

# The Effects of Unions on Wages: Findings from Pooled Data

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## INTRODUCTION

Such is the import of the union impact on wages, that the issue has generated a sizeable literature. This notwithstanding, a strong case can be made for a fresh study. In this article, results have been updated using newer data than has been used hitherto. In addition, time-series and cross-section data have been pooled for the period 1967-1981. Since economic conditions vary over time, union wage premiums calculated for any one year may differ quite substantially from those derived from another year. Pooling of the data tends to give an "averaging" of sorts. Outliers associated with extremes of the business cycle are neutralized.

Most studies on union wage effects confine their attention to a limited number of subgroups of the population as a result of data limitations. By contrast, it has been possible in this study to compute union wage premiums for as many as 260 different (though not mutually exclusive) groups. The computation and comparison of union wage premiums for so many groups, using a common time-period and identical model specification is an endeavor without precedent in the literature.

## THE DATA AND MODEL

Most of the variables used in this study were obtained from the *Panel Study of Income Dynamics*. Consumer price indices which were used to obtain real earnings are from the 1982 *Economic Report of the President*. The data cover a 15-year period from 1967-1981. This study includes only individuals between the ages of 18 and 65 who reported positive income.

In recent years, debate has centered around whether the union membership variable is endogenous in the wage equation. Recent studies have attempted to incorporate this thinking by specifying simultaneous-equations models. Freeman and Medoff (1981) among others, however, have been critical of such models on account of the rather unstable results they yield. The widespread skepticism about the simultaneous-equations models is documented in Ashraf (1990). As a result of these misgivings about the newer models, this study uses the traditional approach in which the union-non-union wage differential is defined as  $\lambda = \exp(U) - 1$ , where U represents the coefficient estimate of the union membership variable in the wage equation.

In this study, the wage equation is:

$$\begin{aligned} \log R\text{hrlyearnings} = & a_1 + a_2\text{NONWHITE} + a_3\text{SOUTH} + a_4\text{DIS1} + a_5\text{DIS2} + a_6\text{DIS3} \\ & + a_7\text{DIS4} + a_8\text{AGE} + a_9\text{AGESQ} + a_{10}\text{EXPERIENCE} + a_{11}\text{EXPSQ} + a_{12}\text{EDUCATION} \\ & + a_{13}\text{EDUCSQ} + a_{14}\text{AGE*E1} + a_{15}\text{AGESQ*E1} + a_{16}\text{AGE*E2} + a_{17}\text{AGESQ*E2} \\ & + a_{18}\text{AGE*E3} + a_{19}\text{AGESQ*E3} + a_{20}\text{WTCOLLAR} + a_{21}\text{UNION-MEMBER} + a_{22}\text{DURMANUF} \\ & + a_{23}\text{NONDURMANUF} + a_{24}\text{CONSTRUCTION} + a_{25}\text{MINING} + a_{26}\text{TCPU} + a_{27}\text{SEX} \end{aligned}$$

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$$+ a_{28} \text{MARITAL-STATUS} + a_{29} \text{CHILDREN} + a_{30} \text{PARTTIME} + a_{31} \text{UNEMPLAG} \\ + a_{32} \text{INFLAG} + a_{33} \text{INDLAG}.$$

To conserve space, the explanation of the variables and coefficient estimates from the regression are not reported here, and in any case, would detract from the main focus of this article.<sup>1</sup>

The regression for the entire sample yields a union wage premium of 23.07 percent. Given the wide variety in occupational subgroups which gives rise to this figure, this estimate means little when viewed in isolation. Tables 1-6 tell a more complete story. On the one hand, unionized white males in the construction industry can look with satisfaction at a 55.61 percent wage advantage that they enjoyed over their nonunion counterparts (Table 2). At the other extreme, workers in Nondurable Manufacturing with 16+ years of schooling were actually earning 39.25 percent less than their more fortunate counterparts in the nonunion sector (Table 4). Apart from construction, large but somewhat less spectacular union gains also accrued to nonwhite males in the Transport, Communications and Public Utilities (TCPU) sector (36.25 percent). Union membership however, was cause for lesser jubilation for nonwhite females in the TCPU sector (5.18 percent).

Of 260 groups for which union wage premiums were calculated, negative premiums were found for only twenty-nine. Of these, only six were statistically significant. Four of these were for various groups with 16+ years of schooling; the others were white-collar workers in Durable Manufacturing and Mining workers in the 55-60 age-group. Negative union wage premiums have been found before by researchers for white-collar and for highly educated employees.<sup>2</sup> The negative wage premium for the remaining group (Mining) is most likely a statistical fluke, resulting from the limited number of observations for that group. Overall, the evidence that unions raise wages of their members relative to their nonunion counterparts is overwhelming.

