Declining Unionization: Further Analysis of the 'Fringe Benefits' Effect

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Benefits have become a more prominent component of compensation. As a result, it has been suggested that support for organized labor has been diluted. New research reports that as fringe benefits have become more prominent, ceteris paribus, unionization has been adversely affected. This study looks for further evidence of a fringe effect, by analyzing the diverse industries associated with manufacturing. With data for 1983-1996 for twenty sub-sectors of U.S. manufacturing, we confirm a fringe effect, but the effect varies substantially across industries.

Introduction

It is well known that there has been a lengthy and pronounced decline in private sector unionization. Seminal studies by Ashenfelter and Pencavel (1969), Pencavel (1971), and Bain and Elsheik (1976) have spawned a vast literature, in which analysts seek to identify factors responsible for the reduction. Factors in the downturn include changes in the structure of the economy, management opposition to organized labor, and other socio-economic factors.[1]

In a new article Edwards and Fuess (forthcoming) report that, *ceteris paribus*, union density nationwide is negatively related to the growing prominence of fringe benefits. With data for 1948-1997, they find that increases in the benefits share of

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[1] For a discussion of ongoing issues, see "The Future of Private Sector Union in the United States," a symposium published in the Spring 2001 issue of *Journal of Labor Research.*

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total compensation account for as much as 15 percent of the drop in union density. They also find this negative "fringe effect" at the state level. In all but five states, union density in manufacturing falls as a result of the increasing prominence of fringe benefits.

The findings of Edwards and Fuess raise interesting questions. Is the fringe effect on union density uniform across diverse areas of manufacturing? Although manufacturing tends to be more unionized than other sectors of the economy, union density does vary across the sector. Industries such as steel and paper are the most widely unionized, with unionization rates exceeding 50 percent. For other areas, such as electric goods or furniture, union density has been less than 15 percent. Does the fringe effect vary between low- and high-density unionized areas of manufacturing? Perhaps tilting the compensation mix toward fringe benefits has a different impact in areas with relatively little union penetration than in widely unionized areas.

Following Edwards and Fuess (forthcoming), this study uses a simple modification of Pencavel's (1971) econometric specification to estimate how the growing influence of non-wage benefits has affected union density. With data for 1983-1996 for 20 different manufacturing industries, we attempt to determine the variability of the fringe effect across manufacturing. We extend the findings of Edwards and Fuess: the negative fringe effect does vary substantially across manufacturing industries.

Fringe Benefits and Unionization: Brief Review

The potential impacts of fringe benefits on support for organized labor are discussed at length by Edwards and Fuess (forthcoming). Thus, we provide only a brief overview.

Before 1950 fringe benefits accounted for less than 5 percent of compensation overall, by 2000 that share had grown to nearly 20 percent. Employers provide many benefits voluntarily, including key ones such as health insurance and pensions. Other benefits, such as Social Security and unemployment insurance, are required by law.

For many years organized labor has lobbied for workplace welfare measures—for example, overtime pay and workers' compensation for job-related injuries and illnesses—and many of them have been instituted by legislation. Oddly enough, it has been suggested that these legislative victories can be a mixed blessing for organized labor. According to Neumann and Rissman (1984), government mandates can effectively substitute for some union functions, diluting support for union membership.[2] In the words of Bennett and Taylor (2001, p. 261), greater government

[2] Neumann and Rissman noted that their hypothesis simply formalizes an earlier observation by Reder (1951) that some functions of labor unions had been taken over by the state. In testing their substitution hypothesis, Neumann and Rissman found that union membership was inversely related to government spending on welfare initiatives. Other researchers, however,

involvement in industrial relations reduces the "scope of issues that may be addressed at the bargaining table," which could adversely affect interest in organized labor.

