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FACTORS AFFECTING NEGOTIATED WAGE RATE CHANGES IN THE UNITED STATES: AN INDUSTRY LEVEL INVESTIGATION

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The effect of labor unions on the level of money wage rates has been a controversial topic among economists. For example, D.S. Hamermesh, using data involving wage differentials between white-collar and blue-collar workers argues that blue-collar unions have had a positive, but not large, effect on wage rates.[1] Segal also found a statistically significant correlation between changes in hourly earnings and union strength in nineteen industries during 1952-58.[2]

On the other hand, Clark Kerr argues that,

> The conclusion from this record is that trade unionism in the United States to date has had no important effect on labor's share. . . There is no evidence of any significant permanent effect through normal collective bargaining, except possibly in highly unionized metropolitan areas. . . There may have been some slow secular shift toward labor over the half century since 1900, but most of it occurred before 1929 (thus before the rise of the modern trade union movement), and in nonmanufacturing sectors.[3]

Allan Cartter concurs with Kerr and states,

> Both unionists themselves and their strongest antagonists believe that unions do have the power to markedly affect wage levels but both seem overimpressed by the illusory effect of money wage changes resulting from collective bargaining.[4]

However, he also believes that unions do affect the form of wage changes, the general structure of wages, the level of money wage rates and prices, and certain nonmonetary aspects of work agreements.[5]

The purpose of this paper is to examine the relationship between certain factors which are expected to reflect union wage rate requests and the outcomes of the wage bargaining process. The data used are United States industry data at the two digit SIC classification level of aggregation. Previous investigations have not been carried out using industry data at this level of disaggregation for this time period, 1958-1971. Also, Segal's work involved the use of simple correlation coefficients, no regression analysis.

I. The Model

We shall begin our discussion by examining briefly a theoretical model of labor union behavior.[6] In this model the goal of a labor union is assumed to be maximization of utility, and because of difficulties involved in constructing a social welfare function, the decision maker(s) is (are) assumed to be the union leader (or leaders). (If there is more than one union leader, it is assumed that their preferences relevant to the following analysis are identical). Furthermore, it is assumed that the utility function of the labor union leader has three arguments: the real wage rate applicable to union members currently and in future periods, W_t/P_t, where W is the money wage rate, P is an index of consumer prices, and $t = 1, 2, \ldots, n$; the fraction of union labor employed currently and in future periods, L_t; and the bargaining costs, B_t, which a union incurs to achieve the wage rate (W_t). Thus,

$$U = U(W_t/P_t, L_t, B_t), \text{ where } t = 1, 2, \ldots, n.$$

It is assumed that $\partial U/\partial W_t > 0$, $\partial U/\partial L_t > 0$, and $\partial U/\partial B_t < 0$.

The utility of union leaders is constrained by two factors – the demand for labor and the relationship (i.e., "production function") of bargaining costs relative to wage rate changes. These limitations are expressed by the following two functions:

$$L_t = f(W_t/P_t), \quad \partial f/\partial W_t < 0, \quad \partial f/\partial P_t > 0,^{7} \text{ and,}$$

$$B_t = g(W_t - W_{t-1}), \quad \partial g/\partial W_t > 0 \text{ and } \partial g/\partial W_{t-1} < 0,$$

as long as $(W_t - W_{t-1})$ is greater than zero; $B_t = 0$, otherwise.

This last relationship states that bargaining costs incurred this period are a function of the size of the wage rate *increase* bargained for this period. If no wage rate increase is bargained for, bargaining costs are zero. Furthermore, this author would suggest that bargaining costs are related in a nonlinear fashion to the size of $W_t - W_{t-1}$, so that as the size of $W_t - W_{t-1}$ increases, B_t increases more than proportionally.

It seems reasonable to assume that many manufacturers will be able to pass on some wage increases in the form of price increases without a significant impact on the quantity demanded of the firm's product, especially when price increases are occurring throughout the economy. Labor productivity increases may also offset part of the wage rate increases. However, larger wage rate increases and correspondingly larger price increases may have a significant effect on the quantity demanded of the final product, particularly if these increases make foreign goods more competitively priced. Thus, while firms may be willing to grant small wage rate increases with little bargaining costs in-

curred on the part of unions, larger wage rate increases may well entail disproportionately higher bargaining costs.

