Union-Nonunion Compensation Differentials Across Plant Sizes: Evidence from CPS 1983

Albert Ade Okunade
Phanindra V. Wunnava
Michael D. Robinson

ABSTRACT. Previous empirical work on the relationship between plant size and union-nonunion differentials has focused either on wages (Podgursky, 1986) or benefits (Bramley, Wunnava, and Robinson, 1989; Freeman, 1981). This note extends this research by simultaneously focusing on both wages and benefits. There are several arguments that can be made in explaining union-nonunion differentials across plant sizes: (1) union threat effects, (2) efficiency wage effects, and (3) wage dispersion effects. Our study focuses on measuring the union-nonunion differential in total compensation. For this end, estimates of total compensation are obtained using Mellow's suggestion (1982) for combining hourly wage information with qualitative data on pensions and health insurance, and Ross's imputations (1989) for holidays and vacations benefits. Our results, based on the May 1983 CPS supplemented by BLS data on pensions, health insurance, holidays, and vacation benefits indicate significant union-nonunion total compensation differentials exist only for workers in establishments with less than 500 workers. These results are consistent with Podgursky's wage differential findings.

Final version accepted on March 26, 1990

Department of Economics
Memphis State University
Memphis, TN 38152
U.S.A.

Department of Economics
SUNY-Binghamton, NY 13901 (1989–90)
and
Middlebury College
Middlebury, VT 05753
U.S.A.

and

Department of Economics
Mount Holyoke College
South Hadley, Mass. 01075
U.S.A.

I. Introduction

Labor receives pecuniary and nonpecuniary (life insurance, health benefits, pension coverage, and other agreed-upon benefits) compensation from employers. Four recent empirical studies have examined the variation of union-nonunion differentials focusing on wages (Podgursky, 1986) and nonwage benefits (Bramley, Wunnava, and Robinson, 1989; Freeman, 1981; Freeman and Medoff, 1984) across establishment sizes. Podgursky found that union-nonunion pecuniary wage differentials are most pronounced in small plants. While the union-nonunion differentials in health care coverage reported by Bramley, Wunnava and Robinson (hereafter BWR) mimic that for wages reported by Podgursky, the union-nonunion differentials in pension coverage were smallest in medium sized establishments. Freeman and Medoff (1984) report higher total benefits in large as opposed to small firms, while Freeman (1981) using establishment data shows that increasing establishment size lowers voluntary fringe benefits to non-office workers.

Research on union-nonunion wage/benefits differentials by establishment size has the potential for addressing a number of issues: wage-nonwage compensation trade-offs in the worker's utility function (Woodbury, 1983), unionization and other collective bargaining trends (Edwards and Swaim, 1986; Freeman, 1986; Linneman and Watcher, 1986), and industrial structure, conduct and performance (Schmalensee, 1988). One previous investigation by Freeman (1981) utilized the 1967–1972 data from the now-discontinued Expenditures for Employee Compensation Survey (EECS) tapes, to show that union raises the share of compensation alloted to fringes and the

Small Business Economics **2**: 313–317, 1990.

straight-time wage rate. However, no study has utilized CPS data tapes to empirically quantify how union-nonunion total (pecuniary and nonpecuniary) compensation differentials vary across establishment sizes. Research efforts in this direction are becoming more important for at least two reasons. First, union influence appears to be vital in shifting workers' preference for benefits, resulting in higher benefits-to-wages mix under collective bargaining (Lester, 1967; Woodbury, 1983). Second, previous studies[1] focusing on either wages or benefits in isolation are necessarily incomplete. A worker accepts his/her current job offer based on both the wage-benefits mix of total compensation and the total compensation comprising both components. In effect, the patterns of union-nonunion total compensation and benefits-to-wages mix differentials are likely to differ across plant sizes when compared to wages or benefits differentials in isolation. Moreover, a simultaneous consideration of wage and nonpecuniary compensations allows an assessment of whether the declining union-nonunion pattern of differentials observed for wages (Podgursky, 1986), total benefits (Freeman, 1986; Freeman and Medoff, 1984), and health coverage (BWR) across plant sizes or the U-shaped pattern of union-nonunion differentials (as observed by BWR for pension coverage) across plant sizes is preserved for total compensation. Thus, we formally extend the recent works of Podgursky and BWR by investigating the structure of union-nonunion total compensation (wage and nonwage -- focusing on pension, health coverage, holidays, and vacations) differentials across establishment sizes.