#### Union Wage Premiums by Race and Gender

Table 1 indicates that unionized nonwhites enjoyed a 28.8 percent wage premium over their nonunion counterparts (compared to 19.8 percent for whites). This lends support to Freeman (1980) who argued that for reasons of equity, unions tend to reduce wage dispersion. The widely accepted view that wages of nonwhites lag behind those of whites in the absence of unionization (this is particularly true in the South) points to agreement between the results of this study and the Freeman thesis. Within nonwhites, however, a major disparity exists between the sexes, with males commanding an impressive 30.7 percent union wage premium as opposed to a less lustrous 15.5 percent for females. Moreover, while both organized nonwhite males and nonwhite females do well relative to their white counterparts,

TABLE 1  
Union Wage Premiums by Race and Sex, 1967-1981

Group	Union Wage Premium	t-statistic*	No. of Observations
All	23.07	35.77	24,355
Females	14.78	6.81	1,999
Males	23.81	35.26	22,356
Nonwhites	28.85	25.08	8,552
Whites	19.78	25.34	15,803
Nonwhite Males	30.67	24.83	7,567
Nonwhite Females	15.49	4.56	985
White Males	20.15	24.89	14,789
White Females	13.20	4.43	1,014

\*The t-statistics correspond to the coefficient of the union membership variable in the equations from which the union wage premiums were derived.

TABLE 2  
Union Wage Premiums by Industrial Affiliation, Sex and Race

Group	Union Premium	t-stat	No. of Observations
Durable Manufacturing	14.42	15.65	9927
Nondurable Manufacturing	19.48	14.61	4943
Construction	49.58	24.96	4530
TCPU	24.70	16.85	4505
Mining	26.04	4.84	445
<i>By Industry and Sex</i>			
Durable Manufacturing (Females)	19.50	5.67	883
Nondurable Manufacturing (Females)	10.40	2.96	760
Construction (Females)	**	—	47
TCPU (Females)	8.25	1.57	292
Mining (Females)	**	—	
Durable Manufacturing (Males)	14.42	15.03	9043
Nondurable Manufacturing (Males)	20.97	14.54	4182
Construction (Males)	49.61	24.89	4458
TCPU (Males)	26.01	16.94	4212
Mining (Males)	26.83	4.89	432
<i>By Industry and Race</i>			
Durable Manufacturing (Nonwhite)	24.33	13.25	3054
Nondurable Manufacturing (Nonwhite)	17.84	7.86	2061
Construction (Nonwhites)	40.61	13.54	1782
TCPU (Nonwhites)	34.64	13.21	1565
Mining (Nonwhites)	11.21	0.97	85
Durable Manufacturing (Whites)	9.92	9.22	6872
Nondurable Manufacturing (Whites)	15.84	9.72	2881
Construction (Whites)	55.48	20.63	2747
TCPU (Whites)	20.06	11.27	2939
Mining (Whites)	23.18	3.68	359

\*The t-statistics correspond to the coefficients of the union membership variable in the equations from which the union wage premiums were derived.

\*\*Enough observations were not available to run regressions.

the union differential for males (30.7 percent for nonwhites against 20.2 percent for whites) considerably exceeds that for females (15.5 percent for nonwhites against 13.2 percent for whites). As Table 1 illustrates, this by no means implies that whites have had insignificant gains from organizing. Union wage premiums of 20.2 percent and 13.2 percent for white males and white females respectively (while less than the corresponding union premiums among nonwhites) represent respectable pay differentials that these groups enjoy over their nonunion colleagues.

#### Union Wage Premiums by Industry

A breakdown by industrial affiliation of workers (Table 2) provides insights into why results of earlier studies have reported union wage premiums significantly less than more recent work. On account of data limitations, the majority of earlier studies have examined union wage differentials only in the manufacturing sector. As Table 2 indicates, workers in both Durable and Nondurable Manufacturing have union wage premiums (14.4 percent and 19.5 percent) considerably lower than those in the other industrial sectors. In particular, construction workers get a very large premium (49.6 percent) above their nonunion counterparts. This confinement of earlier data to manufacturing goes a long way