Using the method of Lagrangean multipliers we can combine the utility function with its two constraints into one augmented function,

$$(1)\quad Z=U(W_t/P_t,\ L_t,\ B_t) + \lambda_t\ [L_t - f(W_t/P_t)] + \lambda_t'[B_t - g(W_t-W_{t-1})]$$

Taking partial derivatives of Z and setting them equal to zero we obtain the following first order conditions:[8]

$$(2)\quad \partial U/\partial W_t - \lambda_t \partial f/\partial W_t - \lambda_t' \partial g/\partial W_t - \lambda_{t+1}' \partial g/\partial W_{t-1} = 0 \qquad t = 1,2,\ldots n.$$

$$(3)\quad \partial U/\partial L_t + \lambda_t = 0 \qquad t = 1,2,\ldots n.$$

$$(4)\quad \partial U/\partial B_t + \lambda_t' = 0 \qquad t = 1,2,\ldots n.$$

$$(5)\quad L_t - f(W_t/P_t) = 0 \qquad t = 1,2,\ldots n.$$

$$(6)\quad B_t - g(W_t - W_{t-1}) = 0 \qquad t = 1,2,\ldots n.$$

The last term in Equation 2 can be confusing because of the notation. Notice that λ_{t+1}' in that expression refers to Period t + 1. The presence of this term is required because it takes into account the fact that the value of W_t this period will affect bargaining costs *next* period when this period's wage rate moves into the position of W_{t-1}. Specifically, the higher the bargained-for wage rate *this* period, the lower will be the bargaining costs incurred next period to achieve a particular wage rate, other things remaining equal.

Without bargaining costs the marginal rate of substitution of employment for wages would (for utility maximization) simply equal minus one times the reciprocal of the slope of the demand curve for labor, or

$$(7)\quad \frac{\partial U/\partial W_t}{\partial U/\partial L_t} = -\partial f/\partial W_t, \qquad t = 1,2,\ldots n.$$

Equation 7 states that the utility of the union is maximized when the rate at which it is just *willing* to substitute higher wage rates for

greater employment (keeping utility constant), is equal to the rate at which they *can* be substituted given the demand for labor.

However, when bargaining costs must be considered, the utility maximizing condition becomes

$$(8)\quad \frac{\partial U/\partial W_t}{\partial U/\partial L_t} = \frac{\overset{<0}{-(\lambda_t}\ \overset{<0}{\partial f/\partial W_t} + \overset{>0}{\lambda'_t}\ \overset{>0}{\partial g/\partial W_t} + \overset{>0}{\lambda'_{t+1}}\ \overset{<0}{\partial g/\partial W_{t-1}})}{\underset{<0}{\lambda_t}}$$

$$= -\partial f/\partial W_t - \frac{\lambda'_t}{\lambda_t}\,\partial g/\partial W_t - \frac{\lambda'_{t+1}}{\lambda_t}\,\frac{\partial g}{\partial W_{t-1}}.$$

In this case there are two additional terms on the right hand side of the equation, terms which could be interpreted as the ratio of the marginal (dis) utility of bargaining costs to the marginal utility of employment times the effect of marginal changes in W_t on bargaining costs both in the current period and in the next period. It is significant that the first two terms both represent costs of increasing W_t; the first represents the cost of losing employment and the second increased bargaining costs. The effect is to make wage increases in the current period more costly when bargaining costs are considered than when they are ignored.

However, as indicated above, the third term does represent a benefit of a higher W_t: *ceteris paribus*, bargaining costs will be lower in Period t + 1 than with a lower W_t. In other words, the higher the W_t, the lower the bargaining costs required to achieve some specific higher wage rate. It seems realistic to assume that it is easier to bargain for a $10 wage rate from a current wage rate of $9 than one of $5. Consequently, the presence of bargaining costs creates a built-in bias toward relatively higher wage rates (or downward wage-rate rigidity when the demand for labor has declined), because union leaders recognize that a reduction in the current wage rate would cause them to pay higher bargaining costs in the future if they wished to obtain higher wage rates. Since unions do not recoup any of the bargaining expenses incurred previously when wage rates are lowered, the effect of bargaining costs on wage demands may not be symmetrical relative to a wage increase or decrease.

The empirical model which was used in this study and which can be derived from the theoretical model presented above will now be presented. It is hypothesized that the bargained-for wage rate changes are a function of the level of unemployment, changes in the consumer price index, changes in labor productivity, and the number of major contracts which have expired during the bargaining period.

