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Municipal Government Structure, Unionization, and the Wages of Fire Fighters

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Abstract

[Excerpt] Also important to any analysis of labor costs in the public sector today is, of course, the effect of collective bargaining on wages. For reasons described in a recent article by Orley Ashenfelter, fire fighters provide an excellent test of union wage effects at the city level. This study will therefore use fire fighters as an example with which to assess and compare the effects on wages of both unionism and the structure of municipal government.

This article is in many respects an extension of the excellent study by Asehenfelter, who examined the effect of the International Association of Fire Fighters on wages of firemen over the 1960-66 period and concluded that the union did have a statistically significant impact. The present study analyzes the wages of firemen in 1969, adds the new variable of government structure, and provides a more accurate estimate of the wage effect of unionism through four changes in approach.

Keywords

fire fighters, collective bargaining, wages, municipal government, public sector, unionization

Disciplines

Collective Bargaining | Labor Economics | Labor Relations | Unions

Comments

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MUNICIPAL GOVERNMENT STRUCTURE, UNIONIZATION, AND THE WAGES OF FIRE FIGHTERS

RONALD G. EHRENBERG

A SUBSTANTIAL percentage of all municipalities in the United States employ a city manager as the principal operating officer rather than an elected mayor or set of elected commissioners. (See Table 1.) Presumably this reflects the belief that a professionally trained manager can more efficiently "produce" a desired bundle of municipal services.[1] For example, if professionally trained managers are better negotiators or are more aware of market conditions than elected nonprofessionals, one might expect, ceteris paribus, that city manager–operated cities will tend to have lower wage costs per municipal employee than municipalities with other forms of government.[2] To date, however, no study has been conducted to ascertain the impact of governmental structure on municipal employee wages, although the growing financial crisis of the cities suggests that the results of such an analysis could be important.

Also important to any analysis of labor costs in the public sector today is, of course, the effect of collective bargaining on wages. For reasons described in a recent article by Orley Ashenfelter,[3] fire

This study tests the hypothesis that labor costs in municipal government are influenced by the structure of "management"—whether the chief operating officer is a professional manager or elected official—as well as by the strength of organization among employees. Using fire fighters as a test group, the author constructs a model to explain the variation among cities in the demand for and supply of firemen and applies this model to data for 1969 and a sample of 270 cities. He concludes that unionism does have a significant wage effect in cities that have agreed to a formal labor contract, but the structure of city government appears to have only a minor impact on wages.

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[1] Political scientists often suggest that the widespread adoption of the manager form of government is at least partially due to *claims* of its economic efficiency made by proponents of the city manager plan. See, for example, C. Adrian and C. Press, *Governing Urban America*, 3rd ed. (New York: McGraw-Hill, 1968), p. 206.

[2] A survey of 628 cities with a city manager and a population greater than 10,000 found that the cities were represented by the manager in contract negotiations with employee groups over 70 percent of the time. See W. Crouch, *Employer-Employee Relations in Council-Manager Cities* (Washington: International City Managers' Association, 1968), p. 60.

It should be emphasized that low wages for fire fighters will be a measure of efficiency only if we have standardized for intercity variations in the productivity of fire fighters. At points in this paper, we have attempted to control for these intercity differences in productivity and find that this alters none of the conclusions we obtain in our unstandardized analysis. The proxies we use, however, are crude, and our conclusions should be qualified accordingly.

[3] Orley Ashenfelter, "The Effect of Unionization on Wages in the Public Sector: The Case of Fire Fighters," *Industrial and Labor Relations Review*, Vol. 24, No. 2 (January 1971), pp. 191–202.

Table 1. Governmental Structure of Cities with Populations of Over 5,000, for 1966.*

Population Group	Number of Cities Reporting	Type of Municipal Government					
		Mayor-Council		City Manager		Commission	
		by Number	by Percentage	by Number	by Percentage	by Number	by Percentage
500,000 and up	26	20	77	5	19	1	4
250,000–500,000	27	11	41	13	48	3	11
100,000–250,000	96	34	35	50	52	12	13
50,000–100,000	227	84	37	121	54	22	10
25,000– 50,000	461	167	36	244	53	50	11
10,000– 25,000	1105	538	49	468	42	99	9
5,000– 10,000	1148	746	65	344	30	58	5
Total	3090	1600	52	1245	40	245	8

* This table has omitted information on sixty-six cities that have town meeting and representative town meeting forms of government and thirty-three cities that failed to report. Only eighteen of these cities had populations greater than 25,000.

Source: "Governmental Data for Cities Over 5,000 Population," *Municipal Year Book—1966* (Washington: International City Managers Association, 1966), p. 90.

fighters provide an excellent test of union wage effects at the city level. This study will therefore use fire fighters as an example with which to assess and compare the effects on wages of both unionism and the structure of municipal government.