**TABLE 3**  
Union Wage Premiums by Industrial Affiliation, Race and Sex

Group	Union Premium	t-stat	No. of Observations
Durable Manufacturing (Nonwhite Males)	24.66	12.44	2659
Nondurable Manufacturing (Nonwhite Males)	22.23	8.63	1603
Construction (Nonwhite Males)	40.93	13.57	1758
TCPU (Nonwhite Males)	36.25	13.24	1461
Mining (Nonwhite Males)	19.79	1.56	81
Durable Manufacturing (Nonwhite Females)	10.10	4.10	394
Nondurable Manufacturing (Nonwhite Females)	2.16	0.42	457
Construction (Nonwhite Females)	*	*	*
TCPU (Nonwhite Females)	-6.72	-0.54	103
Mining (Nonwhite Females)	*	*	*
Durable Manufacturing (White Females)	18.43	3.60	488
Nondurable Manufacturing (White Females)	9.85	1.97	302
Construction (White Females)	*	*	*
TCPU (White Females)	5.18	0.74	188
Mining (White Females)	*	*	*
Durable Manufacturing (White Males)	9.31	8.46	6383
Nondurable Manufacturing (White Males)	16.78	9.73	2578
Construction (White Males)	55.61	20.60	2723
TCPU (White Males)	21.78	11.65	2570
Mining (White Males)	23.54	3.70	350

\*Regressions could not be run for these groups due to small number of observations.

in explaining the oft-alleged widening of the union-nonunion wage gap over time. It is very likely that this result emerges from the use of more comprehensive data by researchers in recent years. It is clear that of the four industrial subsectors considered in this article (treating Durable and Nondurable Manufacturing as one sector), manufacturing workers gain the least from organizing.

**TABLE 4**  
Union Wage Premiums Classified by Educational Levels

Group	EDUC1		EDUC2		EDUC3		EDUC4	
	(Less than 12 yrs)	t	High-school	t	(Some College)	t	(College grad)	t
All	35.78	34.06	17.75	18.95	11.92	6.17	0.28	0.09
White	33.44	23.11	15.95	14.89	13.73	6.13	2.49	0.71
Nonwhite	36.44	23.65	23.94	12.48	8.79	2.18	-14.68	-2.05
Male	36.95	33.56	18.14	18.56	12.35	6.14	-1.64	-0.50
Female	19.98	5.86	10.50	3.24	17.80	2.29	-3.21	-0.26
Nonwhite Male	38.12	23.13	25.72	12.62	7.74	1.77	-29.38	-3.69
Nonwhite Female	16.10	3.63	19.02	3.24	5.23	0.46	*	*
White Male	34.39	22.90	16.16	14.55	13.77	5.99	24.27	0.62
White Female	27.86	4.80	8.55	2.09	29.54	2.38	21.59	1.14
Durable Manufacturing	28.86	18.76	9.48	7.10	0.17	0.06	-13.70	-2.86
Nondurable Manufacturing	25.89	16.51	16.27	8.05	4.92	1.15	-39.25	-3.71
Construction	54.08	19.35	45.46	15.31	35.50	4.68	100.08	5.24
TCPU	37.82	13.47	20.56	9.58	14.95	4.28	13.60	2.96
Mining	38.43	4.12	13.13	1.71	17.85	1.10	*	*

\*Regressions could not be run due to small number of observations.

**TABLE 5**  
Union Wage Premiums for Blue-Collar and White-Collar Workers

Group	White-Collar	t	Blue-Collar	t
All	7.84	4.96	28.90	39.85
Nonwhites	6.46	1.80	32.69	26.75
Whites	6.97	3.98	26.07	28.76
Females	-3.57	-0.84	21.58	8.26
Males	8.72	5.12	29.74	39.42
Durable manufacturing	-10.07	-3.98	18.89	18.62
Nondurable Manufacturing	-0.68	-0.18	23.23	15.54
Construction	58.99	8.89	50.77	24.88
TCPU	10.27	3.95	37.19	20.41
Mining	73.94	1.83	24.07	4.50

\*The t-statistics are those that correspond to the coefficients of the union membership variable in the wage equations from which the union premiums were derived.