More explicitly, the following relationship was estimated:

$$\frac{\dot{W}}{W_{t-1}} = \beta_0 + \beta_1 MC_t + \beta_2 \left(\frac{\dot{P}}{P_{t-1}}\right) + \beta_3 \left(\frac{\dot{Prod}}{Prod_{t-1}}\right)$$

$$+ \beta_4 \left(\frac{1}{U_t}\right) + \epsilon_t,$$

where

$\frac{\dot{W}}{W_{t-1}} = \frac{W_t - W_{t-1}}{W_{t-1}}$ = the bargained-for fractional change in the money wage rate at time t,

MC_t = the number of major contracts to be negotiated during Period t,

$\frac{\dot{P}}{P_{t-1}} = \frac{P_t - P_{t-1}}{P_{t-1}}$ = the fractional change in the consumer price index during period t,

$\frac{\dot{Prod}}{Prod_{t-1}} = \frac{Prod_t - Prod_{t-1}}{Prod_{t-1}}$ = the fractional change in labor productivity during period t,

U_t = the unemployment rate during period t, and

ϵ_t is an error term.

It was expected that β_1, β_2, β_3, and β_4 would be greater than zero.

The major contracts variable was included because it was hypothesized that during a period in which many contracts were scheduled to be negotiated the labor unions might be willing to work for greater wage increases as a result of economies of scale relative to bargaining costs due to a "pattern" or "snowballing" effect. Thus, it is expected that the size of the wage rate changes and the number of major contracts negotiated will be correlated.

As was indicated in the theory section, union utility is assumed to be a function of the *real* wage rate. Consequently, changes in the consumer price index are assumed to affect union demands and bargaining outcomes. Productivity growth is included because it was hypothesized that increases in productivity would reduce the bargain-

ing costs necessary to obtain a given wage rate increase (or enable the union to obtain a larger wage rate for a given amount of bargaining costs). Higher worker productivity should also result in employer willingness to hire a greater number of employees at any given wage rate.

Finally, it was argued in the previous section that employment is a factor affecting union utility. Consequently, it follows that the level of unemployment affects union *demands* for wage rate increases, and, consequently, the bargained-for wage rate increases. The reciprocal of the unemployment variable is used because it is expected that an inverse, nonlinear relationship prevails between unemployment and wage rate growth. Because frictional unemployment is always present, the relationship between wage rate growth and the reported unemployment rate is usually hypothesized to be nonlinear, especially at lower levels of unemployment. Thus, a statistical unemployment rate of zero would be most unusual, and at low levels it appears that successively higher levels of wage rate growth are needed to reduce the unemployment rate by some fraction of a percent.

Originally, a work stoppages variable was also included as an independent variable, since it was assumed that higher bargaining costs incurred by a union would result in higher wage rate increases. However, this variable was highly correlated with the major contracts and unemployment variables, so it was omitted in later regressions.

As stated above, the data used in this paper are annual data at the two-digit SIC industry classification level for the United States for the years 1958 through 1971. Because of difficulties in obtaining data only the fabricated metals, food and kindred, textiles, and apparel industries were included in this study. Even so, the data for the bargained wage rate increase variable had to be developed as a weighted average (weighted according to number of workers affected) of the results of individual contract agreements.[9]

The above relationships were estimated using both aggregate manufacturing labor productivity data and an index of labor productivity in each industry calculated from indices of output and employment at the two-digit SIC industry level reported by John Kendrick and Elliot S. Grossman.[10] Aggregate productivity data and industry productivity data are indicated by *A Prod* and *I Prod*, respectively.

The appropriate lag structure with regard to price and productivity growth was not evident a priori. In fact, it may vary from industry to industry. Therefore, the above relationships were estimated first with no lagged variables and then with the price and productivity variables lagged one period.

The 1958-71 period was used in this study for two reasons. First, some of the unemployment data was not available before 1958. Second, the imposition of wage and price controls in August, 1971, interrupted the time series. Moreover, even after the controls were lifted the United States labor markets have been somewhat in disarray because of anticipation that wage controls would be reimposed.