This article is in many respects an extension of the excellent study by Asehenfelter, who examined the effect of the International Association of Fire Fighters on wages of firemen over the 1960–66 period and concluded that the union did have a statistically significant impact. The present study analyzes the wages of firemen in 1969, adds the new variable of government structure, and provides a more accurate estimate of the wage effect of unionism through four changes in approach. First, Ashenfelter uses, as a measure of unionization, a variable that takes on the value of one if there is an IAFF local in the city and zero otherwise. Although the proportion of fire protection employees represented by the IAFF is usually close to unity, this variable may not be a good measure of the union's ability to influence wages. One might suspect that the IAFF would have a significant impact on wages only if the city has agreed to an explicit contract with the union; that is, unless some formal means have been established by which the union can influence wages, its effect is not likely to be large.[4] Table 2 shows, however, that in 1969 a formal contract covering firemen existed in fewer than 50 percent of the cities in which there was an IAFF local. Consequently, in addition to utilizing Ashenfelter's measure of unionization, this study employs a variable that takes on the value of one if a city has a contract with an IAFF local and zero if it does not.[5]

[4] Hirschel Kasper, "The Effects of Collective Bargaining on Public School Teachers' Salaries," *Industrial and Labor Relations Review*, Vol. 24, No. 1 (October 1970), pp. 57–72, presents evidence to support this point. Kasper finds that the impact of unions on teachers' salaries is larger when formal bargaining agreements exist.

[5] Unfortunately information on whether the IAFF local had formal collective bargaining rights and/or the right to strike was not reported by enough cities to allow us to use variables representing these concepts in our analysis.

Table 2. Union Affiliation of Firemen and Distribution of IAFF Contracts, in Cities with Populations of Over 5,000, for 1969.

(percentages)

Population Group	*Cities with Firemen Affiliated with a National Union*	*Cities with Unions Affiliated with the IAFF*	*IAFF Cities in Which the City has a Contract with the Union*
Greater than 500,000	96	92	41
250,000–500,000	96	96	22
100,000–250,000	87	97	42
50,000–100,000	76	93	48
25,000–50,000	66	93	44
10,000–25,000	49	98	48

Source: Boyd Hartley, "Fire Department Unionization," *Municipal Year Book—1970* (Washington: International City Managers Association, 1970), pp. 391–404.

Second, Ashenfelter uses average annual salaries and average hourly wages of fire department employees as dependent variables. These average values are functions of the seniority structure of each fire department's work force and if unionized cities for any reason tend to systematically employ fire fighters with more (less) seniority, then a spurious positive (negative) correlation will exist between these earnings measures and the unionization variables. Furthermore, the IAFF presumably attempts to directly influence salary scales, not realized average values. Thus, this study uses earnings measures based on entry and maximum (nonpromotional) salaries of uniformed firemen, as well as Ashenfelter's measures.

Third, Ashenfelter assumes that the supply of labor to an individual fire department is perfectly elastic. This allows him to empirically specify that "in the absence of unionism, differences in money wages across cities would, apart from a disturbance term, be due primarily to differences in living costs." [6] If job seekers vary, however, in their perception of the relative nonpecuniary benefits from fire protection employment and alternative forms of employment, then the supply of labor to an individual fire department will *not* be infinitely elastic. In this case, factors that influence either the derived demand for fire fighters or the position of the supply curve will affect fire fighters' wages. This study attempts to control for these factors.

Finally, it is well known that police and fire department entrance and maximum (nonpromotional) salaries are closely related within cities, through either formal or informal parity agreements. If police unions have a positive impact on police compensation, one might expect a spillover effect on the wages of firemen. Consequently, the impact of police unions on fire fighters' wages will also be considered in this study.

Supply and Demand Factors

The demand for fire protection employees is derived from the demand for fire protection services. Based on a utility maximization model of municipal government behavior, one can postulate that this derived demand is a function of the price of the service, the community's "tastes" for the service, and the community's ability to pay. In this study, the price of fire protection services is assumed to be positively related to a measure of the hourly wage cost of fire fighters (w) and negatively related to their average productivity or quality (x_1). The com-

[6] Ashenfelter, "The Effect of Unionization on Wages in the Public Sector: The Case of Fire Fighters," p. 197.

munity's taste for fire protection is assumed to be positively related to its population density (x_2) and the median value of housing in the community (x_3). Finally, the ability to pay for the service is taken to be a positive function of median family income (x_4). Hence, the demand for fire fighters is given by the equation,

$$(1)\quad D = D(w,x_1,x_2,x_3,x_4) \qquad D_1 < 0 \;\; D_2,D_3,D_4,D_5 > 0.$$

Assuming that potential applicants to a fire department place different values on the relative nonpecuniary benefits of fire fighting and alternative forms of employment, the supply of labor to a fire department is positively related to fire fighters' hourly wages (w) and negatively related to the wage (x_5) potential applicants would expect to obtain from alternative employment. Empirically, the latter variable is taken to be the average hourly earnings of manufacturing production workers in the area. Given the alternative wage, an increase in the community's median education level (x_6) will increase the number of qualified applicants who apply to the department at each fire fighter wage level. Finally, only a small proportion of fire fighters are nonwhite. Although this is probably due primarily to discrimination in hiring, it also may indicate that nonwhites derive extremely low nonpecuniary benefits from fire protection employment and that, ceteris paribus, the supply of fire fighters is negatively related to the nonwhite proportion of the population (x_7). Thus, the supply curve can be written as

$$(2)\quad S = S(w,x_5,x_6,x_7) \qquad S_1 < 0, S_2 < 0, S_3 > 0, S_4 < 0.$$

In the absence of imperfections in the labor market, Equations 1 and 2 can be solved to determine a single market clearing wage (w^c).[7]

$$(3)\quad w^c = w^c(x_1,x_2,x_3,x_4,x_5,x_6,x_7) \qquad w_1^c,w_2^c,w_3^c,w_4^c,w_5^c,w_7^c > 0 \; w_6^c < 0.$$