Even an analysis of union wage premiums by industrial breakdown is not disaggregated enough to permit inferences to be drawn, except very broad ones. Table 2 suggests that the 25 percent wage premium accruing to unionized TCPU workers is a largely male phenomenon: female workers in that sector gain only 8.3 percent over their nonorganized counterparts. In Durable Manufacturing, however, females affiliated with unions win larger wage gains (19.5 percent) than do males (14.4 percent). A racial break-down of the industrial categories in the same table indicates that significant differences exist in the union wage premium for nonwhites and whites. While nonwhites gain substantially more in Durable Manufacturing (24.3 percent against 9.9 percent for whites) and TCPU (34.6 percent against 20.0 percent for whites), their gains are less than for whites in construction (55.5 percent against 40.6 percent) and in mining (23.2 percent against 11.2 percent). A further division of these results by race and gender is presented in Table 3. Conspicuous is the negative (-6.7 percent) but statistically insignificant union wage premium for nonwhite females in the TCPU sector. White females in that sector fare somewhat better, gaining 5.2 percent over their nonunion counterparts; that difference is however, also insignificant. Though unionized nonwhite males gain more than white males in the Durable Manufacturing sector, this pattern is reversed for females, with white females gaining more than nonwhite females.

#### Union Wage Premiums by Educational Levels

Table 4 examines union wage premiums for workers with different levels of educational attainment. Four levels of educational attainment were defined: (1) EDUC1 (those with fewer than 12 years of schooling); (2) EDUC2 (high school graduates), EDUC3 (those with between 12 and 16 years of schooling; and (4) EDUC4 (those with 16 or more years of schooling). As expected, in most cases, the higher the level of education, the less the gain from being a union member. Across the entire sample, the union wage premium was 35.8 percent, 17.8 percent, 11.9 percent and 0.3 percent for each of the educational groups, respectively. For EDUC4, the differential was statistically insignificant. Across different subgroups, large significant negative union wage premiums were observed in some instances, with workers in Nondurable Manufacturing having 16 or more years of schooling, earning almost 40 percent less than their nonunion counterparts. The finding of negative union wage premiums was restricted only to the fourth educational group, i.e. workers with 16 or more years of schooling.

#### Union Wage Premiums for Blue/White-Collar Workers

The widely held view that white-collar workers gain little from unions is, for the most part, supported by the results of this study (Table 5). Three of the white-collar groups examined (females,

**TABLE 6**  
Union Wage Premiums Broken Down by Age

Groups	Age-Groups									
	18-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
All	19.73	22.02	22.62	21.23	17.73	12.98	27.96	28.43	24.67	52.57
(t-stat)	3.76	12.84	14.47	11.35	9.63	7.95	15.27	12.98	9.19	10.20
White	13.64	22.13	21.66	22.75	17.18	10.36	18.27	23.04	18.29	42.26
(t-stat)	1.36	9.61	11.31	10.01	7.13	5.07	8.82	9.88	5.92	8.31
Nonwhite	17.59	22.26	17.79	17.93	23.82	21.28	41.20	33.59	47.48	60.59
(t-stat)	1.02	6.62	6.79	6.09	7.50	7.49	12.05	8.35	9.89	7.09
Male	21.96	22.96	21.12	21.96	22.41	15.43	25.36	27.67	26.84	45.96
(t-stat)	2.17	11.47	13.21	11.81	11.19	9.01	13.47	13.02	9.69	9.83
Female	-16.91	14.67	24.11	11.70	-2.11	0.45	16.66	8.19	11.56	81.26
(t-stat)	-1.02	2.32	3.93	1.84	-0.36	0.07	3.10	0.93	1.42	5.59
Nonwhite Male	32.91	23.72	17.97	18.41	27.78	22.70	44.25	36.90	47.97	63.94
(t-stat)	1.47	6.47	6.44	5.82	8.16	7.49	11.92	8.85	9.41	7.02
Nonwhite Female	*	9.58	13.48	5.31	8.98	10.18	30.87	18.53	-9.02	20.55
(t-stat)		0.94	1.64	0.57	0.95	1.05	3.29	1.00	-0.66	0.76
White Male	16.40	22.59	21.40	23.61	18.90	11.48	17.25	24.51	18.31	40.19
(t-stat)	1.47	9.38	10.93	0.07	7.54	5.49	7.99	10.14	5.59	7.25
White Female	6.67	18.15	36.25	-1.41	-9.21	-17.63	18.73	11.91	4.86	96.31
(t-stat)	0.24	1.98	3.38	-0.13	-1.05	-1.78	2.33	1.41	0.52	5.61
Durable Manufacturing	8.42	21.82	18.82	14.83	13.14	2.13	7.02	15.81	24.95	31.94
(t-stat)	0.59	7.61	8.02	5.61	4.91	1.01	2.91	5.39	6.98	5.54
Nondurable Manufacturing	-2.62	14.14	21.04	17.54	6.37	26.82	20.90	28.05	0.52	18.20
(t-stat)	-0.19	3.81	6.89	5.39	1.39	16.12	5.51	6.28	0.11	2.52
Construction	39.01	29.18	31.30	44.19	42.45	54.96	70.77	44.62	76.79	121.29
(t-stat)	1.69	5.26	6.31	7.95	8.98	10.19	12.75	7.11	7.71	7.75
TCPU	11.25	24.65	17.43	27.64	33.09	12.05	35.78	17.15	35.29	63.21
(t-stat)	0.33	5.48	5.52	6.34	6.71	3.25	8.58	3.78	5.05	5.11
Mining	*	38.12	34.96	27.28	-2.76	41.84	*	57.56	-55.65	*
(t-stat)		2.04	3.10	2.19	-1.27	2.52	—	2.55	-1.98	—