Companies may be willing to provide some compensation in the form of non-wage benefits, in part because they may not have to pay employment taxes on such compensation. Employers may have another incentive: to thwart unionization (see Fiorito, 2001). If offered more fringe benefits, workers might be less likely to seek collective bargaining. Because benefits such as health insurance and pension contributions are typically suspended during a strike, workers may be reluctant to jeopardize them (especially increasingly expensive health care coverage). Workers may be less eager to gamble on industrial action if doing so means risking vital benefits. Thus, the substitution hypothesis can be modified: fringe benefits may displace union services. As fringe benefits occupy a greater share of compensation, other things equal, unionization may be adversely affected.

Benefits and Unionization in Manufacturing: Specification

Overview of Manufacturing Industries and Fringe Benefits

In the regression analysis to follow, the dependent variable is $UNIZ_{it}$, the fraction of the labor force that is unionized in industry i at time t. Among the explanatory variables, we use $FRINGE_{it}$, the share of total compensation in industry i accounted for by non-wage benefits.

Figures for union density in 20 separate manufacturing industries are available back to 1983. (See Table 1 for a listing.) Consistent *FRINGE* series are available through 1996. Thus, the sample period is 1983-1996.

Union density in manufacturing averages nearly 23 percent over the sample period. But Table 1 (left column) reports substantial variations across the sector. Basic steel, paper, and railroad equipment are by far the most heavily unionized industries: 54.9, 53.7, and 42.2 percent, respectively. The next highest union densities are at the 30 percent rate. In contrast, there are six industries for which the unionization rate is not even 15 percent. The lowest rates are for yarn and thread mills, measuring and controlling devices, and miscellaneous manufacturing: 7.4, 11.1, and 11.4 percent, respectively.

For manufacturing overall, non-wage benefits account for roughly 20 percent of total compensation. Many benefits are paid voluntarily, but others are mandated. Compared to *UNIZ*, there is a narrower range for *FRINGE*. Nevertheless, Table 1 (right column) shows that the benefits rate does vary across manufacturing. Basic steel is not only the most unionized industry; it also exhibits the highest *FRINGE*

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have reported findings that do not support the hypothesis (for example, Chaison and Rose, 1991, or Stepina and Fiorito, 1986).

ratio (27.8 percent). Benefits are lowest for workers in the apparel/textiles industry (averaging only 16.2 percent).

In general, those areas of manufacturing with high union densities also tend to have relatively high values for *FRINGE*. Industries with low values for *UNIZ* tend to lag behind in terms of benefits. While there is not perfect correspondence, a simple Spearman rank correlation test confirms that industries with a *UNIZ* measure above the median also have a *FRINGE* measure above the median.[3]

Table 1—Union Density and Fringe Benefits in Manufacturing, 1983-1996

	UNIZ		FRINGE	
Industry (SIC Code)	(mean)	Rank	(mean)	Rank
Blast Furnace/Basic Steel (331)	54.86	1	27.83	1
Paper/Allied Products (26)	53.67	2	19.45	8
Railroad Equipment (374)	42.19	3	25.82	2
Petroleum Refining (291)	30.75	4	20.50	5
Tobacco Products (21)	29.74	5	25.21	3
Misc. Nonmetallic Minerals (308)	23.02	6	20.62	4
Fabricated Structural Metals (344)	21.26	7	18.90	13
Misc. Food/Kindred Products (209)	20.55	8	18.91	12
Chemicals/Allied Products (28)	18.69	9	19.80	6
Machinery, Except Electrical (35)	18.04	10	19.06	11
Sawmills/Planing Mills (242)	17.58	11	19.73	7
Apparel/Other Textiles (23)	17.46	12	16.22	20
Footwear, Except Rubber (314)	17.05	13	18.03	15
Electric/Electronic Equip. (36)	15.09	14	19.32	9
Misc. Plastic Products (308)	14.62	15	19.07	10
Furniture and Fixtures (25)	13.87	16	18.02	16
Newspapers (271)	13.37	17	17.11	18
Misc. Manufacturing (39)	11.41	18	17.22	17
Measuring/Controlling Devices (382)	11.05	19	18.40	14
Yarn/Thread Mills (228)	7.41	20	16.60	19
Manufacturing (Overall)	22.58		19.79	

Estimating the Impact of Benefits on Union Density: Specification

In estimating determinants of unionization, Ashenfelter and Pencavel (1969) and Pencavel (1971) specified union density as a function of

1) Previous unionization,
2) Labor market conditions,
3) Factors representing the structure of the economy, and
4) Labor relations factors.