The data chosen for this study come from the May 1983 CPS. With this data we are able to identify establishment size for the workers. Unfortunately health and pension benefits are reported only as present or absent. In order to circumvent this problem we implement a procedure suggested by Mellow (1982) for separately imputing dollar values for health insurance and pension coverage benefits of workers who claim participation in these benefits and Ross's (1989) imputations for holidays and vacations. Each worker's pecuniary wage is then augmented with the imputed nonwage benefits to derive the worker's estimated total hourly compensation.

II. Establishment size and union-nonunion differentials

Union-nonunion (pecuniary, nonpecuniary, or total) compensation differentials across employer sizes can be explained by alternative theories such as: union threat effects (Podgursky, 1986), efficiency wages (Lindbeck and Snower, 1987), and the wage dispersion effects of unions (Freeman and Medoff, 1982). Adherents to the union threat effects theory contend that large non-unionized firms pay workers higher wages to ward off the threat of potential unionization. Efficiency wage theory implies that both union and non-union employees in large plants will receive higher wages beacuse of large monitoring costs. The wage premiums paid to non-union workers in larger plants could decrease the extent of the union-nonunion differential. The wage dispersion effects of unions presupposes the existence of a binding upper limit constraint on the wage for a particular job. This assumption guarantees that the ability of a newly unionized firm to obtain large wage increase for its workers is inversely related to the firm size. If employees of a small non-union firm receive wages far from the maximum possible wage for a particular job, they have the most to gain from unionization.

III. Data and methodology

The data are for full-time, white, male workers employed by the private non-agricultural sector from the May 1983 Current Population Survey (CPS). Compensation includes the hourly wage (HW) and four nonpecuniary fringe benefits: a worker's participation in pension or health insurance at his/her present job, holidays and vacations.[2] Since no data are available on holidays or vacations in the CPS, we have adopted Ross's (1989) assumption that all workers receive holidays, and workers with more than one year of tenure receive vacations. Since responses on individual worker's participation or non-participation in pension and health benefit plans are recorded on an ordinal ("Yes" or "No") basis, it is necessary to impute dollar values for these as well. In order to compute total hourly compensation (THC) for each worker we use 1977 BLS

published data on average expenditures on fringe benefits as percentage of total compensation. Each worker's hourly wage is then augmented by the appropriate percentage according to the package of benefits that worker receives. Benefits were separately imputed for manufacturing and non-manufacturing workers by size of establishment.[3] We have weighted our estimates by the proportion of workers in each cell that receives the benefit so the average imputed benefits within the cell equal the reported percentages in the BLS data.[4] Obviously, the imputation procedure employed here is not equivalent to actual data on fringe benefits. The conclusions we draw should be contemplated with this in mind.

Since the main purpose of this paper is to examine the pattern of union-nonunion compensation differentials across different plant sizes the following is our empirical specification:

$$ln\ \text{THC} = X\beta_x + U\beta_u + \varepsilon \qquad (1)$$

where ln THC is the natural log of total hourly compensation (i.e., the hourly wage plus estimated pension, health benefits, holidays and vacations); X is a vector of human capital/personal variables consisting of education, experience (experience^2), tenure (tenure^2), region, occupation, and industry dummies; and U is a vector of five union-establishment size dummy variables. U_1 is equal to 1 for union workers in the smallest establishment size and 0 otherwise, U_2 is equal to 1 for union workers in the second establishment size and so on. The five establishment sizes are: Size 1 (0 to 24 employees), Size 2 (25 to 99 employees), Size 3 (100 to 499), Size 4 (500 to 999 employees), Size 5 (over 1000 employees).