Empirically, this reduced form equation can be approximated by the following specific functional form.

$$(4)\quad w^c = \alpha_0 \prod_{j=1}^{7} (x_j)^{\alpha_j}$$

Suppose that the IAFF succeeds in pushing up fire fighters' wages by the same percentage above the market clearing wage (γ_0) in all unionized cities in our sample, and it has no impact on fire fighters' wages in nonunion cities.[8] If u

[7] Even if the labor market for fire fighters in a city is characterized by a monopsony structure rather than a competitive structure, the equilibrium wage (w^m) will still be a function of the same variables as w^c. The impacts on wages of those variables that influence the demand curve will be qualitatively identical to their impacts in Equation 3; however, the impacts of the supply-side variables may be qualitatively different. See J. Robinson, *Economics of Imperfect Competition* (London: MacMillan, 1938) for the earliest exposition of this point.

[8] I am ignoring the spillover effects of the IAFF on the wages of fire fighters in nonunion cities in my theoretical structure. For a treatment of this problem, see S. Rosen, "Trade Union Power, Threat Effects, and the Extent of Organization," *Review of Economic Studies*, Vol. 36, No. 2 (April 1969), pp. 185–196. Empirically, only the wage advantage of IAFF members relative to nonunion fire fighters can be estimated, and no statement as to the IAFF's impact on absolute wages should be inferred.

The assumption that α_0 is constant across cities (in the absence of different forms of government) is also patently false. However, as shown by Ashenfelter, "The Effect of Unionization on Wages in the Public Sector: The Case of Fire Fighters," pp. 194–197, and originally H. G. Lewis, *Unionism and Relative Wages in the United States* (Chicago: University of Chicago Press, 1964), pp. 27–40, all that can be estimated empirically is the value of the proportionate union-nonunion *average* wage differential across cities. For expositional purposes, I have assumed this differential to be constant across cities.

is a zero-one dummy variable, which takes on the value unity when the fire fighters in a city are unionized, then the observed wage ($\bar{w}$) is given by

$$\bar{w} = w^e(1 + \gamma_0 u) \tag{5}$$

or

$$\log \bar{w} \simeq \log w^e + \gamma_0 u.$$

The structure of municipal government may affect the wages of fire fighters in two ways. First, city managers may be more efficient negotiators than either elected nonprofessional mayors or commissioners. This may be due either to their professional training or the different type of political pressures that they face. As a result they may reduce the ability of the IAFF to push up the wages of its members. Second, city managers may be more efficient than mayors or commissioners in "producing" fire protection services from a given number of firemen. Hence, they may reduce the derived demand for fire protection employees and the market clearing wage (w^e). Finally, since an elected commissioner has more limited responsibility and can focus his attention on a narrower range of issues than a mayor, ceteris paribus, we might also expect that commission-run cities will have lower wages than cities in which an elected mayor is the chief operating officer.

To test these hypotheses, let g_1 be a dichotomous variable that takes on the value of one if the municipality has a city manager form of government and zero if it does not. Let g_2 be a similar variable with a value of one representing the commission form of government and a value of zero indicating another form. Suppose that,

$$\gamma_0 = d_0 + d_1 g_1 + d_2 g_2, \tag{6}$$

$$\alpha_0 = a_0 + a_1 g_1 + a_2 g_2.$$

Substituting Equations 6 and 4 into Equation 5 then yields our basic estimating equation,

$$\log \bar{w} = a_0 + a_1 g_1 + a_2 g_2 + \sum_{j=1}^{7} \alpha_j \log x_j + d_0 u + d_1 g_1 u + d_2 g_2 u. \tag{7}$$

Statistically significant estimates of a_1 or a_2 (d_1 or d_2) will indicate that *on average* city managers or commissioners do differ from mayors in their ability to produce fire protection services and to negotiate with the IAFF.[9]

[9] Again, it is important to emphasize that, as in the case of the union impact, empirically all that can be estimated are the average measures of the impact of government structure, although the effectiveness of individual executives obviously varies widely across cities within any one of the governmental categories. Furthermore, the data do not permit one to distinguish between "strong-mayor" and "weak-mayor" forms of government.

It should also be noted that there are several studies by political scientists that attempt to ascertain the "determinants" of the structure of municipal government. Examples of this literature include J. Kessel, "Governmental Structure and Political Environment: A Statistical Note About American Cities," *American Political Science Review*, Vol. 56, No. 3 (September 1962), pp. 615–620; R. Wolfinger and J. Field, "Political Ethos and the Structure of City Government," *American Political Science Review*, Vol. 60, No. 2 (June 1966), pp. 303–326; and R. Lineberry and E. Fowler, "Reformism and Public Policies in American Cities," *American Political Science Review*, Vol. 61, No. 3 (September 1967), pp. 701–717. Much of the literature is summarized in B. Hawkins, *Politics and Urban Policies* (Indianapolis: Bobbs-Merrill, 1971).