\*Regression estimates could not be derived due to limited number of observations.

workers in Durable Manufacturing, and workers in Nondurable Manufacturing) had negative union wage premiums. This contrasts with the large and statistically significant wage gains for blue-collar workers in those very categories. Aberrations were the construction and mining groups, where white-collar employees not only had large and significant wage premiums, but in fact surpassed the gains which blue-collar workers in those sectors attained.<sup>3</sup> The general pattern was however clear with the results lending strong support to the general perception that blue-collar workers stand to gain far more from unionization than white-collar employees.

#### Union Wage Premiums by Age

The union wage premium for the entire sample was 23.1 percent. Across different age groups (Table 6) this premium ranged from a low of 19.7 percent for workers aged 18-19.9 to a high of 52.6

percent for workers in the 60-65 age-group. The coefficients for the union membership variable (from which the union wage premiums were derived) were significant in every single age group, implying that unionism raises hourly earnings, regardless of age. Interestingly, the premium declined for three consecutive age-groups (30-34.9, 35-39.9 and 40-44.9). In the three age-groups in which the union wage premiums declined, the female wage premium was considerably less than for males. For practically every group, the largest wage gains from unionization accrued to those in the 60-65 age division. For some groups, there were wide swings in the union wage premium across age divisions. For example, females aged 35-39.9 had a union wage premium of -2.2 percent against 81.3 percent for those in the 60-65 age-group. This is a reflection of the capriciousness of results arising from the relatively small number of observations in some of the cells.

The general trend for different groups was consistent with findings reported earlier, regardless of age-divisions. Construction workers continued to have the highest union premiums in all age divisions. The gains to nonwhite males continued to be large and highly significant. And manufacturing workers continued to have the lowest gains from unionization among all industrial groups.

#### SUMMARY AND CONCLUSIONS

On two counts, this study represents an advance over earlier work in the area:

(i) As a result of the size of the data set (88,000 observations over a fifteen year period) it has been possible to break down the sample into as many as 260 subgroups. No other study has attempted to examine as many groups. This disaggregation is not trivial. A break up of the data permits the comparison of union wage premiums across different groups within the framework of a common model. While it is useful to calculate the union wage premium for the entire sample, great policy interest centers on the effect unions have on more narrowly defined subgroups.

(ii) Results from earlier studies have been updated by using more recent data. Few studies (including recent ones) have used data from the mid-1970s onward. Since changing economic conditions and demographic composition of the population can reasonably be expected to impact upon union wage premiums, this study represents a partial assessment of those changes.

Some of the major results from this article can be summarized as follows:

(a) It was found that the more highly educated a worker, the lower the gains from unionism. In fact, workers with 16+ years of schooling often *lose* from joining a union.

(b) This study supports recent researchers who found that union wage premiums are higher than in the immediate post-War period. These researchers explain that earlier studies used only manufacturing data which yields relatively low union wage premiums. It is quite to be expected, therefore, that more comprehensive data will lead to the derivation of higher premiums.

(c) The payoff from unionism is far greater for blue-collar workers than it is for white-collar employees. Nonwhites gain more than whites. Both these set of results are in accord with earlier findings in the literature.

(d) Among different age groups, workers aged 60-65 gain the most from unionism. The lowest gains accrue to the youngest workers (aged 18.19.9) and those in their prime years (30-34.9 years of age).

#### NOTES

1. An appendix with a complete list of all variables and the rationale for their use is available from the author. The appendix includes a table with complete regression results for the entire sample as well as for the union and nonunion samples separately.
2. See for example, Johnson and Youmans (1971).
3. These unexpected results are likely the result of the small number of observations for white-collar workers in mining and construction.

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