II. Statistical Results

The results of the statistical investigation, shown in Table 1, can be summarized as follows. First, the coefficient of the major contracts variable was generally significant at the 10 percent level of significance and it had the hypothesized sign. This result is consistent with the hypothesis that union bargainers put forth additional effort for greater bargained-for wage rate increases the greater the number of major contracts expiring in a given year.

The coefficient of the unemployment variable generally had the hypothesized sign, but it was significant at the 5 percent level of significance only in the lagged bargained wage rate change relationships for the fabricated metals industry.

The statistical results with respect to the price and productivity variables were mixed. The coefficient of the price variable had the hypothesized sign and was generally significant at the 5 percent level of significance for the fabricated metals industry. However, this coefficient frequently had the wrong sign and was not statistically significant for the relationships estimated for the other three industries.

The behavior of the coefficients of the productivity growth variables seem consistent with the conclusion that the productivity indices derived from the two-digit SIC data supplied by Kendrick and Grossman did not more closely reflect productivity growth in these industries than did aggregate manufacturing productivity data. There does seem to be a problem with obtaining data which accurately depict productivity growth at this level of aggregation. In general, the lagged versions of the equation correspond more closely to the hypothesized relationship than did the unlagged versions.

Thus, while the relationships estimated for the fabricated metals industry were in general consistent with that hypothesized, the results for the other three industries were mixed. The estimated relationships of the food and kindred industry particularly gave little support to the hypothesized relationship.

In general, except for the food and kindred industry, the Durbin-Watson statistic was such that we could accept the hypothesis of no autocorrelation at the two percent level of significance. Even in the case of the food and kindred industry, the statistics were in the range where the hypothesis of no autocorrelation could be neither accepted nor rejected. In fact, they were much closer to the range of no autocorrelation than the ranges where the hypothesis of no autocorrelation would be rejected. Moreover, given the other problems with the estimated relationship for this industry, it did not appear to be worthwhile to utilize any of the statistical procedures available to reduce or eliminate any possible autocorrelation.

The reasons why these results were obtained for the apparel, food and kindred, and textiles industries are not clear. However, a few sug-

TABLE 1
Results of Wage Rate Bargaining Investigation
(t Value)

Industry									R^2	D-W
Apparel	$\frac{\dot{W}}{W}_{t-1}$	= -.00922	+ .00047 MC_t	- 1.58614 $\frac{\dot{P}}{P}_{t-1}$	- .05176 $\frac{I\ Prod}{Prod}_{t-1}$	+ .40672 $\frac{1}{U_t}$			.64	2.33
			(3.615)***	(-2.596)**	(- .170)	(1.326)				
	$\frac{\dot{W}}{W}_{t-1}$	= .05997	+ .00033 MC_t	- 1.27172 $\frac{\dot{P}}{P}_{t-1}$	- .72246 $\frac{A\ Prod}{Prod}_{t-1}$	+ .12651 $\frac{1}{U_t}$			.78	2.02
			(3.000)***	(-2.581)**	(-2.295)**	(.482)				
	$\frac{\dot{W}}{W}_{t-1}$	= .03869	+ .00040 MC_t	- 1.35674 $(\frac{\dot{P}}{P}_{t-1})_{t-1}$	- .01901 $(\frac{I\ Prod}{Prod}_{t-1})_{t-1}$	+ .04025 $\frac{1}{U_t}$			.72	1.90
			(4.444)***	(-3.379)***	(- .066)	(.186)				
	$\frac{\dot{W}}{W}_{t-1}$	= .03253	+ .00034 MC_t	- 1.03986 $(\frac{\dot{P}}{P}_{t-1})_{t-1}$	+ .36262 $(\frac{A\ Prod}{Prod}_{t-1})_{t-1}$	- .00045 $\frac{1}{U_t}$			.76	1.92
			(3.400)***	(-2.059)**	(.957)	(-.002)				