Edwards and Fuess (forthcoming) add to the list by including *FRINGE* as an explanatory variable. To see if the fringe effect can be reproduced, this article

[3] Test is described by Daniel and Terrell (1989, pp. 697-699).

follows the approach of Edwards and Fuess. Specifically, we hypothesize the following relationship for union density

$$UNIZ_{it} = \beta_0 + \beta_1 UNIZ_{it-1} + \beta_{2i} FRINGE_{it} + \beta_3 RAISE_{it} + \beta_4 MFG\ SHR_{it} + \beta_5 PART\ TIME_{it} + \beta_6 UNEMPLOY_{it} + \varepsilon_{it}, \quad (1)$$

where the explanatory variables are as follows (see appendix for all data sources):

$UNIZ_{it-1}$: Union density in manufacturing industry i (lagged),
$FRINGE_{it}$: For industry i, share of total compensation accounted for by non-wage benefits at time t,
$RAISE_{it}$: For industry i, percent change in wage-only compensation (1992 dollars) of production workers,
$MFG\ SHR_{it}$: Industry i's share of U.S. manufacturing employment,
$PART\ TIME_{it}$: Share of part-time workers in industry i, and
$UNEMPLOY_{it}$: Unemployment rate in industry i.

Inertia in union membership is likely, so we use lagged union density ($UNIZ_{it-1}$) as an explanatory variable (see Moore *et al*., 1989, or Neumann and Rissman, 1984). Assuming that union members at time t-1 are also likely to be members in period t, we expect $\beta_1 > 0$.

Union membership is likely to be influenced by various aspects of compensation. To reflect these aspects, we use *FRINGE* and *RAISE* as explanatory variables.

Suppose the substitution hypothesis is true and fringe benefits displace union services. Then as non-wage benefits become a bigger component of total pay, other things equal, we expect unionization to decrease, implying $\beta_2 < 0$.

The impact of *RAISE* on *UNIZ* is not clear *a priori*. For a given mix of wages and benefits, a sufficiently big pay raise might deter workers from seeking union representation. Conversely, workers might rely on union protection in order to maintain relatively big pay hike. Therefore, β_3 could be positive or negative.

The *MFG SHR* variable represents industry i's share of manufacturing sector employment. We presume that relatively prominent areas of manufacturing are more likely to attract unionization, implying $\beta_4 > 0$.

Besides controlling for economic factors, we also control for the industrial relations climate. Other researchers have considered part-time employment as an indicator of the labor climate (see Hernández, 1995, or Riddell, 1993). The reasoning is that firms might undermine organized labor by hiring part-time workers, who are less likely to seek union membership.[4] In some areas of manufacturing—for example, railroad equipment—the share of part-time workers has been negligible. Not surprisingly, these industries exhibit particularly high values for *UNIZ*. In contrast, newspapers employ a relatively big share of part-timers, nearly one-third, and the

[4] It might be desirable to track labor relations by documenting filings of unfair labor practice charges. But such information is not disaggregated by sub-sectors of manufacturing, so it is not possible for this study.

industry has comparatively low union density (13.4 percent). We include *PART TIME*$_{it}$, industry *i*'s share of part-time workers as an explanatory variable, expecting $\beta_5 < 0$.

