end of and immediately following World War II. The data in Tables 1 and 2 indicate that a standard deviation of relative wage effects of unionism as large as 4 to 8 per cent surely involves for some industries relative wage effects that, I judge, few economists would describe as either "small" or "economically insignificant."

b. The role of unionism as a factor explaining relative wage dispersion among industries surely was minor compared to that of factors other than unionism. During the period 1929-58 the standard deviation of relative wages among industries ranged from 24 to 35 per cent and averaged 30 per cent. In 1929 the dispersion was about 30 per cent, in 1953 about 29 per cent. I estimate that in the absence of unionism the dispersion would have been only slightly lower: by less than one-half percentage point in 1929 and by roughly 2 to 3 percentage points in 1953.

COMMENT

JOHN T. DUNLOP

(1) The effects of combinations of workmen, trade unions or collective bargaining have been a persistent problem to economists from the earliest days of the discipline in Great Britain. The many recent attempts to measure or to estimate the magnitude of these effects is in keeping

with the quantitative developments of our discipline. Gregg Lewis is concerned with only one dimension of the effects of unions, that on interindustry wage differentials. He is not concerned with the effects of unions (or collective bargaining) on the level of wages nor with its impact on occupational or geographical differentials or other aspects of the structure of wages. But he does provide a useful summary and interpretation of seventeen studies of interindustry differentials, although since his paper was prepared a number of additional articles have appeared.

(2) Lewis' general results will not surprise students of the problem. He concludes that the relative wage effect of unionism among industries was approximately 2 to 4 percentage points in the late 1920's and about 4 to 8 percentage points in the late 1950's; that the interindustry wage structure tends to be highly stable; that unionism tended to make money wages somewhat rigid against price decreases in the Great Depression and against price increases in the post-World War II inflation, and that relative wage dispersion among industries must be accounted for largely in terms of factors other than unionism.

(3) In view of the growing number of statistical studies of the impact of unions on wages, it is unfortunate that more attention has not been paid to a number of basic questions concerning the significance and fruitfulness of this use of scholarly resources. There are a number of problems with the whole line of inquiry which need to be raised, and the present conference is an appropriate occasion.

(4) On general intellectual grounds one should suspect that it would be well-nigh impossible to measure the specific impact on wage rates, and more specifically, the effects on the interindustry wage structure, of so complex an institutional change as the introduction of collective bargaining. To separate out the independent effect of unionism from all the other factors influencing wage-rate structures implies a higher degree of confidence in our statistical data and methods and a simpler view of the workings of collective bargaining than is warranted.

One must seek a reason for this persistent concern with the impact of unionism. There appears to be no similar concern to measure the independent effect of the corporate form of organization on industrial prices, or the independent effects of the banking sytem or the savings banks on the structure of interest rates. No one estimates what prices would be or what the price structure would look like with a different size distribution of enterprises, or with a greater or lesser degree of

concentration in business. No one attempts to give a figure for the effect of insurance companies or investment trusts or personal finance companies on the structure of interest rates. The persistent concern with the impact of unionism as an institution perhaps reflects a pre-occupation with defending or condemning the institution as a whole. The institution is here and is likely to stay. The factors influencing wage structure and wage levels are a significant area of investigation, but the institution itself is hardly to be included in equations alongside profits, employment, productivity, the degree of competition, and other variables.

(5) All we know about collective bargaining suggests that the most important effects involve fundamental changes in an enterprise and its surrounding product and labor markets. It is really not possible to leave the enterprise and its markets alone, introduce a union, and then see what happens to the wage structure. The introduction of unionism typically involves a wholesale transformation. Lewis recognizes one facet of this change when he points to changes in what he terms the quality of the work force. But there are many more aspects to the problem. The content of jobs and the division of one from another is frequently altered. The method of wage payment may be changed. The division of compensation between wage rates and fringes and benefits is altered. Working rules change the meaning of the services supplied. Even greater significance should be placed on the point that virtually every determinant of wages in an enterprise and its surround-ing markets may be altered, and often is changed, with the introduction of collective bargaining. The physical productivity of labor including its skill, training, and morale may be changed. The information on jobs and the workings of the labor market may be altered. The whole in-ternal management of an enterprise is almost certain to be drastically altered to confront or deal with a labor organization. Aside from sub-stitution, technology may be different. Product-market competition has been decisively affected in many cases. It is unrealistic and improper to pose the problem in terms of comparing wages with or without a union, assuming all other wage-setting factors are unchanged. Col-lective bargaining changes most of the wage-setting variables.

(6) The fashion to measure union power by the proportion of an industry governed by collective bargaining agreements or by the pro-portion of employees in an industry in labor unions involves some serious difficulties. This measure does not distinguish between equally

well-organized unions, some of whom operate in favorable markets and others who confront unfavorable environments. Consider the differences in wage movements in the last decade between the steel industry and the men's clothing industry. The difficulty with the measure of union power may be most clearly seen if one considers a fully unionized labor force; the measure then ceases to have meaning as any index of union power to interpret the wage structure. The measure also fails to acknowledge the difference between an initial impact of collective bargaining and the long-term consequences, a distinction which has been noted by many observers from Paul H. Douglas on. Moreover, the measure constitutes an implied negation of the whole field of union (or collective bargaining) policy making. The intellectual problem is to explain the different policies developed by different parties. Contrast, for example, the various policies of the coal and railroad unions, each equally well organized and confronted with autonomous decreases in demand in their product markets. There are different effects on wages (also employment, technical change, etc.) in accordance with different policies of the parties.

(7) Brief mention should be made of at least one statistical difficulty common to these studies. The use of standard industrial classifications of industries involves divisions of the economy that may be of little significance for wage-setting purposes. The industrial classifications of "stone, clay, and glass products," "products of petroleum and coal" or "chemical and allied products," for instance, involve mixtures of product markets and local or national wage-setting contours which are not likely to reveal the forces determining wage rates. Wage rates are determined in these separate contours, and ideally the wage data and the variables thought to influence wage rates should be presented for such contours or sectors of the economy.