IV. Estimation results, discussions and implications

For comparative purposes OLS estimates of two different versions of Equation (1) are reported in Table I: (i) ln of total hourly compensation (THC) as the dependent variable, and (ii) ln of hourly

TABLE I
OLS estimates of equation 1[a]

Regressors	(i) Dependent variable: ln THC		(ii) Dependent variable: ln HW	
		t-value		*t*-value
Intercept[b]	0.188	3.20	0.203	3.53
Size 2	0.119	8.33	0.097	6.92
Size 3	0.192	11.80	0.176	11.11
Size 4	0.315	12.47	0.259	10.49
Size 5	0.374	18.02	0.316	11.47
Union 1	0.251	10.75	0.208	9.13
Union 2	0.162	7.13	0.139	6.27
Union 3	0.052	2.42	0.043	2.02
Union 4	−0.006	−0.16	−0.016	−0.45
Union 5	0.007	0.27	−0.003	−0.13
Education	0.041	19.09	0.040	18.51
Experience	0.054	20.07	0.051	19.40
Experience^2/100	−0.059	−18.28	0.056	−17.62
Tenure	0.019	11.59	0.016	9.57
Tenure^2/100	−0.036	−7.58	−0.029	−6.08
R^2	0.483		0.452	
Adjusted R^2	0.480		0.448	
F ratio	147.65		129.92	
N	6657		6657	

[a] Other controls include regional, occupational, and industrial dummies. Full regression results available on request.
[b] Size 1 is the omitted category.

wage (HW) as the dependent variable. As expected, workers with higher education, experience, and tenure are paid significantly higher compensation. Also, workers in larger establishments receive higher compensation. There is very little difference between the total compensation and hourly wage estimates.

Now we turn our attention to the union-nonunion differentials. The union-nonunion differential is significant in the three smallest establishment sizes (under 500 employees) and insignificant in the largest two establishment sizes. This is true in both the total compensation and hourly wage specifications. The significant coefficients on the union dummies are only slightly larger in the total compensation equation than in the hourly wage equation. The pattern of union-nonunion differentials observed by Podgursky (1986) for wages and BWR (1989) for health benefits exists in both our total compensation and hourly wage specifications. The union-nonunion differential in wages and total compensation steadily declines from over 20 percent in establishments with fewer than 25 employees, to close to zero in establishments with over 500 employees.

Table II presents a summary of union-nonunion compensation/wage differentials across plant sizes based on the estimates presented in Table I. Tests were conducted to determine if the union-nonunion differentials varied across establishment sizes. These results indicate that the union-nonunion differentials in the smallest two establishment sizes are significantly different from each other, as are the union-nonunion differentials in Size 2 and Size 3 establishments. The final row of Table II indicates that we can quite strongly reject the null hypothesis that the union-nonunion differentials are identical across all establishment sizes. In other words, Podgursky's results that union-nonunion wage differentials decline over plant sizes still holds even when pension, health benefits, holidays, and vacations are incorporated into the compensation structure. Our finding of an inverse relationship between union-nonunion total

TABLE II
Summary of union-nonunion differentials across establishment sizes

Proposed H_0	Compensation			Wages		
	Difference in union coefficients	F ratio	Significance level	Difference in union coefficients	F ratio	Significance level
Union-nonunion differential is the same in Size 1 and Size 2	0.089	4.92	0.026	0.068	4.92	0.027
Union-nonunion differential is the same in Size 2 and Size 3	0.110	13.16	0.00	0.097	10.68	0.00
Union-nonunion differential is the same in Size 3 and Size 4	0.058	1.80	0.17	0.059	1.94	0.16
Union-nonunion differential is the same in Size 4 and Size 5	−0.013	0.08	0.77	−0.014	0.089	0.77
All Union-nonunion differentials are identical	***	18.49	0.00	***	14.63	0.00

compensation differential and the size of establishments is also consistent with that of Freeman (1981). While our study differs from Freeman's on methodological approaches, the BLS data we used are in fact derived from the EEC data used by Freeman. We do have concerns about imputing the dollar value of fringe benefits to derive total compensation for 1983. However, unless there have been substantial increases in union benefits in large establishments, our conclusions remain valid.[5]

V. Conclusion

This paper has presented results that extend Podgursky's 1986 findings about union-nonunion differentials by expanding the results to estimated total compensation. Our work indicates that the union-nonunion differentials, as found by Podgursky to decline in larger establishments, holds for 1983 hourly wage data, and data that includes the estimated compensation in the form of health, pension, holidays and vacation benefits, With appropriate cautions about the use of imputed total compensation it appears as though this effect is quite robust.