Primarily using simple pairwise comparisons of the mean values of variables across types of cities, these studies have found that the structure of municipal government appears to be correlated with various socioeconomic and demographic variables. The specific variables considered and the signs of the relationships found have varied with the sample of cities studied. The form of a local government, however, has

The dependent variable in Equation 7 is a measure of the hourly wage rate of fire fighters. The IAFF or municipal government decision makers influence this rate through altering either the annual salary of fire fighters (S) or their annual hours of work (H). Indeed, it is an identity that

$$\log \bar{w} = \log S - \log H. \tag{8}$$

As a result, variants of Equation 7 that utilize $\log S$ and $\log H$ are also used as dependent variables. Due to the condition presented in Equation 8, the theoretical impact of any independent variable on $\log \bar{w}$ will equal its impact on $\log S$ minus its impact on $\log H$, and the least-squares estimates of the variants of Equation 7 preserve this property. Consequently, one can empirically analyze the impact of the IAFF (or the municipal government structure) on the hourly wage of fire fighters as the difference between its impacts on annual earnings and annual hours of work.

Empirical Results

Estimates of Equation 7 will now be presented, utilizing cross-sectional data for a sample of 270 cities that had populations of between 25,000 and 250,000 in 1969.[10] Three different hourly (annual) wage measures were used in the analysis: the entrance hourly (annual) wage for uniformed fire fighters $W_1(S_1)$, the maximum nonpromotional hourly (annual) wage of uniformed fire fighters $W_2(S_2)$, and the average hourly (annual) wage for all fire department employees $W_3(S_3)$. Each of these variables was deflated by an estimate of the city cost-of-living index to control for intercity cost-of-living differentials. This practice was applied to all other variables that were expressed in money terms.[11]

As noted earlier, two unionization variables were used. The first, u_1, was a dichotomous variable that took on the value one if an IAFF local were present in the city and zero otherwise. The second variable, u_2, took on the value of one if the city had a contract with an IAFF local and zero otherwise. In addition, to account for the interdependence that exists between the salaries of police and firemen, a variable representing the proportion of police patrolmen who belong to a national union (ϕ), was in-

usually been found to be "related" to variables reflecting the city's ethnic composition, size, income distribution, economic base, population growth, religious composition, regional location, etc. To the extent that municipal government structure is endogenously determined, the parameter estimates obtained in the present study may reflect, to some degree, the impact of omitted variables, rather than an exogenous structure of government. Our conclusions should be further qualified due to this point.

[10] Cities with populations of less than 25,000 were excluded from the sample due to the unavailability of data for several of the independent variables; cities with populations greater than 250,000 were excluded since virtually all have IAFF locals (see Table 2). Data for 1969 were used because of the availability of information identifying those cities that had a contract with an IAFF local that year. Somewhat fortuitously, this was also the first year after the IAFF eliminated the "no-strike" clause from its constitution.

[11] Comparative cost-of-living indices for forty metropolitan areas and nonmetropolitan areas (by region) are available from the U.S. Bureau of Labor Statistics, *Handbook of Labor Statistics*, Bulletin 1666 (Washington: G.P.O., 1970). For these areas I estimated a cost-of-living index equation using as independent variables six size-class-of-SMSA dummy variables and four region-of-country dummy variables. Estimates for the unavailable comparative cost-of-living indices for the other cities in the sample were then constructed using this equation. Details of this procedure, which differs from that used by Ashenfelter, are available from the author. Estimates of Equation 7, using undeflated money variables, did not differ significantly from those presented in the text.

cluded as an independent variable in Equation 7.[12]

Table 3 presents estimates of the variants of Equation 7, which include u_1 as an independent variable; similar estimates for the specifications utilizing u_2 are found in Table 4. In no case did the municipal government structure have significant impact on the ability of the IAFF to improve the wages of their members. Consequently, only the estimates that constrain d_1 and d_2 to be zero are presented in these tables. In addition, the variables available as proxies for the average productivity of fire fighters in the city were initially omitted from the regressions.[13]

In both tables virtually all of the coefficients of the variables representing supply and demand conditions have the anticipated signs for the hourly wage and annual salary coefficients. Several of these coefficients are not statistically significant; however, this may be due partially to problems of severe multicollinearity.

Somewhat surprisingly, annual salaries are between 5 and 8 percent higher in manager-run cities than mayor-council cities, when other factors are equal. The size of the differential varies with the dependent variable and model specification used (Columns 1–3 of these tables). The higher annual salaries, however, are due solely to the fact that fire fighters work 9 percent more in manager-run cities (Column 4). As a result, hourly earnings are betwen 1 and 4 percent lower in manager cities than mayor-council cities (Columns 5–7). In addition, hourly earnings are between 5 and 8 percent lower in commission cities than in mayor-council cities (Columns 5–7). In neither case, however, are these hourly earnings differences statistically significant.