TABLE 1, continued

Industry											R^2	D^W
Fabricated Metals	$\frac{\dot{w}}{w}_{t-1}$	=	-.00516	+	.00047 MC_t	+	.79918 $\frac{\dot{P}}{P}_{t-1}$	-	.14344 $\frac{I\ \dot{Prod}}{Prod}_{t-1}$	+	.03610 $\frac{1}{U_t}$	.84	1.97
					(1.741)*		(1.572)*		(.376)		(.568)		
	$\frac{\dot{w}}{w}_{t-1}$	=	-.00419	+	.00056 MC_t	+	.62518 $\frac{\dot{P}}{P}_{t-1}$	-	.00369 $\frac{A\ \dot{Prod}}{Prod}_{t-1}$	+	.05241 $\frac{1}{U_t}$	.84	1.87
					(2.000)**		(2.006)**		(-.012)		(1.113)		
	$\frac{\dot{w}}{w}_{t-1}$	=	-.00641	+	.00029 MC_t	+	.61101 $(\frac{\dot{P}}{P}_{t-1})_{t-1}$	-	.32506 $(\frac{I\ \dot{Prod}}{Prod}_{t-1})_{t-1}$	+	.13435 $\frac{1}{U_t}$	.91	2.63
					(1.933)**		(2.658)**		(-1.885)**		(3.824)***		
	$\frac{\dot{w}}{w}_{t-1}$	=	-.01164	+	.00031 MC_t	+	.80845 $(\frac{\dot{P}}{P}_{t-1})_{t-1}$	-	.05616 $(\frac{A\ \dot{Prod}}{Prod}_{t-1})_{t-1}$	+	.11023 $\frac{1}{U_t}$	.86	1.81
					(1.476)*		(3.308)***		(- .269)		(2.823)**		

TABLE 1, continued

Industry										R^2	DW
Food and Kindred	$\frac{\dot{W}}{W}_{t-1}$	= .48598	+ .00142 MC_t		- 9.19922 $\frac{\dot{P}}{P}_{t-1}$		+ 4.87753 $\frac{\dot{I\ Prod}}{Prod}_{t-1}$		- 3.94168 $\frac{1}{U_t}$	.20	2.78
			(.469)		(- .579)		(.570)		(- .529)		
	$\frac{\dot{W}}{W}_{t-1}$	= 2.33892	- .00096 MC_t		- 2.01496 $\frac{\dot{P}}{P}_{t-1}$		- 14.05344 $\frac{\dot{A\ Prod}}{Prod}_{t-1}$		- 10.71351 $\frac{1}{U_t}$	.37	2.56
			(-.372)		(- .151)		(-1.546)*		(-1.490)*		
	$\frac{\dot{W}}{W}_{t-1}$	= .77534	- .00061 MC_t		+ .17023 $(\frac{\dot{P}}{P}_{t-1})_{t-1}$		+ 8.05365 $(\frac{\dot{I\ Prod}}{Prod}_{t-1})_{t-1}$		- 6.24017 $\frac{1}{U_t}$	.27	2.42
			(-.220)		(.012)		(1.067)		(-1.138)		
	$\frac{\dot{W}}{W}_{t-1}$	= .48107	+ .00140 MC_t		+ 4.40138 $(\frac{\dot{P}}{P}_{t-1})_{t-1}$		+ 17.81142 $(\frac{\dot{A\ Prod}}{Prod}_{t-1})_{t-1}$		- 8.14386 $\frac{1}{U_t}$	.45	2.55
			(.583)		(.362)		(2.034)**		(-1.707)*		

TABLE 1, continued

Industry		R^2	D^W
Textiles	$\dot{W}_{t-1} = .02583 + .00154\ MC_t - .30275\ \dot{P}_{t-1} - .08421\ \frac{\dot{I\ Prod}}{Prod}_{t-1} + .06594\ \frac{1}{U_t}$ (1.400)* (- .458) (-.605) (.307)	.23	1.86
	$\dot{W}_{t-1} = -.04116 + .00151\ MC_t - .05988\ \dot{P}_{t-1} + .95942\ \frac{\dot{A\ Prod}}{Prod}_{t-1} + .18841\ \frac{1}{U_t}$ (1.798)* (- .116) (2.496)** (1.178)	.55	1.43
	$\dot{W}_{t-1} = -.00443 + .00134\ MC_t + .32173\ (\dot{P}_{t-1})_{t-1} + .12007\ (\frac{\dot{I\ Prod}}{Prod}_{t-1})_{t-1} + .10252\ \frac{1}{U_t}$ (1.196) (.514) (.888) (.553)	.27	2.12
	$\dot{W}_{t-1} = .03138 + .00135\ MC_t + .00796\ (\dot{P}_{t-1})_{t-1} - .43541\ (\frac{\dot{A\ Prod}}{Prod}_{t-1})_{t-1} + .05665\ \frac{1}{U_t}$ (1.174) (.043) (-.581) (.098)	.26	2.00

* Significant at the 10% level of significance.
** Significant at the 5% level of significance.
*** Significant at the 1% level of significance.

gestions can be given. First, the average wage rate in all three of these industries was substantially below that for the fabricated metals industry throughout the period under study. This fact may be an indication that the unions in the fabricated metals industry were generally more effective than those in the other three industries.