Earlier research also accounts for unemployment (or employment) as a determinant of union membership (for example, Koeller, 1994). Higher rates of joblessness could lead workers to seek collective protection. But if unemployment is widespread, workers may be reluctant to antagonize employers. Therefore, unemployment in industry *i*, *UNEMPLOY*$_{it}$, could exert a positive or negative impact on unionization.[5]

With pooled cross-section, time-series data, it is common to specify a fixed effects equation with (1) a separate intercept term for each cross-section and (2) coefficients on the explanatory variables that are common across the cross-sections. In our case there would be a fundamental problem with such an approach. The *FRINGE* effect would not be allowed to vary across the different areas of manufacturing, which is precisely what we wish to gauge.

Instead of a fixed effects specification, we estimate a model with a common constant and allow the *FRINGE* coefficient to vary across industries. Using a standard *F*-test (Balestra 1996, p. 37), we find it appropriate to vary *only* the *FRINGE* coefficients.[6] Thus, we estimate the model represented in equation (1).

The *UNIZ* equation can be estimated by ordinary least squares regression as long as there are not problems with the disturbances. As always with cross-sectional analysis, heteroskedasticity is a potential problem. Using a test outlined by Greene

[5] Others also have attempted to control for the political climate. In their studies of union density economy-wide, researchers such as Ashenfelter and Pencavel (1969) used *DEMOCRAT*, the share of Democrats in Congress, as an explanatory variable. The hypothesis is that a more Democratic Congress would be more likely to enact union-friendly labor legislation. Edwards and Fuess (forthcoming) report a small impact of *DEMOCRAT* on unionization nationwide. This study considers only twenty different sub-sectors of manufacturing. Because these subsectors span political boundaries and constituencies, it is not obvious what political variable(s) might distinguish the various cross-sectional units of manufacturing.

[6] The test compares a restricted specification, where the *FRINGE* variable is the only one allowed to vary across industries, to an unrestricted specification, where other parameter estimates are allowed to vary. The null hypothesis is that only the *FRINGE* parameter estimates vary across industries; the test statistic follows an *F*-distribution. We performed tests for five different specifications against the null hypothesis that only the *FRINGE* parameter estimates vary by industry. The five specifications were as follows:

1. Vary the coefficient of the *MFG SHR* variable by industry;
2. Vary the coefficient of the *UNEMPLOY* variable by industry;
3. Vary the coefficient of the *PART TIME* variable by industry;
4. Vary the coefficient of the *RAISE* variable by industry; and
5. Vary the coefficients of all independent variables by industry.

In each case, the calculated *F*-statistic indicated that the null hypothesis could not be rejected. Only the separate *FRINGE* coefficient estimates were statistically distinct from one another. We therefore concluded that varying only the *FRINGE* coefficient was the appropriate procedure.

(1993, p. 450), we found evidence of heteroskedasticity. Therefore, we estimate the equation using generalized least squares (GLS).

Benefits and Unionization in Manufacturing: Results

Table 2 shows the results of the GLS coefficient estimates. Briefly, we summarize the findings for variables other than *FRINGE*. Then we examine in detail the effects of fringe benefits on unionization across manufacturing.[7]

Effects of Non-FRINGE Variables

For each of the explanatory variables except *RAISE*, the estimated coefficient is statistically significant. Furthermore, the coefficients have the hypothesized signs (see Table 2). Unionization is positively related to lagged union density. The bigger is an industry's share of manufacturing employment, the greater is its unionization rate. According to the *MFG SHR* coefficient, adding 10 percentage points to an industry's share of manufacturing employment adds 3.5 points to union density. Industries with relatively high unemployment also tend to be more unionized. Part-time work, on the other hand, undermines organized labor. An extra 10 points in the *PART TIME* ratio means a 4.3 point decline in unionization.

FRINGE Effects

We are most interested in seeing if unionization is affected by the composition of pay. For most areas of manufacturing (17 of 20), increasing the fringe benefits share means, *ceteris paribus*, a significant reduction in union density (see Table 2). This finding reproduces that of the Edwards and Fuess (forthcoming) study: not only is organized labor nationwide affected by the growing prominence of *FRINGE*, union density suffers in most areas of manufacturing.