The coefficients indicate that the impact of the IAFF on annual salaries, hourly wages, and hours of work is not statistically significant when u_1 is used as a measure of unionization (the impact on annual salaries in this case is, in fact, negative).[14] When Ashenfelter used u_1, however, he found the wage effect of the IAFF to be statistically significant in several cases, especially in his 1966 data. Our differences in results may partially reflect the different years utilized, our slightly different samples of cities, and differences in constructing the price index. More important, Ashenfelter's model may have been mispecified, for it included only the extent of unionization and the logarithm of an estimate of the city price level and therefore omitted variables representing supply

[12] There were not adequate data to consider two points: (1) whether the police union had a contract with the city and (2) the implications of the fact that police patrolmen's local unions are affiliated with more than one national union (primarily the Patrolmen's Benevolent Association and the American Federation of State, County, and Municipal employees).

[13] This was done because of the crude nature of the available proxies: the number of hours of fire ground operational training given recruits and a dummy variable that took on the value of one if the completion of an outside educational course were a requirement for a salary increase, and zero if it were not. The average productivity of fire fighters may also be endogenously determined; for a discussion of this point see Ronald Ehrenberg, "Heterogeneous Labor, Minimum Hiring Standards and Job Vacancies in Public Employment," *Journal of Political Economy* (forthcoming). Except for a North-South division, Ashenfelter did not attempt to control for quality differentials between cities either.

[14] These negative coefficients may indicate a simultaneity problem, if those cities with initially low fire fighters' wages were the first to unionize. If this hypothesis is correct, then the coefficients in Table 4 *understate* the true impact of the IAFF on wages.

Table 3. Coefficients for Fire Fighters' Compensation and Hours, for 1969; Union Variable—Cities in Which There was an IAFF Local. (absolute t statistics, N = 270)

	Dependent Variable						
Independent Variable	S_1 (1)	S_2 (2)	S_3 (3)	H (4)	W_1 (5)	W_2 (6)	W_3 (7)
u_1	−.006	−.024	−.008	−.032	.026	.008	.024
	(0.3)	(1.3)	(0.3)	(1.8)**	(1.0)	(1.3)	(0.7)
p	−.001	−.001	−.001	−.001	−.001	−.001	−.001
	(2.2)*	(2.7)*	(2.7)*	(0.5)	(2.9)*	(1.5)	(2.0)*
g_1	.049	.068	.065	.088	−.039	−.020	−.023
	(2.6)*	(3.9)*	(2.5)*	(5.1)*	(1.6)	(0.8)	(0.8)
g_2	−.025	−.011	−.004	.058	−.083	−.068	−.062
	(0.7)	(0.3)	(0.1)	(1.8)**	(1.8)**	(1.5)	(1.1)
x_2	.062	.052	.072	−.045	.107	.097	.117
	(4.7)*	(4.1)*	(3.9)*	(3.7)*	(6.0)*	(5.5)*	(5.3)*
x_3	.016	.054	.025	−.043	.059	.097	.068
	(0.3)	(1.1)	(0.3)	(0.9)	(0.1)	(1.4)	(0.9)
x_4	.431	.382	.390	−.075	.506	.457	.466
	(5.0)*	(4.6)*	(3.2)*	(0.9)	(4.3)*	(4.0)*	(3.3)*
x_6	.134	.105	.148	−.001	.135	.106	.149
	(3.8)*	(3.2)*	(3.0)*	(0.1)	(2.8)*	(2.3)*	(2.6)*
x_8	−.098	.086	.109	.228	−.326	−.142	−.119
	(0.9)	(0.8)	(0.7)	(2.3)*	(2.2)*	(1.0)	(0.7)
x_7	.001	.001	.001	.001	−.001	.001	.001
	(1.3)	(1.5)	(0.6)	(1.5)	(0.1)	(0.1)	(0.3)
R^2	.435	.509	.355	.241	.378	.408	.323

*Significant at the .05 level, two-tailed test.

**Significant at the .10 level, two-tailed test.

u_1 = one if there were an IAFF local in the city in 1969 and zero otherwise.

u_2 = one if there were an IAFF local with a contract with the city in 1969 and zero otherwise.

g_1 = one if the city had a city manager form of government in 1969 and zero otherwise.

g_2 = one if the city had a commission form of government in 1969 and zero otherwise.

p = proportion of city's police patrolmen who belonged to a national union in 1969.

x_2 = population density in 1960.

x_3 = median value of housing in 1960.

x_4 = median family income in 1960.

x_6 = Average hourly earnings of manufacturing production workers in 1963.

x_8 = median education level in 1960.

x_7 = nonwhite proportion of the population in 1960.

S_1 = the entrance annual salary for uniformed fire fighters.

S_2 = the maximum nonpromotional annual salary for uniformed fire fighters.

S_3 = the average annual salary for all fire department employees.

H = fire fighters' annual hours of work.

W_1 = the entrance hourly wage for uniformed fire fighters.

W_2 = the maximum nonpromotional hourly wage for uniformed fire fighters.

W_3 = the average hourly wage for all fire department employees.