The higher average wage rate for the fabricated metals industry may also reflect a higher level of skill required on the average for the workers in that industry. Also, there is probably more uniformity in worker skills required in the various sub-industries within the fabricated metals industry grouping than in the other three industries.

For example, the relationships estimated for the food and kindred industry were at least like that hypothesized. However, this industry also has the greatest variety of sub-industries included in its group: meat packing plants; producers of cheese, ice cream, and milk; producers of all sorts of canned and frozen foods; producers of flour and other grain products; producers of sugar; and producers of beverages from wines to liquors to soft drinks. Moreover, this list is not exhaustive. Thus, an aggregate relationship for the entire food and kindred industry may not depict very well what is happening in the individual labor markets in that industry. The same problem is probably present to a smaller extent in the textile and apparel industries.

Moreover, these latter three industries employ many workers at the minimum wage–and increases in the minimum wage rate are more a function of United States politics than economic variables. In addition, if the U.S. news media is correct, some of these industries employ a disproportionate number of undocumented workers at wage rates often less than the minimum wage. While neither one of these wage rates is *directly* reflected in the wage rate changes occurring as a result of the bargaining process, it certainly seems likely that the presence of these people working at or below the minimum wage would affect wage negotiations in their respective industries.

It is not clear from this investigation to what extent the degree of unionization of an industry affected the results, partly because "degree of unionization" is a difficult variable to measure. In Table 2 various data on unionization in the four industry groups for 1968 is presented. As noted above, the results of the study were least as expected for the food and kindred industry. At first glance, if we looked only at the percent of total employees who are union members, we could also argue that the food and kindred industry is most highly unionized.

However, if we consider the percent of total employees who are members of AFL-affiliated unions, the picture looks substantially different. The contrast is even more striking if we observe the percent of industry union members who are also members of an AFL-CIO affiliated union. In this sense, the food and kindred industry is least unionized. On the other hand, Segal reports Bureau of Labor Statistics

TABLE 2

Extent of Unionization in the Industry, 1968*

Industry	Number of Unions	Number of Employees Who Are Union Members (1,000's)	Total Number of Nonsupervisory Employees (1,000's)	% Union Members of Total Employees	Members of AFL-CIO Affiliated Unions (1,000's)	% AFL-CIO Members to Total Nonsupervisory Employees	% AFL-CIO Members to Total Union Members
Fabricated Metals	33	543	1,071.8	51	429	40	79
Food and Kindred	26	880	1,191.6	74	526	44	60
Textiles	9	191	880.7	22	179	20	94
Apparel	13	870	1,240.1	70	861	69	99

*Derived from data published in Handbook of Labor Statistics 1975, U.S. Department of Labor Bureau of Labor Statistics, pp. 109, 384.

estimates on the extent of collective bargaining in 1958 in various industries which gave a figure of 70.6% for fabricated metals, 68.1% for food and kindred, 59.7% for apparel, and 30.1% for textile mill products.[11]

Still, none of these concepts may adequately indicate union strength in one industry relative to that in other industries. All of these factors as well as other variables, such as number of unions involved in the industry, number of unions involved in industry sub-groupings, the nature of the unions, and the nature of the jobs (for example, skilled or unskilled, and the training required), probably should be taken into account. Both Segal and Dunlop argue that the strength of unions in industries supplying components to other manufacturing industries (e.g., fabricated metals to the automobile industry), are affected by union strength in both industries.[12] It should also be noted that the Textile Workers Union and the Amalgamated Clothing Workers of America merged in 1976, and this action will likely affect their strength in the future.[13]

Finally, there are economists, including Segal, who find evidence linking profitability and/or concentration of firms in an industry with large wage rate increases.[14] However, it is not clear if these two factors uniformily affected wage rates established through the bargaining process as compared with nonunion wage rates. Thus, the separation of cause and effect is difficult from these analyses since firms in highly concentrated industries tend to be *profitable* and to have strong unions.