Notes

* We wish to thank an anonymous referee and David Ciscel for their constructive comments on the earlier draft of this paper. We would also like to thank Jonathan Mowry for his research assistance, and Murray Ross for providing us with a copy of his disserlation. The usual caveat applies.

[1] With the exception of Freeman (1981).

[2] We focus on holidays, vacations, and pension and health coverage because of data limitations. However, potential bias for not including other benefits can be expected to be minimum since these benefits account for the most of the voluntary fringes offered to employees by their employers. See also Freeman (1981) and Note 5.

[3] Mellow (1982) based his estimates on Tables 10 (pension) and 12 (health) of the BLS (1977) report focusing on office and non-office workers. Our estimates of these fringes are based on table 19 of the same report because these fringes along with others have been reported by the size of the establishment.

[4] We have made extensive use of the imputation suggestions given by Ross (1989). Ross in his Chapter 3 provides econometric proofs supporting the asymptotic consistency of the OLS estimates when individual worker's non-wage benefits expenditure are imputed from establishment data. We'd like to thank the referee for bringing this dissertation to our attention.

[5] The U.S. Chamber of Commerce publication Employee Benefits (various issues) reveals that for hourly workers the percent of compensation that was made towards health insurance and pension plans remained virtually unchanged between 1977 and 1984 (9.3 vs. 9.9 percent of wages for all industries and 9.4 vs. 9.9 percent in manufacturing).

References

Bramley, Donald G., Phanindra V. Wunnava and Michael D. Robinson, 1989, 'A Note on Union/Non-Union Benefit Differentials and Size of Establishment', *Economics Letters* **30**(1), 85–88.

Edwards, Richard and Paul Swaim, 1986, 'Union-Nonunion Earnings Differentials and the Decline of Private-Sector Unionism', *American Economic Review* **76**(2), 97–102.

Freeman, Richard B., 1981, 'The Effect of Unionism on Fringe Benefits', *Industrial and Labor Relations Review* **34**(4), 489–509.

Freeman, Richard B, 1986, 'The Effect of Union Wage Differentials in Management Opposition and Union Organizing Success', *American Economic Review* **76**(2), 92–96.

Freeman, Richard B, and James L. Medoff, 1982, 'Substitution Between Production Labor and Other Inputs in Unionized and Nonunionized Manufacturing', *Review of Economics and Statistics* **LXIV**(2), 220–233.

Freeman, Richard B, and James L. Medoff, 1984, *What Do Unions Do?*, New York: Basic Books.

Lester, Richard, 1967, 'Benefits as a Preferred Form of Compensation', *Southern Economic Journal* **33**, 488–495.

Lindbeck, A. and D. J. Snower, 1987, 'Efficiency Wages Versus Insiders and Outsiders', *European Economic Review* **31**(1/2), 407–416.

Linneman, Peter and Michael L. Wachter, 1986, 'Rising Union Premiums and the Declining Boundaries Among Noncompetitive Groups', *American Economic Review* **76**(2), 103–108.

Mellow, Wesley, 1982, 'Employer Size and Wages', *Review of Economics and Statistics* **64**(3), 341–345.

Podgursky, Michael, 1986, 'Unions, Establishment Size and Intra-Industry threat Effect', *Industrial and Labor Relations Review* **39**(1), 277–284.

Ross, Murray, 1989, 'Compensation Differences in the Union and Nonunion Sectors', Ph.D. dissertation, University of Maryland.

Schmalensee, Richard, 1988, 'Industrial Economics: An Overview', *The Economic Journal* **98**(4), 643–681.

U.S. Bureau of Labor Statistics, 1977, *Employee Compensation in the Private Nonfarm Economy*, 1974, Bulletin 1963, Washington D.C.: USGOP.

Woodbury, Stephen A, 1983, 'Substitution Between Wage and Nonwage Benefits', *American Economic Review* **73**(1), 166–182.