Source: "Governmental Data for Cities Over 5,000 Population," *Municipal Year Book—1966* (Washington: International City Managers Association, 1966), pp. 98–159 (g_1, g_2).

Boyd Hartley, "Fire Department Unionization," *Municipal Year Book—1970* (Washington: International City Managers Association, 1970), pp. 391–437 (u_1, u_2).

"Police Department Statistics," *Municipal Year Book—1969* (Washington: International City Managers Association, 1969), pp. 335–369 (p).

"Fire and Police Salary Expenditures," *Municipal Year Book—1969* (Washington: International City Managers Association, 1969), pp. 146–181 (W_1, W_2, W_3, S_1, S_2, S_3, H).

U.S. Bureau of the Census, *County and City Databook—1967* (Washington: G.P.O., 1967) (x_2, x_3, x_4, x_6, x_8, x_7).

Table 4. Coefficients for Fire Fighters' Compensation and Hours, for 1969; Union Variable—Cities in Which There was an IAFF Local with a Contract with the City.†
(absolute t statistics, N = 270)

Independent Variable	*Dependent Variable*						
	S_1 (1)	S_2 (2)	S_3 (3)	H (4)	W_1 (5)	W_2 (6)	W_3 (7)
u_2	.032	.027	.051	−.047	.082	.075	.098
	(1.7)**	(1.6)	(2.0)*	(2.8)*	(3.2)*	(3.0)*	(3.2)*
p	−.001	−.001	−.001	−.001	−.001	−.001	−.001
	(2.6)*	(3.1)*	(3.0)*	(0.5)	(1.5)	(1.9)**	(2.2)*
g_1	.053	.074	.071	.088	−.035	−.013	−.016
	(2.8)*	(4.2)*	(2.8)*	(5.1)*	(1.4)	(0.5)	(0.5)
g_2	−.020	−.006	.003	.051	−.071	−.057	−.048
	(0.6)	(0.2)	(0.1)	(1.6)	(1.6)	(1.2)	(0.9)
x_2	.062	.052	.071	−.043	.106	.106	.115
	(4.7)*	(4.2)*	(3.9)*	(3.6)*	(5.9)*	(5.5)*	(5.4)*
x_3	.017	.060	.026	−.034	.050	.093	.059
	(0.3)	(1.2)	(0.4)	(0.7)	(0.7)	(1.4)	(0.7)
x_4	.440	.396	.404	−.074	.514	.471	.478
	(5.1)*	(4.8)*	(3.4)*	(0.9)	(4.5)*	(4.2)*	(3.4)*
x_5	.130	.099	.141	.003	.127	.096	.138
	(3.7)*	(3.0)*	(2.9)*	(0.7)	(2.7)*	(2.1)*	(2.4)*
x_6	−.064	.109	.162	.168	−.232	−.058	−.061
	(0.6)	(1.0)	(1.0)	(1.6)	(1.5)	(0.4)	(0.3)
x_7	.002	.002	.001	.001	.001	.001	.001
	(1.7)*	(1.9)**	(1.1)	(0.7)	(0.7)	(0.8)	(0.5)
R^2	.441	.510	.364	.254	.400	.408	.349

†Data sources and variable definitions are the same as in Table 3.
*Significant at the .05 level, two-tailed test.
**Significant at the .10 level, two-tailed test.

and demand conditions. If these variables are correlated with the extent of fire fighters' unionization, his estimated union coefficients may have been biased estimates of the true parameters.

To test for this possibility, I reestimated his model for my sample of cities in 1969 and found that the price term always had a coefficient greater than 2.0. The implication that a 1 percent increase in the price level will lead to a greater than 2 percent increase in annual (or hourly) wages strongly suggests the omission of an important variable, or set of variables, from his model. Further evidence supporting this view is presented in the Kasper study. Kasper found that whereas the simple correlation between teachers' salaries and unionization was .558 in his sample, the partial correlation fell to .068 after per capita income, urbanization, and several other variables were included in his estimating equation.[15]

In contrast, when the variable u_2 is used in our model (Table 4), the results differ markedly. Fire fighters worked 5 percent fewer annual hours in 1969 in cities where the union had a contract than in cities without an IAFF contract. Furthermore, annual minimum and maximum salaries were about 3 percent higher in cities with contracts, and actual average annual compensation was

[15] Kasper, "The Effect of Collective Bargaining on Public School Teachers' Salaries," p. 63.

about 5 percent higher. Consequently, firemen's hourly wages in those cities were between 7 and 10 percent higher in 1969 than in other cities, with the largest differential in the average hourly wage. These results strongly suggest that a contract with the city is necessary if the union is to have a significant impact on wages.[16]

The effect of the police union variable on fire fighters' hourly wages and annual salaries is negative and often significant. The magnitude of the effect, however, is virtually zero. The negative coefficients may reflect the fact that in many cities police unions have sought to eliminate the traditional parity relationship between police and fire fighter wage scales. To the extent that they are successful, one would expect fire fighters' relative wages to fall, given the existence of excess supplies of applicants to fire departments.[17]

The Effect of City Size

It seems plausible that the impact of the IAFF on the wages of fire fighters will vary inversely with city size, since municipal executives of larger cities can afford to hire professionally trained labor negotiators to help them.[18] Similarly, one would expect the impact of municipal government structure on fire fighters' wages to vary with city size. Mayors or commissioners of larger cities can afford to hire professionally trained administrative assistants; hence, the relative efficiency of the city manager form of government and its ability to hold down fire fighters' wages should be greatest for the small-size classes of cities.