Looking at the coefficient estimates in more detail, it is clear that the impact of *FRINGE* varies considerably across the diverse areas of manufacturing. In three industries there is no fringe effect at all. In some sub-sectors the *FRINGE* coefficient is more than three times as large as in others.

First consider where *FRINGE* is *not* significant. For basic steel, paper, and railroad equipment, expanding the share of fringe benefits in total compensation has no meaningful impact on organized labor. The three most heavily unionized manufacturing industries—all with union density rates exceeding 40 percent—exhibit no sensitivity to the composition of pay. Where organized labor is *already* widely established, increasing the share of fringe benefits in compensation has no impact on unionization.

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[7] With time-series data we must watch out for potential serial correlation. Using the Breusch-Godfrey Lagrange multiplier test for serial correlation, we could not reject the null hypothesis of no serial correlation. (See Greene, 1993, p. 426 for test details.)

Table 2—Determinants of Union Density across Manufacturing Industries, 1983-1996

Explanatory Variable	Hypothesis	Coefficient (*t*-Statistic)	*FRINGE* coefficients, (*t*-statistics) Hypothesis: -	Rank	
Constant	+ or -	22.665**			
		(6.517)	Misc. Food	14	-0.579**
					(-4.185)
UNIZ	+	0.515**			
(lagged)		(10.649)	Tobacco	16	-0.362*
					(-1.891)
RAISE	+ or -	-0.004			
		(-0.407)	Yarn & Thread	1	-1.150**
					(-6.296)
MFG SHR	+	0.346**			
		(3.388)	Apparel	4	-0.985**
					(-6.493)
PART TIME	-	-0.425**			
		(-4.722)	Sawmills	10	-0.781**
					(-5.727)
UNEMPLOY	+ or -	0.193**			
		(4.882)	Furn. & Fixtures	6	-0.935**
					(-6.204)
			Paper	20	0.066
					(0.531)
			Newspapers	17	-0.322**
					(-2.389)
			Chemicals	9	-0.793**
					(-6.057)
			Petroleum Refining	15	-0.444**
					(-3.801)
			Misc. Plastic	8	-0.906**
					(-6.333)
			Footwear	11	-0.767**
					(-4.394)
			Misc. Mineral	13	-0.612**
					(-4.581)
			Basic Steel	19	0.059
					(0.834)
			Fabricated Metal	12	-0.725**
					(-5.465)
			Machinery	5	-0.935**
					(-6.846)
			Electrical Equip.	3	-0.990**
					(-6.991)
			Railroad Equip.	18	-0.180
					(-1.020)
			Controlling Devices	2	-1.029**
					(-6.355)
			Misc. Mfg.	7	-0.928**
					(-6.137)
			Adjusted R^2	0.946	

**(*) Significant at the 0.05 (0.10) level

Next consider where *FRINGE* is *most* significant. For yarn and thread mills, adding 10 points to *FRINGE* means an 11.5 point cut in *UNIZ*, other things equal; for measuring and controlling devices, the drop in *UNIZ* is 10.3 points. Substantial fringe effects are also observed for the manufacture of electrical goods and apparel. Raising *FRINGE* 10 points leads union density to fall 9.9 points in both the electrical goods and apparel industries. In contrast, the impact of *FRINGE* is only about 1/3 to 1/2 as great for the newspaper, tobacco, and petroleum refining industries.

More generally, we focus on the ten most heavily unionized areas of manufacturing (see Table 1). These industries tend to pay relatively high fringe benefits; seven of them are in the upper half of the rankings by *FRINGE*. Furthermore, they feature eight of the nine smallest *FRINGE* coefficients. For the most heavily unionized industries, which also tend to have the highest *FRINGE* ratios, increasing the benefits ratio has little or no impact on union density. In this respect there is *not* support for the hypothesis that fringe benefits undermine organized labor.