III. Conclusion

The relationships estimated for the fabricated metals industry were generally consistent with that hypothesized. These results are consistent with the hypothesis that unions put forth greater effort in the bargaining process during years when a greater number of major contracts expired. These findings were also generally consistent with the hypotheses that increases in the consumer price index and worker productivity were reflected in wage rate bargains, and that the unions did take the level of unemployment into account.

The results for the other three industries were mixed. It has been suggested that aggregation of the data from many dissimilar labor markets may have been at least partly responsible. Additional studies involving less aggregated data and more industries would be helpful. However, such data is quite difficult to obtain.

Footnotes

[1]D.S. Hamermesh. "White-Collar Unions, Blue-Collar Unions, and Wages in Manufacturing," *Industrial and Labor Relations Review*, Volume 22 (January, 1971), 159-170.

[2]Martin Segal, "Unionism and Wage Movements," *The Southern Economic Journal*, Volume 28 (October, 1961), 174-81. Also see Arthur M. Ross and William Goldner, "Forces Affecting the Inter-Industry Wage Structure," *Quarterly Journal of Economics*, Volume 64, (May, 1950), 176-181. They argue that new unionization resulted in a wage advantage but continuing unionization did not.

[3]Clark Kerr, "Labor's Income Share and the Labor Movement," in *New Concepts in Wage Determination*, edited by George W. Taylor and Frank C. Pierson, McGraw-Hill, 1957, 287.

[4]Allan Cartter, *Theory of Wages and Employment*, Richard D. Irwin, Inc., 1959, 171.

[5]*Ibid.* Another study which concludes that union strength did not strongly affect wage rate changes is that of Harold M. Levinson, *Postwar Movements of Prices and Wages in Manufacturing Industries*, Study Paper No. 21, prepared in connection with the "Study of Employment, Growth, and Price Levels," Joint Economic Committee, 86th Congress, Second Session, Washington, 1960. Also see C.J. Parsley, "Labor Union Effects on Wage Gains: A Survey of Recent Literature," *Journal of Economic Literature*, Vol. 18 (March, 1980), pp. 1-31.

[6]A similar, but not identical, model was developed by the author in an unpublished manuscript, "The Role of Bargaining Costs in Wage Rate Changes: A Mathematical Model."

[7]By constructing the demand for labor constraint in this fashion the author has made an implicit assumption that the price index which affects *employer* demand for labor is the same price index as that which affects union well-being and, hence, their demands for money wage rates. Although the author recognizes that this assumption is not necessarily realistic, it was made in order to simplify the presentation of the basic theory.

[8]Again, to simplify the presentation of the theory, it is assumed that money wage rate changes do not directly affect the price index, P_t, and that P_t is a constant in this context. Although it is unrealistic to assume that wage rate bargains do *not* affect the price index, it is probably also true, at least in the period under study, that an individual union does not *perceive* the price index as being a variable which, to any significant extent, is under its control.

[9]The raw data for these calculations was obtained from "Selected Wage and Benefit Changes," *Current Wage Developments*, U.S. Department of Labor, 1958-1972. Only those agreements affecting at

least 2,000 workers were included because of an otherwise scarcity of data points. Other data was obtained from Employment and Earnings, The Monthly Labor Review, Handbook of Labor Statistics, and unpublished information from the U.S. Department of Labor for various years during the period from 1958-1975.

[10]John W. Kendrick and Elliot S. Grossman, Productivity in the United States, Baltimore: The Johns Hopkins University Press, 1980.

[11]Segal, op. cit. 1975.

[12]Ibid., 176-181, and J.T. Dunlop, "The Task of Contemporary Wage Theory," in The Theory of Wage Determination, edited by J.T. Dunlop, Macmillan, 1957, 17.

[13]Peter C. Verrochi, "Textile and Clothing Unions Merge, Aim at Organizing the South," Monthly Labor Review, Volume 99 (August, 1976), 32-33.

[14]See Levinson, op. cit. Also see Otto Eckstein and Thomas A. Wilson, "Determination of Money Wages in American Industry," The Quarterly Journal of Economics, Volume 76 (August 1962), 379-414. Another paper using Canadian data is that by G.R. Sparks and D.A. Wilton, "Determinants of Negotiated Wage Increases: An Empirical Analysis," Econometrica, Volume 39 (September, 1971), 739-750.

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