To test these hypotheses, the variants of Equation 7, with d_1 and d_2 constrained to be equal to zero, were reestimated with the data segmented into two groups: one restricted to cities with populations of 25,000–50,000 and the other to cities in the 50,000–250,000

[16] Ashenfelter has suggested to me that rather than estimating the specifications reported in Tables 3 and 4, one should simultaneously estimate these proportionate wage differentials: nonunion—union without contract, and union without contract—union with contract. That is, if one ignores the impact of the municipal government structure variables on the union effects, Equation 7 can be rewritten

$$(7a)\quad \log \bar{w} = a_0 + a_1 g_1 + a_2 g_2 + \sum_{j=1}^{7} \alpha_j \log x_j + e_1 u_1 + e_2 u_1 u_2$$

The nonunion—union with contract proportionate wage differential $(e_1 + e_2)$ can be decomposed into a nonunion—union without contract differential (e_1) and a union without contract—union with contract differential (e_2). My estimation of Equation 7a indicated that almost uniformly e_1 was not statistically significant—that a contract with the city is necessary if the union is to have a significant impact on wages. Consequently, the nonunion—union with contract differentials reported in Tables 4 and 5 are approximately equal to the union without contract—union with contract differentials (e_2). I am indebted to Ashenfelter for suggesting this point to me.

[17] Evidence that police unions have supported movements away from parity is cited by E. Devine, "Manpower Shortages in Local Government Employment," *American Economic Review*, Vol. 59, No. 2 (May 1969), pp. 538–545. Excess supplies of applicants are often rationed by increasing minimum hiring standards; however, these standards may be endogenously determined as functions of fire fighters' wages. See Ehrenberg, "Heterogeneous Labor, Minimum Hiring Standards and Job Vacancies in Public Employment."

[18] An alternative explanation suggested by a referee is that smaller cities may have a greater degree of monopsony power in dealing with public employees. The bilateral monopoly situation that emerges when workers are unionized may then produce larger wage gains in this situation than in the more highly competitive large urban market. It does not appear that the data can differentiate between these competing explanations.

Table 5. The Effects of IAFF Locals with Contracts and of Municipal Government Structure on Fire Fighters' Hourly Wages, Annual Salaries, and Hours of Work, by Size of City, for 1969.

Independent Variables and Extent of Sample	*Dependent Variables* S_1	S_2	S_3	H	W_1	W_2	W_3
Coefficients for presence of IAFF local with contract (u_2)							
(1) Total sample†	.032**	.027	.051*	−.048*	.080*	.075*	.090*
(2) Small cities†	.031	.022	.038	−.074	.105*	.096*	.111*
(3) Large cities†	.015	.020	.041	−.033	.048	.052**	.073*
Coefficients for city manager form of government (g_1)							
(1) Total sample	.053*	.075*	.072*	.088*	−.035	−.013	−.016
(2) Small cities	.069*	.078*	.105*	.080*	−.011	−.002	.025
(3) Large cities	.038	.074*	.038	.095*	−.056	−.020	−.057
Coefficients for commission form of government (g_2)							
(1) Total sample	−.020	−.006	.003	.051	−.071	−.057	−.048
(2) Small cities	.008	−.014	−.022	.041	−.032	−.055	−.063
(3) Large cities	−.067	−.009	−.002	.040	−.108**	−.049	−.043

*Significant at the .05 level, two-tailed test.

**Significant at the .10 level, two-tailed test.

†The coefficients are from estimates of Equation 7 for the specification including u_2 in which row 1 represents the entire sample (quality proxies omitted); row 2 represents cities with populations of 25,000 to 50,000 (quality proxies omitted); and row 3 represents cities with populations of 50,000 to 250,000 (quality proxies omitted).

S_1 = the entrance annual salary for uniformed fire fighters.

S_2 = the maximum nonpromotional annual salary for uniformed fire fighters.

S_3 = the average annual salary for all fire department employees.

H = fire fighters' annual hours of work.

W_1 = the entrance hourly wage for uniformed fire fighters.

W_2 = the maximum nonpromotional hourly wage for uniformed fire fighters.

W_3 = the average hourly wage for all fire department employees.

range. The results are presented in Table 5.[19]

The coefficients for u_2 listed in Table 5 indicate that the impact of the IAFF on annual salaries has not varied across size classes of cities, but the union does appear to have reduced annual hours of work more in small cities (7 percent) than large cities (3 percent). Consequently, its net impact on hourly wages has been larger in the small cities, as expected.