Besides the tendency for *UNIZ* to be impervious to *FRINGE* in union-oriented industries, another tendency is also apparent. Of the 20 areas of manufacturing, Table 1 shows that machinery is fairly moderate in terms of *UNIZ* and *FRINGE* (ranking tenth and eleventh, respectively). But according to the regression results shown in Table 2, the *FRINGE* effect (coefficient, -0.935) is quite potent in the machinery industry. For this industry with moderate unionization and modest fringe benefits, expanding the role of benefits significantly inhibits union density. Moreover, this observation applies to other areas with moderate-to-low rates of unionization.

According to the coefficient estimates, the *FRINGE* effect is most pronounced in the least unionized areas, yarn and thread mills and measuring and controlling devices (see Table 2). Moreover, they have two of the lowest *FRINGE* ratios (see Table 1). Industries such as miscellaneous manufacturing, apparel, and furniture and fixtures also exhibit relatively low unionization and lag behind in fringe benefits. Likewise, they also display some of the most stifling influences of *FRINGE* on *UNIZ*.

In summary, manufacturing industries with the most negative *FRINGE* coefficients tend to rank low in union density and prominence of non-wage pay. Of the ten industries with the strongest *FRINGE* effects, eight are in the bottom half of the rankings by union density. Furthermore, six are in the bottom half of the rankings in terms of benefits. In industries where unions do not have a high profile, non-wage benefits discourage unionization. In this respect there *is* support for the substitution hypothesis. Where benefits have not been relatively prominent, perhaps an increase in *FRINGE* placates workers, weakening demand for union membership.

Concluding Remarks

In a new study Edwards and Fuess (forthcoming) focus on manufacturing as a whole and find that union density is sensitive to the composition of pay. For states with right-to-work laws, they report that fringe benefits have little or no effect on unionization. But for states with no right-to-work laws and moderate union density, they find that increasing fringe benefits inhibits organized labor in the manufacturing sector. This study reproduces and extends their findings.

The negative fringe effect occurs for most types of manufacturing. But it would be hasty to conclude that there is a universal substitution effect, whereby fringe benefits generally undermine unionization. In manufacturing industries where organized labor already has a high profile, there is no fringe effect at all. But in industries where organized labor has not already established a strong foothold, where benefits have tended to lag behind, unionization is adversely affected by increasing the share of fringe benefits in total compensation.

This study shows that the fringe effect varies considerably from one manufacturing industry to the next, with the strongest effects occurring in industries with relatively low union density and non-wage pay. This is a similar pattern observed by Edwards and Fuess across states for manufacturing as a whole. We would expect future research to try to identify those factors that make impact of fringe benefits more pronounced. Specifically, future efforts should try to determine more precisely which industry characteristics and regional factors combine to generate a fringe effect that thwarts organized labor.

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Appendix
Data Series

Union Density. *UNIZ* for 1983-1996 is reported by Hirsch and Macpherson [3], in the table "Union Membership, Density, Employment, and Earnings by Industry" (see "Data Sources" below).

Non-wage Benefits. We calculated *FRINGE* with Bureau of Census [2] data. For 1983-1996 we used Annual Survey of Manufactures data reported in Table 3; specifically, *FRINGE* ≡ [1 – (Payroll/Total Compensation)].

Other Explanatory Variables. *RAISE* is calculated from the same series as *FRINGE* using wage-only components. We used the GDP deflator to convert all values to 1992 dollars. The GDP deflator is reported by the Bureau of Economic Analysis [1], pp. 89-90.

MFG SHR is an industry's share of U.S. manufacturing employment. Total manufacturing employment is reported in [2], Table 1a (1983-1996). Employment for manufacturing sub-sectors is reported in [2], Table 1b (1983-1996). *MFG SHR* is simply the ratio of the latter to the former.

PART TIME is the percentage of sector employment that this is part-time employment, as reported in [3].

For each sub-sector of manufacturing, the Bureau of Labor Statistics web site <www. bls.gov> reports unemployment rates.

Data Sources

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