The results for the city manager variable are somewhat contrary to our expectations. For both size classes of cities, fire fighters tend to work more hours and receive higher annual salaries in city manager cities than in mayor-council cities. The increase in hours is greater and the increase in annual salaries is smaller, however, for the larger cities (compare rows 2 and 3). Consequently, although for both size classes hourly wages tend to be slightly lower in

[19] Estimates of the coefficients of d_1 and d_2 were once again never significant. The coefficients of the other variables are qualitatively similar to those reported in Tables 3 and 4 and are omitted for the sake of brevity.

city manager cities than mayor-council cities (at most, 6 percent lower), the advantage of the manager form of government is smaller for the small class of cities. Uniformly, fire fighters appear to work more annual hours and receive lower hourly wages in commission cities than in mayor-council cities. (See Table 5, the last two rows.) These coefficients do not appear to vary with city size and are not, for the most part, statistically significant.

Finally, variants of Equation 7 were reestimated, including as explanatory variables two proxy variables for the average productivity of fire fighters (x_1) —the number of hours of fire ground operational training given recruits and a dummy variable that assumed the value one if the completion of an outside educational course was a requirement for a salary increase, and zero otherwise.[20] These imperfect proxies were excluded from the earlier regressions for reasons cited previously.[21] They were utilized at this point to check if their omission biased the coefficients of the union and city structure variables.

These results need only to be summarized. In all cases, the "quality" variables were significantly and positively related to the fire fighters' annual salary and hourly wage variables, as expected. The coefficients of the union (u_2) and government structure variables, when these variables were included, were, for the most part, quite similar to those reported previously. For cities in the 25,000–50,000 population class, however, the impact of the IAFF on hourly wages rose to between 14 and 18 percent. Furthermore, several of the coefficients of the commission dummy variables became statistically significant.

[20] These variables were derived from data contained in the Boyd Hartley, "Fire Department Training," *Municipal Year Book—1972* (Washington: International City Managers Association, 1972), pp. 145–155. A variable representing the number of hours of classroom training given recruits was virtually perfectly correlated with the former variable and was omitted from the analysis.

[21] See footnote 13.

Conclusions

This study has presented estimates of the impact of both the IAFF and municipal government structure on the salaries, wages, and hours of work of fire fighters in 1969. When the measure of unionization previously considered by Ashenfelter is used, the IAFF is found to have had, on average, virtually no effect on hours or earnings. When a measure is utilized that considers whether the IAFF has a contract with the city, however, the results are markedly different.

In cities with union contracts, hourly wages of fire fighters are, on average, from 2 to 18 percent higher. These increases are divided into a decrease of annual hours of between 2 and 9 percent and an increase in annual earnings from 0 to 9 percent. The average impact of the IAFF on hourly wages appears to be greater in small cities than in large. Furthermore, the impact on average annual (hourly) earnings of fire department employees (the variable used by Ashenfelter) is greater than the impacts on minimum and maximum annual (hourly) salaries of fire fighters. Since the union presumably bargains for salary scales rather than realized average values, this suggests that less faith should be placed in the accuracy of the measured union impact on the average earnings variables and that a positive correlation probably exists between the unionization variable and the seniority structure of fire departments' work

forces. In any case, like Ashenfelter, I found that the IAFF has had only a moderate impact on the *annual earnings* of fire fighters.

City manager cities appear, on average, to have annual fire fighters' salaries that are from 1 to 10 percent higher than salaries in mayor-council cities; however, annual hours of work, ceteris paribus, appear to be from 3 to 11 percent higher in manager cities. As a result, hourly wages of fire fighters in city manager cities are marginally lower than those in mayor-council cities. For cities of between 50,000 and 250,000 in population, this differential appears to be from 3 to 6 percent. These percentages, however, are not statistically significant.

Finally, fire fighters in cities with elected commissioners tend to work, on average, from 4 to 8 percent more hours and have hourly earnings from 2 to 15 percent lower than fire fighters in mayor-council cities. Although many of the relevant coefficient estimates are statistically insignificant again, it does appear that the commission form of government has had some limited success in holding down the cost of fire protection employees.

These results, unfortunately, do not support any unambiguous conclusion concerning the form of municipal government that is best suited to meet the growing financial crisis of the cities. Subject to the qualifications noted earlier in this article,[22] it does appear that hourly wages of fire fighters are marginally lower in city manager and commission cities than in mayor-council cities. The differentials, however, are often not statistically significant and are primarily due to the greater number of hours worked by firemen in these cities. Over time, one would expect these hours differentials to be eroded by competitive pressures generated by nearby cities. Furthermore, fire fighters are unique among municipal employees in that their "work week" is substantially longer and subject to more variability across cities than other groups. Since hours of work vary substantially less for other categories of municipal employees, it is unlikely that the results of this study can be generalized to them. Consequently, a more comprehensive study of the determinants of the wages of various categories of municipal employees is required before definitive statements can be made about the most "efficient" structure of municipal government.

It should be emphasized, in concluding, that in no case did the structure of municipal government appear to have a significant impact on the ability of the IAFF to improve the wages of their members. As a result, for fire fighters, the impacts of the governmental structure and unionization variables seem to be independent of each other. Furthermore, it also appears that relative wage differentials associated with unionization are larger than those associated with the structure of local government.

[22] See footnotes 2 and 9.